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1 EXECUTIVE SUMMARY

1.1 INTRODUCTION

This Addendum report, together with the ESIA draft for disclosure documentation, constitutes the final ESIA submission to the Government for environmental approval. All public concerns raised during the public review and comment process are addressed in this Addendum report, in conformance with Appendix 3, section 3.9 (iii) of the BTC Host Government Agreement. A final Executive Summary is also included with this Addendum report.

The aim of Public Disclosure was to provide an opportunity for all those with an interest in the BTC pipeline to comment on the draft ESIA. Hence, a formal consultation process was conducted which involved the BP project team working alongside the independent environmental and social consultants. This disclosure process was in accordance with international guidelines including International Financial Institution (IFI) requirements, and the national Host Government Agreements (HGAs).

With regard to environmental issues the most significant feedback was associated with the choice of routing the pipeline through the Borjomola valley as it was perceived that, in the unlikely event of an oil spill, the Borjomi mineral water and fresh water resources could be at risk. Frequent concern was associated with the potential volume of spilled oil in this same area. Specific studies have been carried out to address these key concerns and mitigation measures have been added to the actions already proposed. The reports detailing the studies carried out to address these specific concerns as well as others are attached as Appendices to this document.

The most significant feedback from pipeline-affected communities was associated with employment opportunities generated by the project, the land acquisition and compensation process, the Community Investment Programme and the potential for increased access to energy as a result of the pipeline. Other stakeholders also commented on these same social issues in addition to the approach and methodology used, the socio-economic baseline assessment, community relations, the Community Investment Programme, health and safety and management and monitoring programmes. These issues have been addressed in Section 6 of this Addendum.

The following sections of this Executive Summary describe the proposed BTC project, the alternatives considered for the project both at strategic level and at local routing level and the findings of the ESIA with regard to existing environmental conditions, potential impacts and mitigation measures. Within each section, a discussion is included to address the feedback received during the public disclosure period and to document the changes that have been implemented either to the pipeline design or to the proposed mitigation measures, as a result of the feedback.

1.2 BTC PROJECT

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, Agip, TFE, Itochu, Inpex and Delta Hess. In August 2002 the BTC Owners have formed a company called the BTC Pipeline Company (BTC Co) which will be responsible for the construction and operation of the proposed pipeline in both Azerbaijan and Georgia. The construction contract was awarded in July 2002.

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

1.2.1 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 Bosphorus 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.

1.2.2 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:

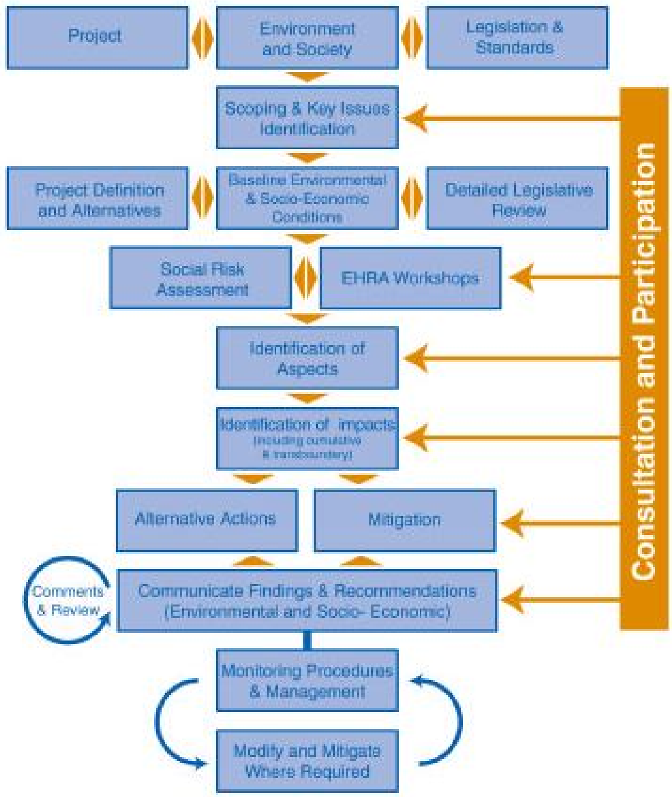
- No combustion emissions
- No loading or offloading emissions
- Zero discharge of oil or chemicals to land or surface waters
- Maximizing efficiency of net energy exported
- Minimizing project footprint (including Right of Way (ROW), temporary facilities and access roads)
- No net damage to protected 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

1.3 ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT

The 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, that positive impacts are maximised, and where possible, negative impacts are eliminated or minimized through early response to the issues. Another key aim is to provide a mechanism for community participation and dissemination of information.

Figure 1-2 The ESIA process

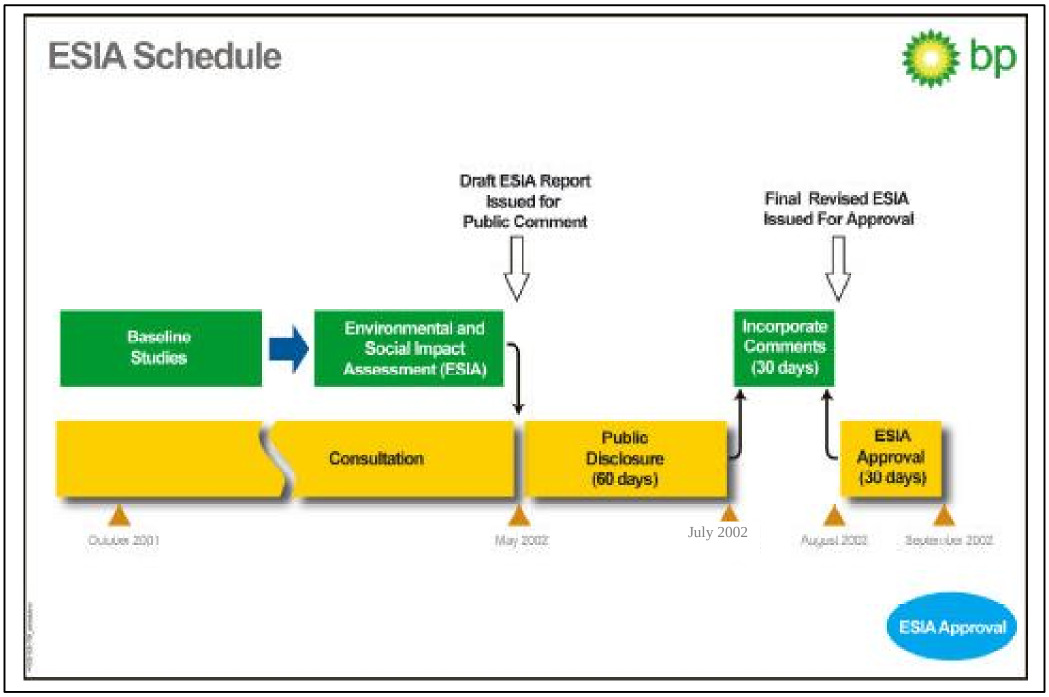


Work started in 2000 on the BTC ESIA in Georgia and the subsequent schedule is shown in Figure 1-3. The ESIA report, which draws together all the findings and recommendations for managing the environmental and social impacts is scheduled for approval in October 2002. Independent international consultants, aided by a number of in-country scientists and experts, have carried out many studies and produced the resulting multi-volume document.

The draft ESIA was released for public disclosure on 30th May 2002 and was made available for public viewing in 13 locations in Tbilisi, and a further 13 locations in the regions. Information about the draft ESIA and the opportunities to comment on it was distributed to every community on the route and through a number of public and community meetings, NGO workshops and meeting with key stakeholders. The Public Disclosure process was widely advertised in Georgia.

This Addendum has been compiled after the disclosure period and summarises the feedback received from interested stakeholders, including the general public. The Addendum also includes the additional studies that have been carried out as a result of concerns or requests from stakeholders and describes the progress made with regard to the project design since disclosure of the draft ESIA. The findings of the overall impact assessment are also summarised in this document to reflect any changes resulting from the consultation process mentioned above.

Figure 1-3 ESIA schedule for BTC in Georgia



1.3.1 Public consultation

Consultation has formed an integral part of the ESIA process. From the outset, BTC Co have sought to develop a basis of mutual respect and understanding with stakeholders with a view to establishing good, long-term relationships.

There has been regular dialogue with potentially affected communities and individuals along the route, as well as with other key stakeholders, including the Georgian regulators, the scientific community, the World Bank and international and national non-governmental organizations (NGOs).

This close liaison has allowed us to accurately identify the real issues of concern, as well as the socio-economic and environmental issues on the ground. As a result, the most appropriate mitigation measures have been developed. Ongoing dialogue throughout the lifetime of the project will contribute towards the early identification of issues and appropriate discussion of proposed mitigation measures.

1.3.2 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.

1.4 PROJECT ALTERNATIVES

1.4.1 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.

1.4.2 Routing alternatives

General

The AGT Pipelines, comprising the 42" South Caucasus Pipeline (SCP) gas and the 46" Baku-Tbilisi-Ceyhan (BTC) oil pipelines, will pass through Georgia between the borders with Azerbaijan and Turkey.

The selection of the route for the AGT Pipelines was carried out in accordance in five stages and in full compliance with the requirements of the Georgian Host Government Agreements (HGA).

Route selection methodology

The route selection process has taken account of all relevant factors, including environmental and social issues, terrain evaluation and geohazard assessment, constructability and long-term integrity, security, health and safety. This has enabled the project to select a pipeline route through Georgia that, on the whole, achieves the following goals:

- Sensitive environmental locations have been avoided
- Most known archaeological and cultural heritage sites have been avoided
- Main areas of population density have been avoided (no resettlement is required)
- High-risk geohazard locations have been avoided. Where it has not been possible to avoid geohazards, specific design solutions have been developed
- Pipeline alignment has been optimised to facilitate construction of major crossings, minimise land take and maximise reinstatement potential
- Security-sensitive areas have been avoided
- A pipeline route that will facilitate safe construction without injury to people

Throughout the development of the route, the primary objective has been to re-route and avoid sensitive areas. However, where this has not been possible, mitigation measures will be put into practice to reduce overall residual impacts.

The AGT pipelines will be installed in a single construction corridor – the FCI-ROW – which is normally 44 metres wide. Reductions in this width to either 34m or 24m are used where topographical, environmental or other considerations dictate.

Stage 0 – Identify alternative export options

Options for the export of oil and gas from the Caspian Sea to markets in the West were identified and evaluated. They included road, rail and shipping but were discounted in the early stages of project development in favour of two new pipelines through Georgia to Turkey due to a combination of factors such as increased environmental risk and impact, social impact, logistics, safety and economics. Export options included routes via Iran, Georgia, the Black Sea plus the use of existing pipelines through Georgia and Russia.

The next step was to review all potential pipeline corridors through Georgia and select preferred alternatives for more detailed assessment. First of all, the border crossing locations with Azerbaijan and Turkey were agreed. A shortlist of three potential pipeline corridors was identified, known as the Eastern, Central and Western Corridors. These three routes took account of major constraints such as mountain ranges, protected areas and opportunities such as more gentle terrain and/or existing pipeline corridors. Topography and terrain were two of the leading factors in the selection of the three 10km wide corridors between the agreed Georgian entry and exit points.

Stage 1 – 10km Corridor of Interest

The three Corridors of Interest identified during Stage 0 were supplemented at the start of Stage 1 with a fourth one – the Modified Central Corridor. This followed a security assessment, which recommended that preference should be given to routes avoiding close proximity to Russian Federation military bases. The four 10km corridors evaluated during Stage 1 are shown below in Figure 1-5.

Figure 1-5 10km Corridors of Interest

The evaluation of the corridors aimed to minimise environmental and social impacts and to balance the requirements of the operator to ensure that construction and schedule were considered in conjunction with the long-term integrity of the pipeline system. Specialist and multidisciplinary teams examined all relevant aspects such as terrain and geohazards, environmental and social impact, security, constructability, reinstatement and long-term integrity. This was carried out initially using desktop studies and followed by a series of field visits. The key results and conclusions of the evaluations were:

- The Western Corridor was rejected due to length, difficult terrain, severe environmental constraints and adverse social impact

- The Eastern Corridor was rejected on security grounds as it passed through areas associated with Russian Federation military activities. However, the Eastern Corridor was acceptable from an environmental viewpoint and, in fact, is the shortest overall route. Engineering and construction issues are generally easier than the other routes but supporting logistics for construction and long-term accessibility are seen to be inadequate

- The Central Corridor was acceptable from environmental and social viewpoints but constructability, and safety issues counted heavily against this route. The corridor was subsequently rejected for similar security reasons to the Eastern Corridor

- The Modified Central Corridor is the preferred route and is acceptable from all viewpoints. It was noted, however, that a number of specific issues needed to be addressed during the subsequent stages of the route selection process

Stage 2 – 500m Preferred Route Corridor

The objective of this stage was to develop the 10km Modified Central Corridor selected during Stage 1 and undertake further refinement work to enable selection of the 500m wide Preferred Route Corridor, premised on the centreline of the 10km corridor. The work involved a number of inter-related desktop studies followed by a series of field trips and route walks as well as the preparation of an environmental and social baseline.

The routing of the 500m wide corridor aims to avoid the main environmental and social constraints identified during Stage 1, whilst at the same time identifying the major technical and construction-related issues. A number of significant route alternatives were evaluated at sensitive locations along the route, including:

- Azerbaijan border to Marneuli
- Lake Tsalka area
- Kizil-Kilisa to Tabatskuri / Ktsia Tabatskuri area
- Tskhratskaro and Tsikhisjvari area
- Outside Ktsia Tabatskuri Reserve
- Mtkvari River to Turkish border

In all cases, acceptable 500m wide corridors were identified that all lay within the boundaries of the 10km Corridor of Interest.

Stage 3 – 100m Specified Corridor

The objective of this stage was to confirm the validity of the chosen 500m corridor and to undertake further refinement work to hone the corridor width to 100 metres, whilst avoiding environmentally and socially sensitive locations and terrain-related geohazards wherever possible by re-routing. If unavoidable, engineering design and/or specific mitigation measures would be employed. The route was developed to ensure that both the SCP and BTC pipelines could be safely constructed within the selected 100m wide corridor.

The route refinement process involved a desktop assessment of the work done to date, followed by a further series of field reconnaissance and site investigation trips including a detailed geotechnical assessment.

The main result of Stage 3 was an acceptable 100m specified corridor and the identification of the main construction-related issues and necessary mitigation measures.

Re-route evaluations

During the course of the Stage 2 and 3 work, it became apparent that additional re-routing investigation was required in several areas. Typically, these investigations were carried out as separate exercises to the main route selection but the results were all used as part of the input data for the selection of the final alignment of the two pipelines.

The main re-routes evaluated were:

- Rustavi. This was initiated by having to pass around an area subject to future strategic military plans;

- Bakuriani/Tsikhisjvari area. Extensive efforts were made to avoid this area due to the high value landscapes and sensitive water. Severe terrain to the north and the south, and security-related issues to the south, eliminated the potential for an alternative to the selected route.

  A detailed assessment was carried out by specialist consultants to better understand the impact of the pipelines on the hydrogeological regime. This assessment concluded that the only contamination occurring in the event of an oil spill would be to local surface water and any commercial ground water aquifers will be unaffected.

- Bakuriani and Tabatskuri. This was initiated by the base case route passing through two environmentally and socially sensitive areas. An alternative preferred route was identified and adopted.

- West of Tabatskuri. GIOC proposed an alternative route to the south of the base case route and an alternative 'northern' option was also evaluated; although the result was to stay with the selected route.

Stage 4 – SCP and BTC centreline alignment

The final alignment for the two pipelines is selected within the 44m wide FCI-Row and route alignment sheets are prepared for both lines. This activity is currently ongoing with final issue of route alignment sheets planned for September/October 2002.

1.5 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.

1.5.1 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, 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.

1.5.2 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.

1.5.3 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 initia l 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.

1.5.4 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 BTC are important continuing activities. A system of regular inspection and maintenance will be established for the pipeline and its ancillary equipment.

1.5.5 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.

1.6 ESIA 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.

The draft ESIA was disclosed to the public in May 2002 and was available for 60 days for public comments. The comments have been processed, analysed and addressed in this Addendum document.

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.

1.7 BASELINE

1.7.1 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.

1.7.1.1 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

Consultation feedback

Additional detail was requested from interested stakeholders on a number of sites, already included in the draft ESIA baseline. In particular, the wetlands of Narianis Veli and Mt. Tavkvetili, Bedeni Plateau and the forests between Thratskharo and Tiseli were the subject of the stakeholders interest. Additional studies have been carried out in Narianis Veli, Tavkvetili and a forestry assessment has been carried out in all forest areas occurring along the proposed ROW. Details of these further studies are included in the Addendum.

In some instances the areas of interest to some stakeholders were not within the area of influence of the proposed construction activities and in these cases the actual location of the sites in relation to the pipeline has been highlighted to document why the site(s) were not included in the detailed environmental assessment.

1.7.1.2 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.

Consultation feedback

Significant interest and in some instances concern, has been raised by various stakeholders in relation to the proximity of the pipeline route to two major groundwater resource areas: Borjomi and Tsalka.

Extensive additional studies have been carried out in the Borjomi area to evaluate the characteristics of the mineral water deposits and the freshwater deposits that occur in juvenile volcanic lava formations and ascertain the risk associated with an oil spill. The findings of these additional studies are enclosed in Appendix 1.

No additional work was deemed necessary in Tsalka as the hydrogeological characteristics of the area are sufficiently well known to enable a detailed risk assessment.

1.7.1.3 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 volcano-clastic 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.

1.7.1.4 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 generally 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). The landscape value is generally higher in the central and western part of the route because of the high terrain elevation and the absence of man made structures.

1.7.1.5 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.

1.7.1.6 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.

1.7.1.7 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.

1.7.1.8 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.

1.7.1.9 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.

1.7.1.10 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.

1.7.1.11 Soil

The types of soils which are present along the proposed route 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.

Consultation feedback

The quality of the data contained in the soil section of the draft ESIA has been criticised by several stakeholders. The main criticism concerned the level of detail associated with the soil descriptions and with the nomenclature used to describe the soils.

Soil characteristics are important in the context of an environmental assessment as they provide an indication of the erosion risk associated with sections of the pipeline and therefore emphasis was placed in the ESIA to identify such areas of very high and high erosion risk. Additional detail on soils distribution and properties provides no added value to an environmental impact assessment and therefore a more detailed characterisation has not been considered necessary. In addition, soil quality, characteristics and depth will be logged during construction of the pipeline to ensure that the overall soil quality and susceptibility to erosion is not adversely impacted by the proposed project.

1.7.2 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 2km 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 during 2001.

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, 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, with 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 Tetritskaro 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 income comes from wages, rather than from selling agricultural products, as wages are so much higher, when present, than income earned in this way. Only 3% of people interviewed reported to being employed in the private sector.

Consultation feedback

The scope of the data contained in the socio-economic baseline was criticised by a number of stakeholders during disclosure. Concerns were expressed over the accuracy and completeness of some of the data presented and requests were made for additional analysis. Additional data has been collected and analysis carried out, where appropriate, and the results are included in this Addendum.

1.7.3 Attitudes to the BTC project

People are generally optimistic that the construction and operation will bring both direct and indirect benefits to the communities. 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.

1.8 IMPACTS AND MITIGATION

1.8.1 Environmental impacts and mitigation

The project approach has been to select the route and design 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 them. Impacts were therefore 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.

1.8.1.1 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)
		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

Project Activities / Environmental Aspects	Environmental Receptor and Potential Impact	Proposed Mitigation Measures
		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 and operation of 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	Environmental 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

1.8.1.2 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

1.8.2 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	Environmen-tal 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

1.8.2.1 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 behaviour 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 in the Borjomi and Tsalka region. Several additional studies have however been carried out in the

Borjomi area as a result of the feedback received from interested stakeholders. The studies have showed that the risk of contamination of either the deep mineral water deposits or the superficial groundwater in the lava (Sadgeri or Daba springs) is not existent.

Additional mitigation measures to protect the surface waters have however been evaluated and are documented in a report attached as Appendix 6.

These include:

- Removal of intermediate pigging station from Borjomola catchment
- Establishment of permanent oil interception and recovery facilities
- Permanent presence of oil response crew in the Tsikisjvari area
- Increased patrols frequency
- Community awareness and involvement

1.8.3 Socio-economic impacts and mitigation

The table below summarises the social impacts and mitigation measures. The majority of social impacts will occur 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

Aspect/ Issue	Impact	Mitigation Measures
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 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

Aspect/ Issue	Impact	Mitigation Measures
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.

1.9 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.

1.10 MANAGEMENT AND MONITORING

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

1.11 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.

1.11.1 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.

1.11.1.1 Construction

Landscape impacts

High ranking landscape impacts due 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
- 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 Managed 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.

1.11.1.2 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.

1.11.1.3 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.

1.11.2 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 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

[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.

- 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.

1.11.2.1 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 expect 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.

1.11.2.2 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.

INTRODUCTION

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2 INTRODUCTION

This Addendum addresses comments received during the Public Disclosure of the draft Baku-Tbilisi-Ceyhan Pipeline Environment and Social Impact Assessment (BTC ESIA). The BTC ESIA Draft for Disclosure was issued on 30th May 2002 for a 60 day Public Disclosure period.

The aim of this Public Disclosure was to provide an opportunity for all those with an interest in the BTC pipeline to comment on the draft ESIA. Within this disclosure period, a formal consultation process was conducted which involved the BP project team working alongside the independent environmental and social consultants. This disclosure process is in accordance with international guidelines including International Financial Institution (IFI) requirements, and meets the requirements of the national Host Government Agreements (HGAs).

This Addendum report, together with the ESIA draft for disclosure documentation, constitutes the final ESIA submission to the Government for environmental approval. All public concerns raised during the public review and comment process are addressed in this Addendum report, in conformance with Appendix 3, section 3.9 (iii) of the BTC Host Government Agreement. A final Executive Summary is also included with this Addendum report.

Details of the disclosure process together with collection and analysis of the comments received are discussed in Section 2.1 below and in Appendix 5 of this report. Section 3 of this Addendum describes the Project Alternatives and focuses on the route selection process, the alternative routes evaluated and the justification for the proposed pipeline alignment. Section 4 addresses developments to the Project Description, which have taken place since the ESIA draft for disclosure was issued. Sections 5 and 6 address comments received on environmental and social issues respectively, Section 7 Cumulative Impacts and Section 8 Management and Monitoring. Section 9 is an overall project assessment based on the draft ESIA, the subsequent feedback and the analyses that has been incorporated.

2.1 PUBLIC DISCLOSURE PROCESS

Following the publication of an ESIA Draft for Disclosure on 30th May 2002, a public disclosure period of 60 days has taken place in accordance with international EIA standards, IFI requirements and the HGA. Full details of the Public Disclosure process are given in Appendix 5 of this report.

Approximately 27,500 ESIA related documents were distributed during the Public Disclosure period. The availability of disclosure documents was widely advertised on television and in newspapers.

The main events through which project information was communicated to the public and key stakeholders were as follows:

- distribution of disclosure documentation
  - public deposit in cities and towns
  - communities along the route
  - key stakeholders
- public meetings
  - pre-disclosure meetings

- workshops
- Road Show community meetings
- meetings with government and other key stakeholders

The sections below describe each of these components and give details of the process of collecting and responding to the feedback and comments received.

2.1.1 Distribution of disclosure documentation

2.1.1.1 Public deposit

Disclosure documentation was displayed at a total of 13 locations in Tbilisi and a further 13 locations in the regions. These locations are listed below:

Tbilisi

- BP office
- Georgian International Oil Corporation (GIOC) office
- Ministry of the Environment and Natural Resources Protection (MOE) office
- Tbilisi State University (library and reading hall)
- National Library
- Academy of Sciences library
- State Pedagogical University
- Georgian Technical University
- Horizonti Foundation library
- United Nations Development Programme library
- Eurasia Foundation office
- Georgia Greens Movement office
- The Regional Environmental Centre for the Caucasus office

Regions

- District Governors office in Gardabani, Marneuli, Tetritskaro, Tsalka, Borjomi and Akhaltsikhe
- Land Management Department in Rustavi
- Towns close to a port or railway that would experience high construction activity, specifically Poti (Mayor's office), Samtredia (Governors office), Khashuri (Central library)
- Two Regional Ministry of Environment and Natural Resources Departments in Kvemo Kartli (Rustavi) and Samtskhe-Javakheti (Akhaltsikhe), and Ministry of Environment and Natural Resources Protection of Autonomic Republic of Ajara (Batumi)

Each display consisted of full copies of the draft ESIA (including appendices) for viewing only, as well as Non-Technical Executive Summaries (NTES) and Community Pamphlets, which were available to take away. Posters described the disclosure process, opportunities to comment, and the dates and locations of public meetings. Feedback forms were available next to a feedback form collection box at every location. All documentation was available in Georgian and Russian. English copies were available where appropriate or if specifically requested. CDs of the full ESIA were distributed to those locations that were able to allow public computer access for viewing.

The location of documents on public deposit was publicised through a total of 10 television adverts on two channels and 20 newspaper adverts were placed in four national and a number of regional newspapers. Every display was visited once during and at the end of disclosure to collect feedback forms and deposit additional documents.

2.1.1.2 Community information

Community pamphlets and NTES were distributed to all project-affected communities in the language they requested. Posters advertising the date, location and transport arrangements to the Road Show and public meetings were placed in at least two prominent locations in each village.

In addition, further copies of the community pamphlets and NTES were left with the Gamgebeli (or appropriate person) for distribution. The Gamgebeli was requested to help publicise the Road Show community meetings and the travel arrangements to those meetings and was given additional posters to display around the community. Where a single Gamgebeli is responsible for more than one village, another appropriate person was also identified, such as a teacher or shopkeeper. The Gamgebeli was also requested to set up a collection point for feedback forms.

Again, every community was visited during and at the end of disclosure to collect feedback forms and distribute additional documents.

2.1.1.3 Key stakeholders

Disclosure documentation was delivered to all stakeholder organisations that had been consulted during the development of the ESIA within Georgia (a total of 78) in the appropriate language. In addition, disclosure documentation for Georgia, Turkey and Azerbaijan was distributed to seven international NGOs.

2.1.1.4 Website

The full ESIA, with relevant appendices and the NTES were posted in English on the internet web site: www.caspiandevelopmentandexport.com

2.1.2 Disclosure meetings

In June and July, a series of meetings were convened in order to introduce the details of the potential environmental and social impacts, present the proposed mitigation measures and solicit feedback from the Georgian government, NGOs, academics and other interested experts, as well as from the general public. These meetings are summarised below.

Pre-disclosure meetings were held with regional and district authorities and village leaders with the aim of providing information about the coming disclosure and community meetings, requesting help in informing communities of the opportunities to give feedback and requesting assistance in the collection of feedback forms.

Two half day **workshops** were held on 10th and 11th June for invited international and national NGOs, donors and academics, one focusing on social impacts and mitigation measures and the other on environment. Representatives of 33 organisations attended the social workshop and 34 organisations the environment workshop.

The general public were invited to attend any or all of three half day **public meetings** through a total of six television adverts and 11 newspaper adverts. Presentations were made and questions from the audience were answered by a panel of BP representatives and the independent ESIA consultants. The following meetings were held:

- 2nd July - Rustavi Dramatic Theatre, Rustavi, approximately 600 attendees
- 4th July - Rustaveli State Theatre, Tbilisi, approximately 200 attendees
- 6th July - Resort Club Complex, Likani, near Borjomi, approximately 150 attendees

Road show community meetings were held in ten villages along the pipeline route. Each meeting consisted of an introductory period where people could view the display boards and disclosure documentation, followed by brief presentations from BP representatives and ESIA consultants and a question and answer session. On average, approximately 120 people attended each meeting. Road Show meetings were held in the following locations:

- Vale
- Akhaltsikhe
- Atskuri
- Tsikhisjvari
- Kizil-Kilisa
- Beshtasheni
- Tetritskaro
- Daget Hachin
- Akhtagla
- Nazarlo

The 10 villages selected covered a wide geographical area and a range of ethnic groups, as well as being accessible from surrounding communities and having a suitable venue for a public meeting. In order to ensure all those who wished to attend a meeting were able to, buses collected participants from pre-arranged points at an advertised time in every project-affected community and delivered them to the nearest Road Show meeting.

A special visit was made to Tabatskuri due to its isolation and the inability of community members to access the other road show meetings.

The Road Show Community meetings were advertised through posters, through Gamgebelis and on two television adverts, five national and 11 regional newspaper adverts.

Representatives of BP and the ESIA consultants were available to **meet government regulators and other key stakeholders** periodically during the disclosure process to discuss specific impacts and mitigation measures proposed in the ESIAs.

A **workshop** was held for **international NGOs** in London on 12th July, covering issues raised by the draft ESIAs in Georgia, Turkey and Azerbaijan.

Figure 2-1 Nazarlo Road Show community meeting, 29th June

2.1.3 Collection and incorporation of feedback

2.1.3.1 Collection of feedback

The opportunities to give feedback are summarised below:

- **Feedback forms** were inserted into every NTES and community pamphlet and could be posted to BP or left in a feedback form collection box. Collection boxes were located in every community along the route, in every location at which the ESIA was on deposit in Tbilisi and the regions and available at every public meeting and Road Show meeting. Feedback form boxes were emptied once during and once at the end of the disclosure period

- **Comments and concerns were recorded** at public meetings, Road Show meetings and the NGO workshops

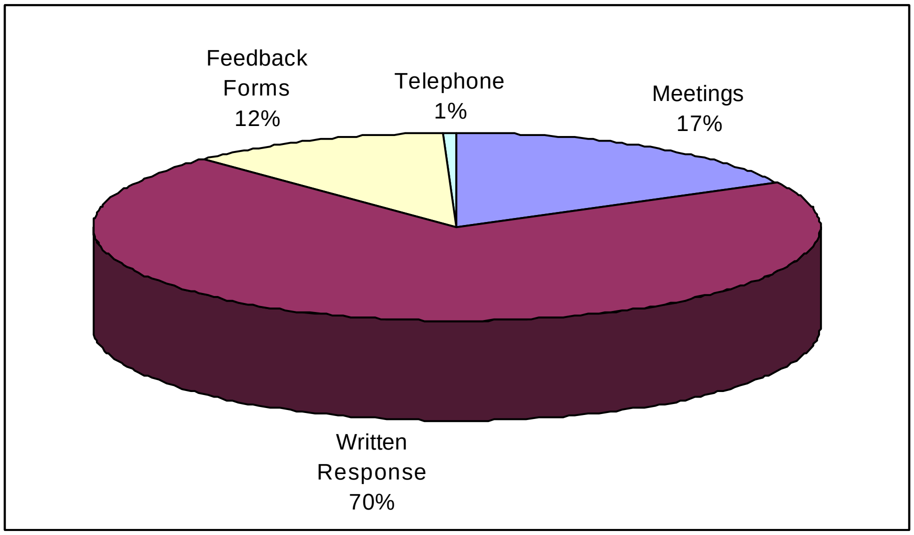
- A **telephone help line** for information requests and comments has been open throughout the disclosure period in order to answer general queries about the disclosure process and record feedback. The number was advertised on television, in newspapers and in disclosure documentation

- Comments were submitted via the **web site**

In addition, formal written responses to the draft ESIA were received from a number of organisations, including Georgian International Oil Corporation, Ministry of Environment and Protection of Natural Resources, Academy of Sciences, World Bank Environmental Consortium (BEICIP – Franlab, IFP, Econ, Royal Haskoning), ESIA Dutch Commission, and 12 NGOs or groups of NGOs. BTC Co acknowledges and appreciates the effort that went into producing these detailed reports.

Figure 2-2 below presents a breakdown of the route by which comments were received.

Figure 2-2 Route by which comments were received



2.1.3.2 Incorporation of feedback

Comments from all sources have been collated into a single disclosure database, which the environmental and social consultants have analysed and used to prepare this Addendum. This database covers both BTC and SCP disclosure, as in general feedback was received that related to both pipeline projects.

Every comment was given a unique identification number. Comments on similar issues were given the same code. For example, the comment presented in Figure 2-3 below is coded as 'Access to Energy'.

Where extensive reports or letters were received from a stakeholder, they have been broken down into individual comments and coded appropriately in the database. Responses have therefore not been provided to these reports as a whole, but rather to the individual issues.

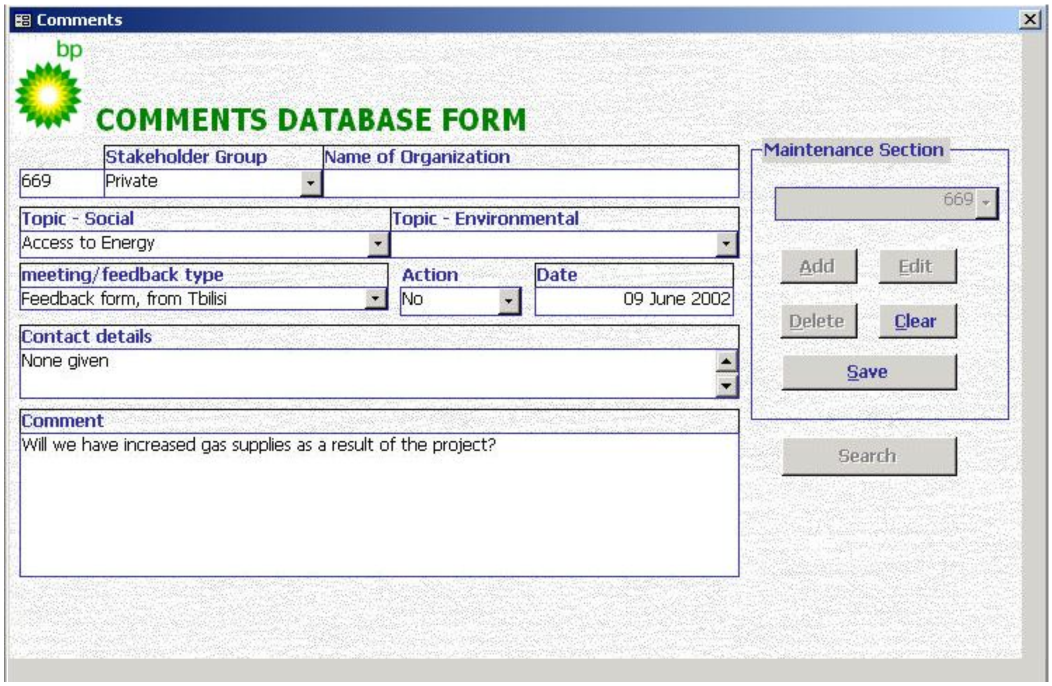
The database recorded the following information:

- Unique comment identification number
- Date comment received
- Source of comment by principal stakeholder group

- Code (either social or environmental)
- District from which the comment was received
- Organisation (if recorded)
- Name (if recorded)
- Method for giving feedback (eg meeting, feedback form, etc)
- Comment or summary of comment

A sample comment shown in Figure 2-3 below.

Figure 2-3 Sample comment from database



Once all comments had been entered into the database, they were sorted according to the codes assigned. These searches were used to prepare consolidated summaries of the feedback on each issue. It is these 'issue summaries', together with the responses, that make up this Addendum.

Each issue summary is formatted in the same way (see Figure 2-4 below) and includes references to the main section of the draft ESIA and a list of the unique comment numbers that are addressed in that issue summary. Appendix 7 of this report lists every unique comment number, the source of the comment and the environment or social code it was given. Using Appendix 7, individuals can trace their own comments from the database to the issue summary and corresponding response.

Figure 2-4 Template Issue Summary

1.1.1 Issue: [Issue Title]

Description of Issue [Consolidated summary of feedback received on this issue]
Issue Drawn from Comments: [List of unique comment numbers addressed in this issue summary. In combination with Appendix 7, this list allows individuals to easily find the response to their specific comments]
Issue Relates to Following Sections of draft ESIA: [Reference to relevant sections of draft ESIA]

Response To Issue

[Detailed response to the feedback received on this issue]

2.1.3.3 Analysis of feedback

By 5th August, 3,187 comments had been received and were subsequently entered and coded in the database. Of these comments, 41% related to environmental issues, 40% to social or socio-economic issues, 6% covered both social and environmental topics and 13% were related to details of the project description.

Figure 2-5 and Figure 2-6 overleaf present a breakdown of the comments received on environmental and social issues respectively. The following sections of this report are based on these categories. A summary of the database is given in Appendix 7 to this Addendum.

Figure 2-5 Breakdown of social comments received

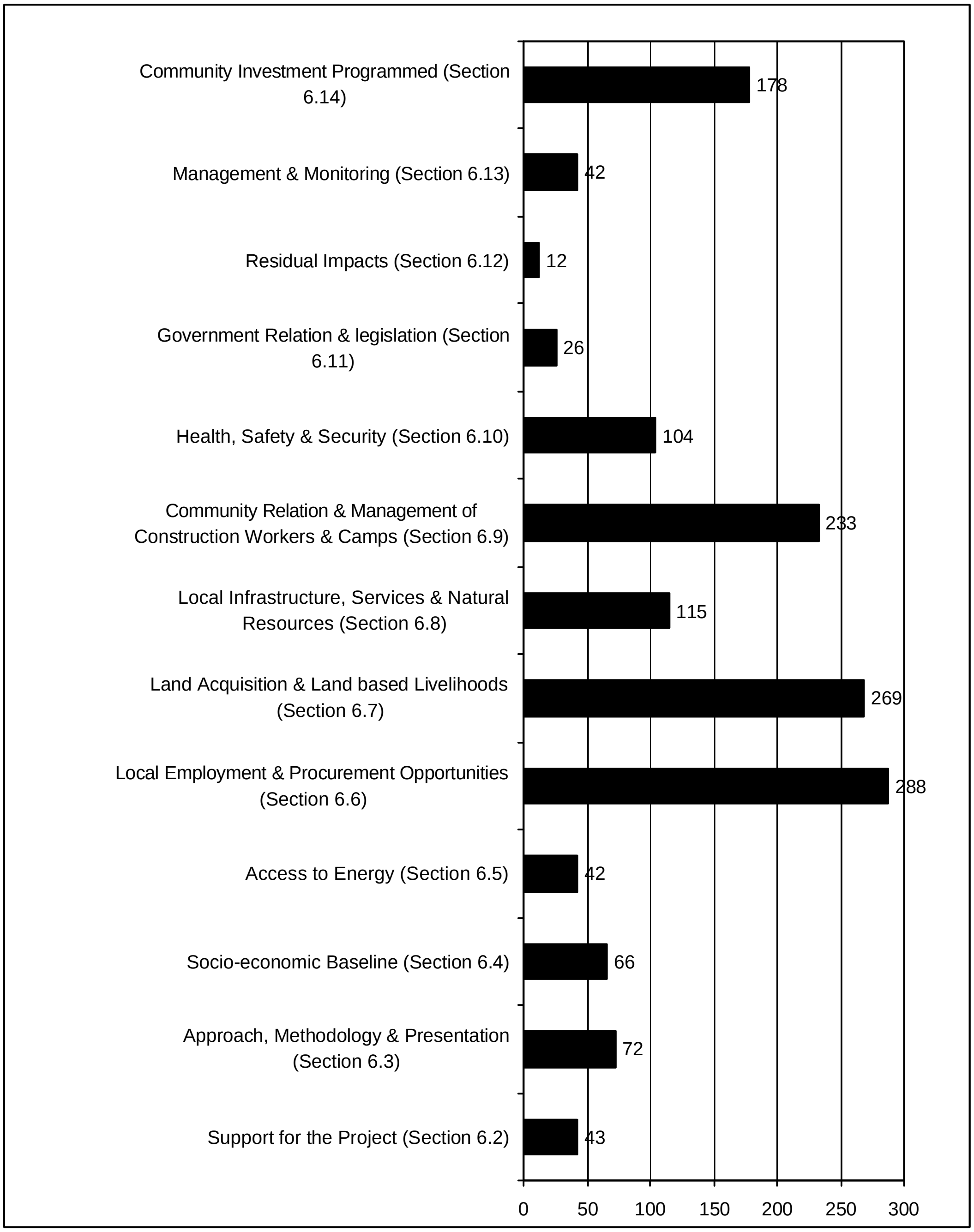
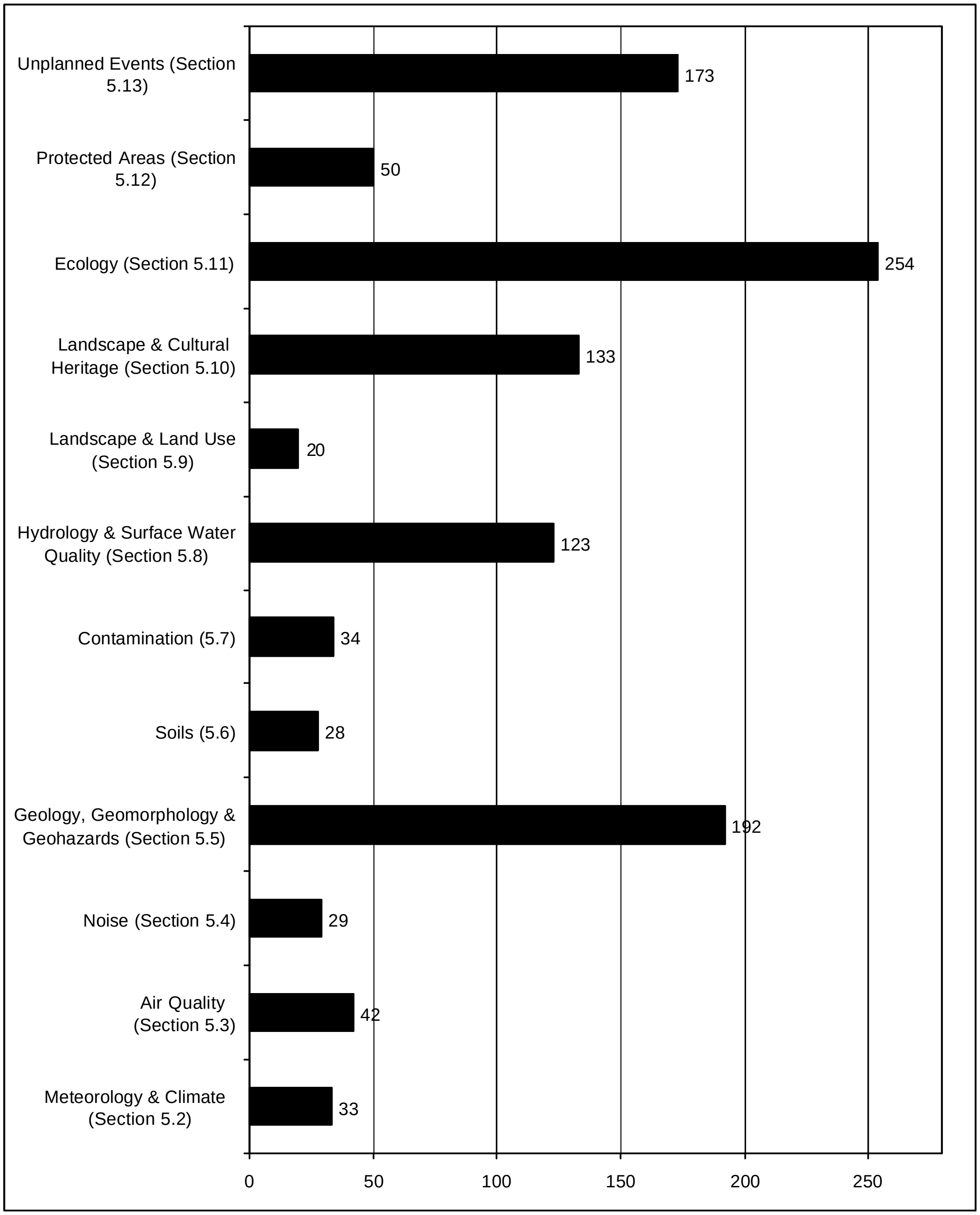


Figure 2-6 Breakdown of environment comments received



PROJECT ALTERNATIVES

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FIGURES

3 PROJECT ALTERNATIVES

Issue : Routing and Technical Alternatives	**Issue Reference Number**: ENG1

Description of Issue :

Additional information has been requested to detail the approach and methodology adopted, as detailed below:

- Justification of the environmental, geohazard, cultural heritage and social evaluation process for the three 10km corridors selected and the 500m route selection is required. Specify which institutions were consulted in this process.
- The recommendations of the Dutch EIA commission on scoping and alternatives issued 8/6/2001 should be used as a reference document for route selection. Reference the reports mentioned in Section 4.
- Route refinement process for 500 m corridor: Explain why there are only "six key areas where a significant number of corridor options were evaluated", as a mathematical method coupled with GIS could have produced and scored infinite options all along the corridor.
- Clarify why the 100 m corridor selection has been carried out only within certain areas.
- Clarify whether the construction corridor is by default supposed to align with the 100 m centre line.
- More optimisation is required of 100m route, if necessary going outside of the preferred corridor for the most sensitive areas: Tskhratskaro; Sakire, in particular the Borjomi area, representing an environment of high value and that the geohazards e.g. Kodiana pass; Mt. Taukvetili; Tertriskaro South to Bedini Plateau; and Tsalka Ridge areas.
- Consider re-routes at Borjomi and Tsalka
- Provide baseline biodiversity information for ROW alternatives within sensitive areas.
- Explain how the Alkhalkalaki military facilities would raise security concerns.
- Security issues are not well justified in the ESIA therefore details of the BP security report would be useful in understanding this issue. Option C for KP0-50 is chosen on security terms. Has the security concern been quantified in a report? Inadequately explained security concerns may have led to early disregard of other route options for KP175-195.
- We would not agree with the idea that there is no alternative to laying the oil pipeline in Tskhratskaro and Tsikhisjvari territory. It is not clear why it is dangerous to construct the pipeline on the administrative territory of Akhalkalaki. The Evaluation provides an argument, concerning location of Russian Military troops, which is very unconvincing and weak, since based on the bilateral agreement Russian troops will leave territory of Georgia in the nearest future. If the case concerns local Armenian population, then why doesn't the route of the pipeline avoid Akhaltsikhe territory, also inhabited by Armenians?
- Information on alternative routes given in ESIA for some of the most sensitive sites, such as Tskhratskaro -Sakire section and Tsalka section could not be considered as satisfactory. It is obligatory to consider in more detail technical and environmental risks, possible mitigation measures for harmful impacts, residual impacts and cost-

benefit analysis. For example why is destroying several summer houses considered a 'grave social impact' while cutting down additional tress is acceptable. Please also explain why the route was rerouted on the territory of Villlage Arali, in particular next to the state border.

- The 'no project' option, as well as the alternatives of routing and designing of different components of the pipeline is quite schematic, and does not assess the implementation of alternatives.

Issue Drawn from Comments: 56, 122, 340; 348; 519; 677, 771; 772; 773; 775; 782; 784; 785; 786; 1553, 1563, 1726; 1728; 1729; 1730; 1731; 1732; 1733; 1734; 1735; 1736; 1737; 1742, 1832, 1833, 1834; 1835, 1874, 1875, 1876, 1878, 1909, 1910, 1920, 1921, 1922, 1925, 1926, 1927, 1934, 1936, 1937, 1938, 1940, 1998a 1999; 2000; 2001; 2002; 2003, 2004, 2087; 2089; 2096; 2128; 2149; 2186, 2187, 2227, 2228, 2230, 2439; 2440; 2462, 3088, 3140, 3162

Issue Relates to Following Sections of ESIA: Section 4.5

3.1 INTRODUCTION

The AGT Pipelines, comprising the 42" South Caucasus Pipeline (SCP) gas and the 46" Baku-Tbilisi-Ceyhan (BTC) oil pipelines, will pass through Georgia between the borders with Azerbaijan and Turkey.

The selection of the route for the AGT Pipelines was carried out in accordance with the requirements of the Georgian Host Government Agreements (HGA). The BTC and SCP HGAs detail three steps in the route selection process, as follows:

Step 1: Corridor Of Interest
Step 2: Preferred Route Corridor
Step 3: Specified Corridor
Step 4: Construction Corridor

For completeness, the total route selection process for the two pipelines within the AGT Pipelines Project was undertaken in five stages:

Table 3.1 Route selection stages

Stage No.	Description	Comment
0	Identify and assess alternative export options	Pre-design definition of candidate routes
1	10km Corridor of Interest	Corresponds to HGA Step 1
2	Route refinement (500m Preferred Route Corridor)	Corresponds to HGA Step 2
3	Route refinement (100m Specified Corridor)	Corresponds to HGA Step 3
4	Centreline Alignment (44m Construction Corridor)*	Corresponds to HGA Step 4; Contractual definition of alignments, post-route selection * 22m BTC, 36m SCP, 44m combined ROW

This technical note describes the rationale behind the route adopted and the processes undergone to achieve a successful route selection. This report was prepared by BP based upon numerous studies, reports and information as well as specific contributions by the engineering consultancy WS Atkins.

For the purposes of this document, the gas transmission pipeline is referred to as the South Caucasus Pipeline (SCP), otherwise known as the Shah Deniz Midstream Pipeline.

Appendix 8 of this Addendum contains an overview of the main activities and processes involved in constructing a large diameter onshore pipeline. This is intended to assist in understanding one of the major factors that influence the selection of a pipeline route – namely the ability to construct the pipeline itself.

3.2 ROUTE SELECTION METHODOLOGY

3.2.1 Basic principles

The correct selection of a pipeline route requires the implementation of a rigorous, and robust process that takes account of all the relevant factors. These factors include:

- Environmental and social issues – including flora, fauna, hydrogeology, landscape, livelihoods, cultural heritage, protected areas, reinstatement potential and requirements, land use, places of habitation
- Terrain evaluation and geohazard assessment – including seismic faults, landslides, slope stability and rivers
- Constructability and long-term integrity – including access and logistics assessments, reinstatement, river, gorge and gully crossings
- Security – including terrorism, sabotage, civil unrest
- Safety and health – to ensure the safety of construction works and long-term safe operation

Wherever possible, the route selection process will identify the least sensitive route from an environmental and social impact point of view given the fundamental constraints associated with terrain and long-term integrity of the pipeline.

For this project the primary mitigation, in terms of environmental and social impact of the pipelines during construction and operation, has been to avoid sensitive areas by re-routing the corridor. Implementation of this philosophy has resulted in successful achievement of the following goals to a very large degree:

- Sensitive environmental locations have been avoided
- Most known cultural monuments have been avoided
- Main areas of population density have been avoided (no resettlement is required)
- High-risk geohazard locations have been avoided. Where it has not been possible to avoid geohazards, specific design solutions have been developed
- Pipeline alignment has been optimised to facilitate construction of major crossings, minimise land take and maximise reinstatement potential
- Security-sensitive areas have been avoided
- A pipeline route that will facilitate safe construction without injury to people

Where necessary, additional mitigation measures have been developed to reduce overall residual impacts and these will be put into practice as part of the pipeline construction.

3.2.2 FCI-ROW

The AGT pipelines will be installed in a single construction corridor, known as the facilities construction installation right-of-way (FCI-ROW). The FCI-ROW is normally 44 metres wide with the two pipelines installed 28 metres apart – each one being 14 metres either side of the centreline of the corridor. Each pipeline (BTC and SCP) has a 32 metre right of way (ROW) for construction purposes (see Figure 3.2).

Where topographical, environmental or other constraints dictated, the FCI-ROW has been reduced in width, as follows:

Reduced FCI-ROW

The total width of the reduced corridor is 34 metres with each pipeline having a 22 metre ROW. The separation between the pipelines is 18 metres – again the pipelines are symmetrical in relation to the corridor centreline. The Reduced FCI-ROW is used in environmentally sensitive areas.

Minimum FCI-ROW

The total width of the minimum corridor is 24 metres with each pipeline having a 16 metre ROW. The separation between the pipelines is 16 metres – again the pipelines are symmetrical in relation to the corridor centreline. The minimum FCI-ROW is used in extremely sensitive areas and/or valuable landscape such as primary forest.

Dual lay areas

To minimise the disturbance in some sensitive areas, it is anticipated that both the BTC and SCP pipelines will be constructed simultaneously to avoid re-visiting the area and obviate the need for interim reinstatement. In such cases, it is proposed that the width of the FCI-ROW is restricted to 20 metres with the pipelines being 10 metres apart. This option only applies if the SCP project is approved and only where absolutely necessary as construction and transport risks are significantly increased for this activity.

3.2.3 Route selection methodology

Pipeline routing is, by its very nature, an iterative process and development of the pipeline route for this project has been carried out in a number of inter-related steps that reflect the requirements of the Georgian Host Government Agreements (HGA). As stated in the Introduction, the BTC and SCP HGA's detail four steps in the route selection process, as follows:

- Corridor Of Interest
- Preferred Route Corridor
- Specified Corridor
- Construction Corridor

For the AGT Pipelines Project, it was considered necessary to carry out the route selection in five stages:

Stage 0: Identify and assess alternative export route options

This stage was considered essential to ensure that all potential candidate route corridors out of the Caspian had been identified, taking into account constraints and requirements from both Azerbaijan and Turkey. At this stage, the level of engineering was preliminary but sufficient to allow experienced engineers and specialists to assess the various export options with regards to two large hydrocarbon deposits – one oil and one gas.

Stage 1 10km Corridor of Interest

This stage corresponds to Step 1 in the Georgian HGAs. The activity investigated and analysed the 10km corridor options recommended at the end of Stage 0 in order to select a preferred Corridor of Interest. This then formed the basis for the subsequent stages of the route selection process.

Stage 2 Route Refinement (500m Preferred Route Corridor)

This stage corresponds to Step 2 in the Georgian HGAs. The activity confirmed the validity of the 10km Preferred Corridor of Interest from Stage 1 and undertook further refinement work to enable selection of a 500m wide Preferred Route Corridor.

Stage 3 Route Refinement (100m Specified Corridor)

This stage corresponds to Step 3 in the Georgian HGAs. The activity confirmed the validity of the 500m Preferred Route Corridor from

Stage 2 and undertook further refinement work to hone the corridor width to 100 metres as the Specified Corridor.

Stage 4 Centreline Alignment (44m Construction Corridor)

This stage is carried out as a post-route selection activity to determine the Construction Corridor as per the Georgian HGAs. The work involved selection of the final alignment for both the BTC and the SCP pipelines within the 44m FCI-ROW.

The above stages are described in detail in Sections 3.3 to 3.8 of this document.

The whole route selection process involves identification and assessment of key routing constraints and selection criteria in progressively more detail in order to refine the route and subsequently meet the project goals.

During the various stages of the route evaluation process, a number of tools were used, including:

- Satellite imagery
- Aerial photography
- Maps (topographical, geological, etc)
- Terrain maps
- Literature reviews
- Desk top studies
- Baseline studies
- Field "ground truthing" surveys
- Detailed field studies
- Route walks

At each stage of the process, multi-disciplinary teams were employed to carry out numerous desktop reviews and field surveys. The teams consisted of experienced personnel with the following recognised areas of expertise:

- Pipeline engineering
- Environmental engineering
- Sociology
- Botany
- Archaeology and cultural heritage
- Geomorphology
- Engineering geology
- Zoology
- Pipeline construction
- Hydrogeology

3.3 STAGE 0: IDENTIFY ALTERNATIVE EXPORT OPTIONS

3.3.1 General

The initial objective of Stage 0 was to identify options for the export of oil and gas from the Caspian Sea to markets in the West (see Figure 3.3). Once the option of a pipeline through Azerbaijan, Georgia and Turkey had been agreed amongst the project participants, Stage 0 moved on to identify potential pipeline corridor options through Georgia, which then formed the basis of Stage 1 (10km corridor selection).

Stage 0 employed information available in the public domain, previous studies undertaken by other parties/developers who had investigated export options, and BP's in-house knowledge of the region.

Initial corridor identification was completed in early 2000 and comprised a desk study of available information, which included:

- Terrain and geological data
- Topographic data
- Environmental data
- Pipeline engineering and safety requirements
- Security data
- Knowledge and studies from previous projects

In addition, the SCP project undertook a preliminary site visit to provide some first-hand experience of the region and help evaluate the assumptions being made and data being used.

3.3.2 Evaluation of export options

Stage 0 began with the identification of potential export options. This was done using BP's in-house knowledge of the region and by review of previous similar studies, including oil export studies by Fluor Daniel for the Azerbaijan International Oil Company (AIOC) in 1997 and by PLE on behalf of BOTAS (funded by the World Bank).

The joint BTC/SCP project development team identified a broad range of options for transporting oil from Baku to markets in the West and gas from Baku to Turkey (as illustrated schematically on Figure 3.3 and explained in more detail in Section 4 of the ESIA).

Rail, road and shipping transport options were discounted early in the evaluation due to a combination of higher environmental risk, logistical difficulties and increased social and environmental impacts. Pipelines, which are considered to be the safest, most cost effective and environmentally sound method of transporting hydrocarbons, were therefore the preferred export method for both oil and gas. The following pipeline options were examined:

Oil export – pipeline options examined

- Baku to Supsa, Georgia pipeline following the WREP to the Black Sea, and then by ship through the Bosphorus
- Baku to Supsa, Georgia pipeline, then by ship to a pipeline bypassing the Bosphorus from Burgas, Bulgaria to Alexandroupolis, Greece

- Baku to Novorossiysk, Russia pipeline following existing pipeline corridors to the Black Sea, and then by ship through the Bosphorus
- Baku to Novorossiysk, Russia pipeline, then by ship to a pipeline bypassing the Bosphorus from Burgas, Bulgaria to Alexandroupolis, Greece
- Baku – Tbilisi - Ceyhan pipeline to the Mediterranean coast of Turkey
- Western Route Export Pipeline (WREP) expansion; ie increasing the capacity of the existing WREP oil pipeline from Baku to Supsa
- Northern Route Export Pipeline (NREP) expansion; ie increasing the capacity of the existing NREP from Baku to Komsomolsky, on the Azerbaijan/ Russia border
- Baku to Iran pipeline to link with existing pipelines in northern Iran – an interim measure to handle initial oil export requirements

Gas export – pipeline option examined

- Baku to Turkey via Tbilisi, Georgia (on same alignment as the oil pipeline option) to link with pipelines in Turkey

Following an assessment of the options outlined above, the project development team concluded that two new pipelines routed through Azerbaijan, Georgia and Turkey was the most acceptable transportation method for exporting oil and gas from the Caspian Sea. The oil pipeline would continue through Turkey to the existing Ceyhan Oil Terminal on the Mediterranean Coast.

The major benefits of the new pipelines option are as follows:

- It avoided politically sensitive areas enhancing long-term security and reliability of product delivery
- It did not require 'double handling' of oil on and off tankers within the Black Sea
- It did not require oil tankers to transit the Bosphorus, with the associated oil spill risk
- It has the lowest environmental risk
- The route offers a competitively priced export option compared to other Caspian evacuation routes

The team also recommended that in Georgia the two pipelines should be constructed in the same corridor to minimise cumulative land take and environmental impact.

3.3.3 Evaluation of pipeline corridors in Georgia

3.3.3.1 General

Evaluation of potential pipeline corridors in Georgia comprised a review of corridors identified in previous studies as well as other corridors not considered in these studies. It should be noted that Stage 0 did not involve the assessment of the individual corridors; rather it aimed to review candidate corridors and select those that should go forward into the Stage 1 assessment of 10km wide corridors.

3.3.3.2 Major constraints and opportunities for pipeline corridors

The joint BTC/SCP route selection team carried out a review of Georgia to ensure that all viable options had been identified and that the rejection of unviable options had been done for sound technical reasons. In evaluating these options, the joint BTC/SCP route selection team had to take account of the agreed limits for the BTC pipeline crossing locations on the border between

Georgia and Turkey (as earlier agreed by the BTC Owner with BOTAS and as reflected in the LSTK agreement with BOTAS for the BTC pipeline, dated November 1999).

- Point of entry from Azerbaijan into Georgia
  The main routing philosophy in Azerbaijan was to run parallel to the existing Western Route Export Pipeline (WREP) wherever possible to minimise potential impacts from construction of new pipelines and to establish an energy corridor through Azerbaijan. A similar approach was also adopted in Georgia for the section of pipeline close to the border. Accordingly, the point of entry was established near the town of Gardabani, to the south of the Jandari Lake.
- Point of exit from Georgia into Turkey
  The LSTK agreement between the BTC Owners and the Turkish Government specified where the BTC pipeline had to cross the border. The LSTK agreement specifies the limits of the border crossing as longitude 42 deg 18 min East and 42 deg 49 min East. These limits are shown on Figure 3.4 as points W and E.

Between the nominated entry and exit points in Georgia, the selection of 10km corridors needed to take account of major constraints including mountain ranges, protected areas and opportunities such as more gentle terrain and existing pipeline corridors. The evaluation included a review of earlier work on potential corridors, including studies by Fluor Daniel for AIOC (1997), PLE for Botas (1998), Fluor Daniel for Shell (1998) and GeoEngineering for GGIC.

Topography and terrain suitability were two of the leading factors in the selection of 10km corridors between the agreed entry and exit points. As shown by Figure 3.4 and described in this section, the constraints and opportunities mean that there are three potential corridors, which have been termed Eastern, Central and Western.

The Lesser Caucasus Mountains are a major (if not insurmountable) obstacle to constructing pipelines with their numerous high peaks and ridges, steep sided valleys and gorges and heavily forested slopes. Therefore, soon after leaving the border with Azerbaijan potential corridors divide near Rustavi into those which:

- continue to follow the broad valley of the Mtkvari River north of the Lesser Caucasus (ie essentially the route followed by the WREP)
- turn more sharply to the west to ascend to the area of Volcanic Plateau that extends south of the Lesser Caucasus

At some point, a corridor following the relatively easy pipeline terrain exploited by the WREP would need to turn south to cross the difficult terrain of the Lesser Caucasus. As shown on Figure 3.4, a potential corridor would be one that turns southwest near Khashuri and continues to follow the general trend of the Mtkvari River across the Lesser Caucasus to Akhaltsikhe. Such a route leads to the Turkish border at the Potskhovi River near Vale. This is known as the Western Corridor.

Corridors following the relatively easy volcanic plateau to the south of the Lesser Caucasus are constrained by the Armenian border and increasingly rugged terrain to the south. In the vicinity of Tsalka they are divided by the northern end of the Samsari Range into those which:

- turn southwest and remain on the Volcanic Plateau, passing between the Samsari and the Javakheti mountain ranges to the border with Turkey at Kartsakhi Lake, which is southwest of Akhalkalaki. This is the Eastern Corridor
- continue west on the Volcanic Plateau, crossing the northern end of the Samsari Range towards Aspindza, passing south of the Veli Ridge and north of the Erusheti Mountains. This is the Central Corridor

A corridor passing through the Aspindza area is faced with a difficult descent from the Volcanic Plateau before continuing via Akhaltsikhe to the Turkish border at the Potskhovi River at Vale.

3.3.4 Corridor options recommended for consideration in Stage 1

The joint BTC/SCP route selection team recommended that Stage 1 should consider three 10 km corridor options, which follow the broad alignments, discussed above. They are shown schematically on Figure 3.4 and tabulated below:

Table 3.2 Recommended corridor options from Stage 0

Corridor Option	General Description
Eastern Corridor	From Jandari Lake, via Tetri Tskaro and Tsalka to Kartsakhi Lake
Central Corridor	From Jandari Lake, via Tetri Tskaro, Tsalka, Aspindza and Akhaltsikhe to Vale
Western Corridor	From Jandari Lake, via Tbilisi, Khashuri, Borjomi and Akhaltsikhe to Vale

3.4 STAGE 1: 10km CORRIDOR OF INTEREST

3.4.1 General

Stage 1 was carried out from early 2000 to mid-2001. Its objective was to investigate and analyse the three 10km corridor options recommended by Stage 0 in order to select a preferred 'Corridor of Interest' which could be carried forward as a basis for the subsequent stages of route selection. A fourth corridor (the Modified Central Corridor) was included during Stage 1 following a security assessment, which recommended that preference should be given to routes avoiding close proximity to Russian Federation military bases.

The four 10km corridors assessed during Stage 1 are tabulated below and illustrated in Figure 3.5.

Table 3.3 Description of 10km corridor options

Corridor Option	General Description	Approximate Length (km)
Western Corridor	From Jandari Lake, via Tbilisi, Khashuri, Borjomi and Akhaltsikhe to Vale	279
Central Corridor	From Jandari Lake, via Tetri Tskaro, Tsalka, Aspindza and Akhaltsikhe to Vale	253

Modified Central Corridor	From Jandari Lake, via Tetri Tskaro, Tsalka, Tsikhisdjvari, Sakire and Akhaltsikhe to Vale	246
Eastern Corridor	From Jandari Lake, via Tetri Tskaro and Tsalka to Kartsakhi Lake	213

The Stage 1 corridor selection process aimed to minimise environmental and social impacts and to balance the requirements of the operator to ensure that construction and schedule are considered in conjunction with the long-term integrity of the pipeline system. The main corridor selection criteria assessed during Stage 1 can be summarised as follows:

- Terrain and geohazards
- Environmental and social issues
- Constructability (including local infrastructure), reinstatement and long-term integrity
- Security
- Health and safety during construction

Specialist teams examined each of these criteria, first by desk studies and then by a series of field visits. The field visits were carried out by multidisciplinary teams of specialists to ensure that no particular criterion was considered in isolation.

The outputs from this work are specialist reports and regional constraints maps describing each of the issues and highlighting areas of particular sensitivity. These were integrated to provide an overall assessment of constraints and opportunities from which the four 10km corridor options could be assessed.

Individual issues are summarised in the sub-sections below and illustrated in Figures 3.6 et seq. An overall assessment is provided in the conclusions at the end of this section.

3.4.2 Terrain and geohazards

3.4.2.1 Methodology

A terrain evaluation and geohazard assessment of the corridors in Georgia were carried out by UK-based consultants. It consisted of a desk study and subsequent combined terrain geohazard, environmental and constructability field trip. The purpose of the field trip was to verify and “ground truth” the results obtained during the desk study and refine the geohazard and constructability assessment criteria.

The desktop study comprised an engineering-geomorphological and engineering-geological interpretation of topographic maps, geological maps and satellite images, supported by a limited literature review. This information was used to subdivide the geographical area traversed by the corridor options into a series of terrain units, each of which was assessed for the following potential geohazards:

- Relief difficulty
- Neotectonics
- Rapid surface erosion
- Landslides
- Hillside or valley debris flows

- River flash floods and scour
- Aggressive soils
- Soft, swelling and shrinking and metastable ground
- Rock excavatability and difficulty in obtaining backfill
- Landfill and wastes, mines and quarries
- Volcanic activity

The output from the study was a series of 1:100,000 maps detailing the terrain unit boundaries. For each terrain unit, the geohazard factors were ranked in order of severity, and a weighting applied to allow an overall CAPEX and OPEX parameter to be determined. This provided a mechanism for comparing and contrasting the different corridors and a basis for compiling a terrain constraints map (Figure 3.6).

Terrain constraints categories used to compile Figure 3.6 are described in Table 3.4 below:

Table 3.4 Terrain constraint categories

Constraint Category	Definition
No significant constraints	Areas where slope steepness, erosion potential, landslides, potential for flooding, and trench excavation are not considered to be significant constraints
Minor constraints	Areas where slope steepness, erosion potential, landslides, potential for flooding, and trench excavation are not considered to be significant constraints. However, within these areas there may be steep slopes, landslides and other terrain related hazards. Reinstatement may present some difficulty on the steeper slopes and through areas where rock is near the ground surface
Moderately difficult to difficult constraints	Areas with difficult features and processes. These include cliffs, scarps, steep slopes, gullies, incised valleys, landslides, debris flows and flooding. This category also includes areas where reinstatement may be difficult due to terrain and the presence of rock near the ground surface. Trench excavation is assessed to be moderately to very difficult due to the presence of rock near the ground surface
Very difficult constraints (= Severe)	Areas within which the difficulties are assessed to be so great that pipeline alignments should avoid them, except where there is no alternative and where it is expedient to employ special procedures and methods of construction. This category includes large rivers, major gorges, cliffs and scarps, very steep and high ground, major landslides, intensely dissected ground and areas where trench excavation is assessed to be very difficult due to the presence of rock near the ground surface. Reinstatement will be extremely difficult

3.4.2.2 Results

The following table summarises the differences between the four corridors in terms of the total corridor length and distance that crosses areas of severe terrain constraints. These areas are illustrated on Figure 3.6.

Table 3.5 Comparison of severe terrain constraints

Description	Western Corridor	Central Corridor	Modified Central Corridor	Eastern Corridor
Total Length (km)	279	253	250	213
Total Non-severe (km)	201	242	232	213
Total Severe (km) *	78	9	18 **	1
Percentage Severe (%)	28	4	7	0

Notes:
* ‘severe constraints’ were called ‘very difficult constraints’ in the specialist report
** See discussion below of severe constraints along the Modified Central Corridor

Western Corridor

The Western Corridor traverses a major area of severe terrain and geohazard constraints in the Lesser Caucasus Mountains between Khashuri and Akhaltsikhe (ie to both east and west of the Mtkvari River Gorge, as well as the Gorge itself). These constraints include:

- Severe/rugged terrain
- Landslides
- Debris flows
- Gorges
- Difficult river crossings

Central Corridor

In comparison with the Western Corridor, the Central Corridor optimises the length traversing relatively good pipeline terrain and minimises potential terrain and geohazard related problems. Nevertheless, there is a difficult descent from the volcanic plateau above Aspindza (assessed as a severe constraint) before crossing an area of difficult, unstable and gullied terrain between Aspindza and the ascent onto Minadze Plain (see Photos 1 to 4 at end of Section 3).

A potential alternative alignment was assessed that runs west from Aspindza, crossing the Mtkvari River downstream of Aspindza before continuing to the border with Turkey. However, this alternative was considered to be unviable due to the extensive landsliding on the west side of the Mtkvari River and the high mountainous terrain along the border with Turkey and was, therefore, discounted.

Modified Central Corridor

The Modified Central Corridor differs from the Central Corridor in that it crosses over Mt Tavkvetili and then, instead of reaching Minadze Plain via Aspindza, it descends from the volcanic plateau at Tskhratskaro Pass and crosses terrain which contains areas of landslides and gullies before reaching Minadze Plain.

At Stage 1 the Modified Central Corridor was assessed to cross four areas of severe constraint: Mt. Tavkvetili, west of Tabatskuri, the descent of Tskhratskaro Pass, and the ascent to Kodiana Pass. Subsequent fieldwork on both the Central and Modified Central Corridors (at Stages 2 and

3) demonstrated that the constraints along the Modified Central Corridor are manageable through use of modern pipeline design and construction techniques. The overall amount and severity of terrain constraints on the Modified Central Corridor is now assessed to be similar to that for the Central Corridor.

Eastern Corridor

The Eastern Corridor follows the same alignment as the Central Corridor from the Azerbaijan/Georgia border to Tsalka. It then continues in a southwesterly direction across the volcanic plateau to the Turkish border. Not only is this corridor shorter, but it also has significantly less terrain constraints than the Central and Modified Central Corridors. It has less than 1km of severe constraint (a gorge near Tsalka).

3.4.3 Environmental and social issues

3.4.3.1 Methodology

A desk study was conducted by Georgian specialists to identify potential environmental and social constraints over the entire geographical area (Southern Georgia) traversed by the four corridor options. Information on constraints that could have a direct influence on the corridor selection was obtained from Georgian and international sources. These constraints were:

- Flora
- Fauna
- Protected areas
- Hydrogeology
- Landscape
- Archaeology and cultural heritage
- Ethnic groups
- Population density
- Land use

The constraints were classified as set out in Table 3.6 below.

Table 3.6 Constraint categories for Environmental and Social Impact

Constraint Category	Definition
None or Low	No constraint or one which can be easily addressed by a minor modification to construction or reinstatement techniques
Medium	A constraint that can be addressed by engineering design or modifications to construction or reinstatement techniques, but at an additional cost; and/or likely to be raised as an issue by consultees
High	A constraint which can, with some difficulty, be addressed by engineering design followed by implementation of a major (non-standard) modification to either construction or reinstatement techniques, at large additional cost; and/or likely to require significant consultation effort to convince consultees that it can be addressed in an acceptable manner

Constraint Category	Definition
Severe	A constraint which cannot be satisfactorily addressed without an unacceptable additional cost or engineering risk; and/or without compromising international standards, country legislation, industry best practice; and/or causing an extreme NGO/consultee reaction. In summary, a constraint which would jeopardise the project

The majority of these constraints will be features that cover a specific area (for example, an area of steep terrain, a nature reserve, etc). There are, however, some constraints that are linear features (for example, major watercourses).

Figure 3.7 is a composite map depicting all severe environmental and social constraints in the region crossed by the 10km corridor options. Only those issues that have a direct influence on the selection of a 10km corridor are included. They are:

- Nature conservation (flora, fauna and protected areas)
- Hydrogeology (aquifers)
- Landscape
- Archaeology and cultural heritage
- Ethnic composition
- Population density
- Geomorphology

It must be noted that where more than one severe constraint has been identified at the same location, only one is shown on the composite map.

3.4.3.2 Results

Table 3.7 below summarises the differences between the four corridors in terms of the total corridor length and the distance that crosses areas of severe environmental and social constraints. These areas are illustrated on Figure 3.7.

Table 3.7 Comparison of severe environmental and social constraints

Description	Western Corridor	Central Corridor	Modified Central Corridor	Eastern Corridor
Total Length (km)	279	253	250	213
Total Non-severe (km)	197	191	204	118
Total Severe (km)	82	62	46	95
Percentage Severe (%)	29	25	19	45

Western Corridor

Excluding social constraints, the Western Corridor has the highest total length within areas of severe constraint. This is for two main reasons. Firstly, the number of archaeological sites in this corridor are high, as for much of its length it follows the ancient east-west transport route

(Silk Road). Secondly, the Western Corridor also passes through two zones of the Borjomi-Kharagauli National Park:

- The State Nature Reserve (equivalent to IUCN Protected Area Category I)
- The National Park (equivalent to IUCN Category II) (see Photos 5 to 7 at the end of Section 3)

It was decided early in Stage 1 that a pipeline could not be routed through the Mtkvari River Gorge: the narrow valley floor in the gorge is densely populated and there is limited potential for route optimisation to minimise environmental and social impacts.

Eastern and Central Corridors

The Eastern Corridor passes close to a number of proposed managed reserves such as Paravani Lake and Kartsakhi Lake as well as a proposed Ramsar site at Khanchali Lake. In addition, the route crosses the Kharami River gorge east of Tsalka. Full reinstatement of this gorge crossing will not be possible.

The Central Corridor passes through two protected areas - the Ktsia-Tabatskuri Managed Reserve and the Tetrobi Managed Reserve (equivalent to IUCN Category IV). It also passes through the Support Zone for the Borjomi-Kharagauli National Park that has no protected status.

The Central Corridor also presents reinstatement difficulties in the crossing of severe terrain eg landslide areas, gullies, etc. This could have environmental consequences in terms of potential effects on soils; water quality; landscape and land use.

Modified Central Corridor

This corridor has the shortest length of areas with severe environmental and social constraints.

The Modified Central Corridor traverses the Ktsia Tabatskuri Managed Reserve. It also passes through the Support Zone of the Borjomi-Kharagauli National Park (no protected status), which includes the alpine resort area of Bakuriani. These were important constraints, but, with adequate mitigation, were not assessed to fall into the 'severe' category.

- Ktsia Tabatskuri Managed Reserve.

  The Ktsia Valley, Lake Tabatskuri and associated wetlands are all part of the proposed Ktsia Tabatskuri Managed Reserve. There has been some debate as to the legal status of the Reserve. The Reserve was proposed in 1995 under the Cabinet of Ministers Resolution No. 447. The State Department of Protected Areas, Reserves and Hunting and the World Wide Fund for Nature (WWF) believe that it is proposed and not yet formally designated.

  A legal view obtained indicates that the Managed Reserve is designated but with temporary boundaries. The development of a Management Plan and formal boundaries is awaited.

  There are a number of non-permitted activities in protected areas, including those which may cause break-up or alteration of environmental systems and any other activity not allowed by individual provision of the Protected Area and the Management Plan. The construction and operation of the proposed pipelines would be undertaken in such a way that they do not contravene the listed non-permissible activities.

The site is currently not listed on the IUCN international list of protected areas. Currently, there is no active management for conservation and agricultural activities are ongoing.

- Support Zone of the Borjomi-Kharagauli National Park

The Borjomi-Kharagauli National Park was designated in 1995 under the Cabinet of Ministers Resolution No. 447. The main purpose of the designation is the conservation of existing ecosystems, restoration of degraded areas, facilitation and control of sustainable use of renewable resources, awareness/ educational activities and ecotourism.

According to the Park Management Plan compiled by WWF, the park is divided into a number of zones: core zone (strict nature protection), wilderness zone, traditional use zone, recuperation zone and support zone. The support zone, through which the proposed pipelines pass, covers 150,000 hectares and consists of various land uses including agriculture, industry, infrastructure and areas of natural and semi-natural habitat. The rationale for the establishment of the support zone is to secure the support of park neighbours for the sustainable protection of the park.

The support zone does not correspond to an IUCN category and, as such, is not on the IUCN international list of protected areas.

3.4.4 Security

3.4.4.1 Methodology

Security specialists from regional and international entities have evaluated the security risk in each of the administrative districts through which the four 10km corridor options would pass. The vulnerability of pipeline assets to the following potential threats was assessed:

- Terrorism
- Sabotage
- Military riot
- Separatism
- Civil unrest
- Criminality
- External influence
- Kidnapping.

These threats were assessed for each administrative district in terms of impact, probability, risk and manageability. Corridors were then evaluated using a Boston Square format (Risk vs. Manageability), which was converted into a Risk Index that provided a simplified assessment of security risk as set out in Table 3.8 below.

Table 3.8 Constraint categories for security assessment

Constraint Category	Risk Index	Definition
Low	Less than 4	Low level of risk. Minimum security measures are sufficient to maintain operations
Medium	4 to 6	Acceptable level of risk. Requires distinct security planning and risk management
Medium to high	6 to 8	Acceptable level of risk, but high probability of occurrence. Requires robust security planning and risk management
High	Greater than 8	Unacceptable level of risk

3.4.4.2 Results

Western Corridor

The Western Corridor scored predominantly medium risk indices with medium manageability, resulting in an overall risk index of 4.5. The corridor therefore falls into the medium category, indicating an acceptable level of risk for the pipelines.

Central Corridor

The Central Corridor passes through the Akhalkalaki Administrative District with close proximity to Russian Federation military bases and associated areas of activity. This district scored high-risk indices with low manageability resulting in an overall risk index of 8.9. They were therefore classified as being a high constraint and having an unacceptable level of risk for the pipelines.

Modified Central Corridor

This corridor was identified during Stage 1 in response to concerns about routing a pipeline through the Akhalkalaki District. It avoids the Akhalkalaki Administrative District and scored medium risk indices with medium to high manageability, resulting in an overall risk index of 5.1. The corridor therefore falls into the medium category, indicating an acceptable level of risk for the pipelines.

Eastern Corridor

The Eastern Corridor crosses a considerable length of the Ninotsminda and Akhalkalaki Administrative Districts where considerable military activities are present. These districts scored high-risk indices with low manageability resulting in an overall risk index of 8.9. They were therefore classified as being a high constraint and having an unacceptable level of risk for the pipelines.

3.4.5 Constructability, reinstatement and long-term integrity

3.4.5.1 Methodology

A preliminary pipeline routing desk study was undertaken to assess the route characteristics for the corridor options. The combined route assurance field trips were subsequently carried out on the Central, Modified Central and Eastern Corridors to refine the desk studies and assess the impact of terrain geohazards, geotechnical and environmental issues on routing, construction and operation of the pipelines.

The assessment took the following principal factors into account:

- Pipe trench excavatability
- Suitability of trench backfill and construction materials
- Side slopes and access to, and along, the Right of Way
- High groundwater table
- Aggressive soils; swelling/shrinking soils
- Special construction techniques for river, gorge and gully crossings
- Slope instability (landslides, rockfalls, etc)
- Reinstatement and erosion control
- Sections needing special pipeline construction techniques
- Access and logistics
- Seasonal constraints
- Environmental impact and management; including restricted Right of Way at environmentally sensitive locations

Possible mitigation measures to ensure integrity of the pipeline system during its construction and operational life were also briefly considered. These included:

- Avoidance where practicable of difficult terrain
- Special trench design and construction methods in areas of unstable ground and in the vicinity of fault lines
- Ground stabilisation measures
- Application of concrete coating for protection and negative buoyancy
- Special crossing designs at rivers

Constructability, reinstatement and long-term integrity of pipelines are all closely related to the terrain through which they are constructed. The terrain constraints map (Figure 3.6) therefore provides a simple approximate assessment of these issues, which are described below.

3.4.5.2 Results

Western Corridor

The Western Corridor was discounted at desk study stage due to the severe environmental and terrain constraints discussed previously.

Central Corridor

As described in Section 3.4.2, the Central Corridor optimises the length traversing relatively good pipeline terrain where constructability, reinstatement and long-term integrity issues are not severe. It does, however, make a difficult descent down a steep narrow ridge from the volcanic plateau above Aspindza. This ridge and an area of difficult unstable and gullied terrain between Aspindza and the ascent onto Minadze Plain were assessed to present severe constraints for pipeline construction. Reinstatement in some areas, particularly on the narrow ridges and gully sections would not be possible resulting in significant visual impact on the surrounding area.

Modified Central Corridor

At Stage 1 the Modified Central Corridor was assessed to cross four areas of severe terrain constraint: Mt. Tavkvetili, section west of Tabatskuri, the descent of Tskhratskaro Pass, and the ascent to Kodiana Pass. These areas also present some difficulties for constructability, reinstatement and long-term integrity. However, subsequent work on both the Central and Modified Central Corridors (at Stages 2 and 3) demonstrated that the constraints along the Modified Central Corridor were not as severe as first thought and could be minimised by minor re-routing and design of mitigation techniques. The severity of these constraints on the Modified Central Corridor is now assessed to be similar to that for the Central Corridor.

Eastern Corridor

The Eastern Corridor was examined by desk study and an initial field reconnaissance. It was assessed to contain no severe constructability, reinstatement or long-term integrity constraints, except at the gorge crossing near Tsalka. However, local infrastructure is considered to be inadequate to support construction activities, e.g. road and rail transport of pipe, personnel and equipment. Further long-term access for maintenance and monitoring is equally not viable.

3.4.6 Conclusions

Based on the Stage 0 and 1 studies, the Modified Central Corridor was the preferred choice and was recommended for more detailed investigation at Stage 2. Table 3.9 below summarises the assessment of constraints and opportunities that led to this recommendation.

Table 3.9 Summary of constraints and opportunities for the Stage 1 corridor options

Description	Western Corridor	Central Corridor	Modified Central Corridor	Eastern Corridor
Total Length (km)	279	253	250	213
Terrain and geohazards	X	O	O	PO
Environmental	X	O	O	O
Social	X	O	O	O
Security	O	X	O	X
Constructability, reinstatements and long-term integrity	X	O	O	PO
Overall assessment	X	X	O	X

Notes:
PO = Preferred option (where one acceptable option is assessed to be significantly better than other acceptable options)
O = Acceptable option
X = Unacceptable option

The paragraphs below summarise the reasons behind this recommendation:

1. The Western Corridor was rejected at desk study stage due to its greater length, the requirement to traverse very difficult rugged terrain in the Lesser Caucasus Mountains and severe environmental constraints associated with the Borjomi-Kharagauli National Park and Nature Reserve. It was concluded that the significant environmental impacts and the terrain, construction and reinstatement and integrity constraints would far out-weigh the potential benefits from using the existing WREP corridor for the first part of the Western Corridor.

2. The Western Corridor was rejected due to the severe constraints in the Mtkvari River Gorge – the narrow valley floor is densely populated and there is limited potential for minimising environmental and social impact.

3. The Eastern, Central and Modified Central Corridors follow essentially the same route from the border with Azerbaijan to Tsalka. From this point, the Eastern Corridor diverges to the southwest and the two Central Corridors continue in a westerly direction towards Tabatskuri Lake. The Eastern Corridor is shorter than the Central or Modified Central Corridors.

4. The Eastern Corridor was preferred to the Central Corridor and Modified Central Corridors as it is shorter and, between Tsalka and the Turkish border, it is less difficult in terms of engineering and environmental issues. Construction is generally

easier, but supporting logistics for construction and long-term accessibility are seen to be inadequate.

5. The Eastern and Central Corridors were assessed to be acceptable from environmental and social viewpoints but these must be weighed against the security-related issues as discussed in Section 3.4.4.

6. The Modified Central Corridor was assessed to be acceptable, although it was recognised that it passes through the Ktsia-Tabatskuri Managed Reserve and the Support Zone of the Borjomi-Kharagauli National Park.

7. The Central Corridor contains a 27km long section of very rugged terrain between Aspindza and Minadze. This section of the route contains a narrow ridge descent from the volcanic plateau near Aspindza and a section of difficult gullied terrain towards Minadze. Both areas will require blasting of ridges to construct a ROW suitable for two large diameter pipelines. Full reinstatement would be impossible and the visual impact, especially on the ridge descent near Aspindza would be significant. Constructability, safety issues and potential environmental impact associated with this section count heavily against selection of this corridor.

8. Long-term accessibility, and integrity of the pipelines, are fundamental to safe operations and, therefore, are key in evaluating route alternatives. The Georgian government is responsible for the long-term protection from third party interference or disturbance and thus must rely on unfettered access to the ROW at all times. Therefore, the conclusion that the security risks associated with the nearby Russian Federation military bases are unacceptable, indicate that the AGT pipelines cannot be routed through these areas.

9. The security risk review indicated that Russian Federation military influences in the districts of Akhalkalaki and Ninotsminda posed an unacceptable level of security risk to pipeline corridors routed through these areas. The Eastern Corridor was therefore rejected.

10. The Central Corridor passes near areas of Russian Federation military influence and suffers similar infrastructure limitations to the Eastern Corridor and, therefore, was rejected.

11. Both the Western and Modified Central Corridors were assessed to be acceptable from a security perspective.

12. The Modified Central Corridor was selected as the preferred 10km Corridor of Interest. This corridor optimises the overall length traversing relatively good pipeline terrain, minimises potential problems associated with scour at river crossings, gullies and landslides, and maximises reinstatement potential. It is acknowledged there are some constructability, environmental and potential safety issues; however these are manageable. Additional mitigation techniques will be developed during detailed design and implemented during construction.

In recommending that the Modified Central Corridor be adopted as the preferred 10km corridor for the AGT pipelines, it was recognised that some specific issues would need to be addressed during Stage 2 (500m corridor selection) and subsequently. These issues include:

- The corridor passes through the designated Ktsia-Tabatskuri Managed Reserve and the non-designated Support Zone around the Borjomi - Kharagauli National Park
- The corridor passes through the headwaters of the Borjomola catchment, which drains to the Mtkvari River at Borjomi
- The corridor traverses the environmentally sensitive Tskhratskaro Sakire area, which supports areas of primary and secondary forest
- The corridor crosses the Bakuriani tourist zone (summer and winter tourism) and the high quality landscapes of the area
- The corridor traverses terrain with landslides and gully erosion between Tskhratskaro Pass and Minadze Plain
- The corridor runs down the steep Tskhratskaro Pass, which presents challenges in terms of construction and reinstatement

3.5 STAGE 2: ROUTE REFINEMENT (500m PREFERRED ROUTE CORRIDOR)

3.5.1 General

The objective of this exercise was to develop the 10km Modified Central Corridor selected during Stage 2 and undertake further refinement work to enable selection of the 500m wide Preferred Route Corridor.

The route refinement process was premised on the centreline of the 10km Corridor of Interest identified previously and which was confirmed by an initial Route Assurance Review (including a field trip). This was followed by a detailed desktop assessment of this 'assured' corridor followed by a series of more detailed field reconnaissance trips.

3.5.2 Methodology

The route refinement process was carried out in a number of progressive steps:

3.5.2.1 Detailed desktop studies

This first step involved a number of inter-related desktop studies including:

- Constructability (terrain, access, ground conditions, seasonal working)
- Logistics and interfaces with existing transportation infrastructure
- Possible utilisation of existing corridors
- Environmental and social
- Existing infrastructure
- Seismic activity
- Proximity to politically sensitive areas
- Proximity to areas of known or potential cultural heritage interest
- Environmental sensitivities
- Future developments
- Technical (excessive bridging, erosion, flooding, etc)
- Building proximity and design factor related to safety to the public
- Overall route length and wall thickness requirements
- Construction safety

- Land use and areas of habitation

Due to the possibility of both BTC and SCP pipelines being constructed along the same route, consideration was also given to the need for an extended ROW to permit construction of the second pipeline at a later date.

3.5.2.2 Field trips and route walks

A number of field trips and route walks were made to investigate the various route options identified by the desktop studies. In many cases, these visits comprised multi-disciplinary teams that enabled on-the-spot assessments to be made that ensured all the relevant aspects were covered.

The main purposes of the field trips were:

- Ensure the selected pipeline corridor avoids areas of terrain instability
- Identify unavoidable areas requiring detailed site investigation
- Further refinement of the geohazard and constructability issues
- Prepare conceptual construction methodologies
- Avoid environmental sensitivities

3.5.2.3 Environmental and social baseline

A review of the available environmental baseline literature was carried out for the 500m preferred route corridors, looking at the following aspects:

- Archaeology
- Engineering geology
- Fauna
- Flora
- Landscapes
- Monuments
- Protected areas
- Quaternary deposits
- Soils
- Geology and hydrogeology
- Fisheries
- Air quality

Social aspects such as land use, residences, commercial activities, recreational activities, etc were also taken in to consideration in preparing the baseline.

This review was followed by a number of field surveys, which identified key sites needing more detailed study to fully understand the impact of pipeline construction.

A social baseline survey was also carried out within an area approximately 2km either side of the preferred 500m corridor. The social baseline was used iteratively by the pipeline engineering team during evaluation of potential re-routes. This process ensured selection of the optimum 500m corridor with minimal social impacts.

3.5.3 Key areas within 10km corridor

The Stage 2 route refinement is one of the most, if not the most, important steps in the development of a pipeline route. It is at this stage that the corridor is routed to avoid the main environmental and social constraints whilst, at the same time, identifying the major technical and construction criteria. As a result, numerous corridor options were evaluated, including:

- Azerbaijan border to Marneuli
- Tetriskaro area
- Lake Tsalka area
- Kizil-Kilisa to Tabatskuri / Ktsia Tabatskuri area
- Tskhratskaro and Tsikhisjvari area
- Tabatskuri Lake to Kura River
- Mtkvari river to Turkish border

It should be noted that the section of pipeline between the Azerbaijan border and west of Marneuli was also subject to a later separate evaluation, which is described in Section 3.7.2.

3.5.4 Azerbaijan Border to Marneuli

3.5.4.1 Route options

Three potential options were identified for further development in this area – two to the north of the Kura River and one to the south. These options, shown in Figure 3.8, are:

Option A: Crosses the Azerbaijan/Georgia border south of the Mtkvari River and heads northwest towards Marneuli.

Option B: Crosses the Azerbaijan/Georgia border north of the Mtkvari River and heads northwest towards Marneuli.

Option C: Crosses the Azerbaijan/Georgia border north of the Mtkvari River and heads north before turning west at Akhali Samgori towards Rustavi and Marneuli.

3.5.4.2 Route Assessment

Engineering/construction

The basic terrain is relatively similar for the three possible routes and presents no significant construction-related problems; however, Option B and C both involve crossing the Kura River whereas Option A doesn't. Option C passes through areas of significant urban and industrial development near Rustavi and areas previously used by the military. In addition, there are several 'pinch points' that will require special construction techniques to minimise impacts during installation of the pipeline.

Terrain/geology

The three alternate routes largely pass through flat agricultural and grazing land with very similar geological features. None of the routes was considered to present any difficulty for the pipeline although some rock may be present.

Environmental

All three routes are predominately used for agricultural and grazing purposes and have little conservation value except for the remnants of a Tougay forest near Gardabani on Option B. With care during construction (eg crossing less ecologically valuable areas of secondary growth) and proper restoration, the effect of the pipeline on this forest can be minimised.

A potentially sensitive groundwater area was identified that may be affected by Option C. The issue of groundwater in this area is less sensitive than in Azerbaijan as surface water is mainly used from the Kura and from Jandari Lake. In Azerbaijan, the Karayazi aquifer has been highlighted as sensitive as it is used as the main water supply for the towns of Kazak and Akstafa.

Jandari Lake is a potentially sensitive receptor. The site is included in the Proposed Protected Area of Multiple/Various use of Iori Uplands. This designation may not exclude the installation of the pipeline adjacent to the lake provided normal precautions are taken. There is some ornithological interest.

A number of significant archaeological sites were identified along this section of the route. It is possible to either avoid these sites by minor re-routing or to undertake surveys to allow 'preservation by record'.

The broad-scale studies undertaken as part of the Scoping Phase of the ESIA did not identify any issues that would affect route choice.

Security

Due to the proximity of Option A to areas of current or planned future military bases, there is a significant potential security risk and so this route was not recommended. Options B and C both had minimal security risks that can be managed.

Costing

Due to the selected route crossing flat agricultural land and the river crossing being relatively straightforward, the cost of Options A and B will be similar with Option B being slightly more expensive due to areas of higher population density traversed by the route. Option C however, will be the most expensive due to its greater overall length and longer section in close proximity to urban and industrial areas leading to slower lay-rates.

3.5.4.3 Route assessment summary

Tabular assessment of selection criteria (with ranking factors).

Table 3.10 Route assessment summary for Azerbaijan Border to Marneuli

Selection Factor	Ranking		
	Option C	Option B	Option A
Engineering/construction	3	2	4
Terrain/geology	2	2	2
Environment	3	3	3
Security	5	2	2
Cost	2	2	3
Total	**15**	**11**	**14**

Code 1 = relatively easy, no constraints, low cost
2 = some difficulty, some minor constraints, some increased costs
3 = medium difficulty, constraints and cost
4 = significant difficulty, significant constraints, high cost
5 = high degree of difficulty, major constraints, very high cost (route not practical)

3.5.4.4 Conclusions

Option A passes adjacent to an environmentally sensitive area. This route also crosses woodland considered to be of medium to high conservation value.

Option B was selected as the preferred option and an engineering study was undertaken to further define this route. The selected route involves two additional crossings of the Kura River but does not suffer from significant environmental issues and proximity problems associated with the other two options. In addition, it avoids an area allegedly used for the disposal of anthrax-contaminated waste. It does, however, pass through some areas of significant urban and industrial development but is considered the only viable option.

Option C, which crosses the border north of the Kura River and continues to Rustavi was considered unsuitable. The pipeline would pass through areas of significant urban and industrial development in addition to areas previously utilised by the military.

3.5.5 Tetriskaro area

3.5.5.1 Route options

This section of the route is essentially unchanged from that identified during the original Route Assurance Review. However, three feasible route options were identified around the town of Tetri Tskaro; one route to the north of the town and two to the south of the town. These options, shown in Figure 3.9, are:

Route A: leaves the lower level plains and begins the ascent to Bedeni Ridge east of Tsalka. The pipeline climbs in a northwesterly direction for approximately 11km over a series of rolling meadows with occasional steep sections before entering a steep hilly forested section. Where possible the selected route uses existing clearings to minimise the environmental impact.

Route B: From east of Tetri Tskaro, the route travels west, south of Tetri Tskaro across sparsely cultivated and grazed farmland with forested areas, where it crosses a river gorge. The pipeline then travels northwest through a wooded section gently climbing towards Bedeni Ridge. The pipeline then converges with Option A to cross the lava plateau along Bedeni Ridge.

Route C: follows the same general corridor as Route A until it diverges just east of Tetriskaro to run southwest and converge with Route B. However, the alignment utilises existing clearings wherever possible by running parallel to and alongside existing railway infrastructure, overhead electricity power lines and an existing forest vehicle track.

3.5.5.2 Route assessment

Engineering/construction

Route A around Tetri Tskaro has a greater degree of construction difficulty than the southern options. The main difficulties associated with construction are steep unstable slopes leading down to gullies at the bottom of the slopes. These areas will be installed as special sections with care being taken not to initiate a landslip. Also, there is a greater length of hard rock that will require blasting.

Routes B and C are longer than Route A and pass through a significant length of forested areas which will increase construction difficulty but to a lesser extent than the difficulties which would be experienced along Route A. However with Routes B and C being longer, this results in construction difficulties being approximately equal.

Terrain/geology

Route A around the north of Tetriskaro includes an unstable slope and gully crossing and a 2km long section of very hard surface rock. The unstable slope will have to be constructed as a “special section” at an increased depth (below the unstable surface) and with care so as not to initiate a mudslide. The gully at the bottom of this slope will present some difficulties due to the depth and vertical sides however at one point it was observed that the watercourse banks were sloping and the crossing could be undertaken without serious problems. The rock areas will require blasting.

Either of the two southern options - Routes B and C - are considered to be preferable. There are no unstable sections as the routes are predominantly over thin clay soils with underlying, slightly weathered basalt bedrock with outcrops in places.

Environmental

North of Tetriskaro there are areas of significant environmental importance associated with Route A; namely mature mountainous woodland which would be seriously affected by the construction of the pipeline. This woodland supports four plant community types, three of which are unique in the region. These forests are of primary (natural) origin, mostly intact and characterised by a high growth rate. Two rare species of Georgian flora and four rare tree and bush species of the local flora have been recorded.

The southern routes around Tetriskaro would also pass through woodland areas, four of which are considered to be environmentally sensitive. Mitigation measures in the form of a reduced ROW width, avoidance of specimens of rare species and routing to use clearings as far as possible would reduce the overall impacts. This last point applies particularly to Route C where the alignment makes deliberate use of existing clearings. Whilst not ideal, Route C is preferable in terms of conservation and protection of ecosystems of rare species of national and local flora and plants of economic value to the northern option.

There are a number of archaeological sites along all options around Tetri Tskaro with the most important sites being along Route B, in particular the ruins of Nadarbazevi Palace. However, it is considered that these sites can be avoided by local re-routes as required. Additional archaeological sites may be discovered during detailed survey work and these should be investigated prior to construction of the pipeline to avoid any delays. Where necessary, the pipeline will be re-routed to avoid any significant archaeological sites identified during the detailed survey.

The broad-scale studies undertaken as part of the Scoping Phase of the ESIA did not identify any issues that would affect route choice.

Security

There is little security risk associated with any of the route options for this section of the pipeline.

Costing

The installed costs for the pipelines are approximately the same for all three route options with the increased construction costs of Route A being comparable with the costs associated with the additional length of Routes B and C.

3.5.5.3 Route assessment summary

Tabular assessment of selection criteria (with ranking factors).

Table 3.11 Route assessment summary for Tetri Tskaro area

Selection Factor	Ranking		
	Option A	Option B	Option C
Engineering/construction	4	3	3
Terrain / Geology	4	2	2
Environment	5	4	2
Security	1	1	1
Cost	3	3	3
Total	**17**	**13**	**11**

Code 1 = relatively easy, no constraints, low cost
2 = some difficulty, some minor constraints, some increased costs
3 = medium difficulty, constraints and cost
4 = significant difficulty, significant constraints, high cost
5 = high degree of difficulty, major constraints, very high cost (route not practical)

3.5.5.4 Conclusions

Route C was the recommended route due to the lesser environmental impact.

When comparing the terrain, construction and cost there was little to differentiate between the three route options. Route A will be more difficult to construct but due to its shorter length a cost comparison of the three routes resulted in approximately the same total cost.

All three route options traverse environmentally sensitive mountain forest habitat as detailed in the environmental baseline survey. However, the relatively higher conservation value of the forests along Route A resulted in this route being discounted. The main factors behind this decision were the significant presence of mature high mountain oak and the importance of the habitat for fauna

With suitable safeguards it was considered that Route C can be constructed with minimal impact on the environment as it utilises existing clearings wherever possible. This gives it a significant advantage over Route B.

3.5.6 Lake Tsalka area

3.5.6.1 Route options

Three potential options were identified for further development in the Lake Tsalka area (a fresh water reservoir). These options, shown in Figure 3.10, are:

Option A: descends the south side of the Bedeni Range, runs westwards towards Lake Tsalka before descending onto the flat cultivated land that forms the lake basin. The route then continues on the northern shores of the lake before reaching the village of Santa.

Option B: descends the north side of the Bedeni Range, runs westwards through flat cultivated land towards Lake Tsalka before climbing and running along a ridge and continuing towards the village of Santa.

Option C: runs close to Option B with two main detours – one being the route off the Bedeni Range and the second being to pass north of Eli Babar mountain.

Other routes further to the north were discounted because of the number of river gorge crossings, the increased severity of the rocky terrain and the multiple crossings of streams feeding Tsalka Reservoir.

Other routes to the south of Lake Tsalka were discounted because of the very severe gorge crossing of the Khrami River and the increased social impact of having to route the pipeline in close proximity to the town of Tsalka.

3.5.6.2 Route assessment

Engineering/construction

Option A involves construction within a protection zone imposed by Georgian legislation that prohibits major construction activities within 300m of surface water reservoirs. In addition, the route crosses the Tsalka Tectonic Fault at an undesirable angle.

Option B crosses potentially unstable ground in the section coming off the Bedeni Range but does cross the Tsalka Tectonic Fault at an acceptable angle.

Option B avoids the area of instability on the descent from Bedeni Plateau and crosses the Tsalka Tectonic Fault at an acceptable angle.

In general, with the exception of the fault crossing, none of the routes has any unmanageable engineering or construction problems.

Terrain/geology

Option A has the shallowest (and hence longest) descent off Bedeni Plateau although this is outweighed by the fact that the descents are in rock for all three routes. Option A then runs through flat agricultural land which forms the lake basin and which is deep soft soil.

The descent off Bedeni Plateau for Option B crosses potentially unstable ground made up of large boulders. The route then runs through flat cultivated land, avoiding several wetland areas, before climbing a rocky section onto a ridge.

Option C avoids the area of instability off the Bedeni Range and, generally, crosses similar terrain to Option B.

Options B and C both cross the Tsalka Tectonic Fault at an acceptable angle, unlike Option A.

Environmental

There are a significant number of archaeological features in the area north of Lake Tsalka. Option A passes very close to at least six potential Bronze Age features, which effectively mean that this route must be discounted. Option B passes very close to the protected zone around an archaeological feature known as the Knole settlement and to the Eli Baba mountain with its two ancient fortresses. Option C manages to avoid all the known archaeological and cultural features.

None of the routes has any major social impact although they all cross cultivated land to a greater-or-lesser degree.

Security

There are no significant security risks with any of the three route options.

Costing

The installed costs for the pipelines are approximately the same for all three routes.

3.5.6.3 Route assessment summary

Tabular assessment of selection criteria (with ranking factors).

Table 3.12 Route assessment summary for Lake Tsalka area

Selection Factor	Ranking		
	Option A	Option B	Option C
Engineering/construction	5	4	3
Terrain / Geology	3	3	2
Environment	5	5	3
Security	1	1	1
Cost	3	3	3
Total	**17**	**16**	**12**

Code 1 = relatively easy, no constraints, low cost
2 = some difficulty, some minor constraints, some increased costs
3 = medium difficulty, constraints and cost
4 = significant difficulty, significant constraints, high cost
5 = high degree of difficulty, major constraints, very high cost (route not practical)

3.5.6.4 Conclusions

Option A is discounted on account of the unacceptable crossing angle of the Tsalka Tectonic Fault and the close proximity of at least six potential Bronze Age features.

Option B is discounted because of its routing through potentially unstable ground and the unacceptable impacts of construction on sensitive archaeological sites.

Option C is the recommended route as it minimises overall environmental and heritage impact.

3.5.7 Kizil-Kilisa to Tabatskuri / Ktsia Tabatskuri area

3.5.7.1 Route options

Four possible route options have been assessed between Kizil-Kilisa and Tabatskuri to avoid the security risks and minimise potential environmental impact within the Ktsia Tabatskuri Managed Reserve. These options are detailed below and illustrated in Figure 3.11.

Option A: Ascends a rock escarpment from Kizil-Kilisa and heads in a westerly direction across a lava plateau towards Mt. Tavkvetili. The route continues across the lava plateau for some 16km passing to the south of Mt. Tavkvetili and generally follows the valley to Lake Tabatskuri. The route then passes to the north of the lake across agricultural and grazing land before entering the Ktsia River Valley. The route continues along the valley floor towards Tskhratskaro Pass. Approximately 4km of this route will pass through the Akhalkalaki District.

Option B: In common with Option A the route ascends the rock escarpment from Kizil-Kilisa and continues in a northwesterly direction across the lava plateau towards Mt. Tavkvetili, an old dormant volcano with large boulders covering the surface. The route ascends the northern shoulder of Mt. Tavkvetili avoiding several small wetland areas on the summit before descending into a flood plain (Narianis Veli Wetland). The route crosses the wetland, passes over a small col before converging with Option A in the Ktsia River Valley.

Option C: Avoids the majority of the wetland and traverses the slightly higher terrain to the north. The route then joins Option A to follow the Ktsia River Valley to Tskhratskaro Pass.

Option D: Descends Mt. Tavkvetili and turns southwest to skirt around the south side of the wetland whilst keeping to the higher ground away from the flat wet areas. The route continues heading west passing to the north of Lake Tabatskuri before turning south west and ascending onto hills above the northwest shore of the lake. The route continues in a westerly direction, crossing the Ktsia River before traversing the higher ground away from the Ktsia River Valley towards Tskhratskaro Pass.

3.5.7.2 Route assessment

Engineering/construction

The main construction issue with Option A is the large section of route length that may require blasting (16km). The lava plateau is predominantly flat, however there is a substantial amount of hard rock, many gullies (some of which are vertical sided) and small hills. Establishing the ROW will require blasting and substantial grading and reinstatement will be difficult due to the thin soils. Installation of the pipeline will require a large quantity of pipeline bends. The route along the Ktsia River Valley floor has substantial areas of unstable ground along the valley sides, which may cause problems during construction.

The main challenge associated with Option B is the crossing of Mt. Tavkvetili. This crossing cannot be achieved using conventional construction and trenching techniques due to the presence of large boulders covering the surface. This area will be designated a special pipeline section and a detailed technical review will be carried out to evaluate the optimum alignment and construction techniques. These special construction techniques will ensure safe installation of the pipeline and a high standard of reinstatement following installation of the pipeline.

In common with Option A, this route crosses the lava plateau, although for a shorter distance of approximately 10km before ascending Mt. Tavkvetili. The route across the wetland will present no significant construction problems; the wetland is waterlogged during spring but dries out during summer. Care will need to be taken when crossing the mountain col with solifluction on one side to ensure construction operations do not induce instability. The issues associated with the River Ktsia Valley are also applicable to Option B, however, problems associated with this type of terrain can be minimised with judicious route selection during final alignment and care during construction.

Option C is a variation of Option B. The route is longer but avoids the low, wet ground of Narianis Veli and the potential solifluction problems over the mountain col. There are no significant construction issues associated with this section of the route.

Option D is also a variation of Option B. The route is slightly longer but avoids the low, wet ground of Narianis Veli, the potential solifluction problems over the col and the areas of unstable ground along the Ktsia River Valley sides. Although slightly longer and potentially more difficult to construct, this route avoids the construction and long-term integrity risks associated with the unstable ground.

All route options through this section will be difficult and expensive to construct due predominantly to the extent of rock, however it is considered that Option A will be slightly easier due to the technical and construction challenges associated with crossing Mt. Tavkvetili.

Terrain/geology

A significant section of route Option A (16km) is across a lava plateau made up of younger, stronger rock than the rock present along route Option B. This will require a greater degree of blasting. The route then passes an area consisting of largely soil strata with rock outcrops before entering the Ktsia River Valley containing debris flows along the valley sides. This potential instability could present further construction and long-term integrity problems.

Option B initially crosses the same lava plateau that will require some blasting for a distance of approximately 10km to excavate the trench, however the ground is stable. The route then crosses Mt. Tavkvetili, the surface of which is comprised of large boulders and rock streams that present pipeline construction difficulties, although not insurmountable. The route crosses Narianis Veli Wetland, which comprises mainly of silty soils and continues over the col with solifluction on the side. This solifluction is not of a nature or depth to present a major pipeline stability problem. The route converges with Option A before running along the Ktsia River Valley exposing the route to the problems associated Option B through this section.

The terrain/geology for Option C is similar to Option B with the exception of the relatively small re-route to avoid Narianis Veli Wetland. The soils through this section will be silts and boulders.

Option D will be similar to Option B with the exception of the route avoiding Narianis Veli Wetland and the Ktsia River Valley. The soils through these sections will be variable with a combination of silts and boulders and possible weathered bedrock on the higher sections.

Technically Option A is the preferred route up to Tabatskuri due to Option B having to cross Mt. Tavkvetili. However, from Tabatskuri to Tskhratskaro Pass, the preferred alignment follows Option D avoiding the potential instability within the Ktsia River Valley.

Environmental

An initial assessment confirmed that both Narianis Veli Wetland and the Upper Ktsia Reaches were potentially delicate ecosystems and both were recognised to have high conservation value. Both areas form part of the Ktsia-Tabatskuri Managed Reserve.

The Ktsia River is a small alpine stream that flows in an easterly direction from its upper reaches on the east side of Tskhratskaro Pass into Narianis Veli Wetland. The river becomes the main source of irrigation water for the extensive agricultural plots that exist around Tsalka Lake. In addition to the ecological value of the Narianis Veli Wetland, concerns were raised with regard to the impact of any potential sediment release into the river during construction. Mitigation techniques will be necessary in order to minimise disturbance to the riverbed and wetland areas.

In addition the Ktsia River, associated tributaries and wetlands are subject to significant seasonal variations in water level. Narianis Veli Wetland is important for birds, including rare species, and certain plants. Consideration will be given to the timing of construction in order to minimise impacts on bird populations.

Option A avoids the Narianis Veli Wetland, however is routed through the Ktsia River Valley, running parallel to the course of the River Ktsia. The route crosses either the Ktsia itself or its numerous tributaries several times before continuing all the way to the upper reaches of the Ktsia and onto Tskhratskaro Pass.

Option B crosses a natural boulder field on the ascent to Mt. Tavkvetili. Careful construction techniques and engineered mitigation measures will allow reinstatement of the boulder field. In terms of environmental impact, this route is the most sensitive, crossing both Narianis Veli and the Ktsia River Valley wetlands before converging with Option A in the Ktsia River Valley.

Option C avoids the majority of the Narianis Veli Wetland by traversing the higher ground to the north and above the wetland, however the route converges with Options A and B in the Ktsia River Valley wetland and follows the same alignment to Tskhratskaro Pass.

Option D avoids the sensitive areas around Narianis Veli and Ktsia River Valley wetlands. However, there are a number of potential archaeological sites identified along a section of route above the Ktsia River Valley. These sites will be investigated and where necessary, any significant sites will be avoided by minor re-routing or archaeological surveys will be carried out to allow 'preservation by record'.

In terms of minimising environmental impact, Option D is the proposed route.

Security

There is a potentially serious security risk associated with Option A as approximately 4km of the route passes within areas of influence from Russian Federation military operations. Security assessments concluded that the risk associated with passing through this area was high; with low risk manageability and the requirement for "hardening" measures and increased operating costs and, therefore, was not recommended.

Options B, C and D share the same basic alignment through this section. This route does not pass through these areas of influence and consequently the security risk is reduced.

Costing

The costing for Options B and C will be similar as they both follow the same basic alignment with the exception of the small re-route to avoid Narianis Veli Wetland. There are a number of conflicting factors associated with the costing of Options A and Options B, C and D. Option A has more rock and the rock is stronger resulting in more difficult trenching and more blasting. However, Options B, C and D must cross Mt. Tavkvetili, which presents a number of technical and construction related issues. As a result of these technical and construction issues Option B has been given the highest-ranking factor of 5.

3.5.7.3 Route assessment summary

Tabular assessment of selection criteria (with ranking factors).

Table 3.13 Route assessment summary for Ktsia Tabatskuri area

Selection Factor	Ranking			
	Option A	Option B	Option C	Option D
Engineering/construction	4	5	5	5
Terrain / Geology	3	4	4	4
Environment	3	4	3	2
Security	4	2	2	2
Cost	3	5	4	4
Total	**17**	**19**	**18**	**17**

Code 1 = relatively easy, no constraints, low cost
2 = some difficulty, some minor constraints, some increased costs
3 = medium difficulty, constraints and cost
4 = significant difficulty, significant constraints, high cost
5 = high degree of difficulty, major constraints, very high cost (route not practical)

3.5.8 Tskhratskaro and Tsikhisjvari area

3.5.8.1 Route options

Selecting a suitable corridor through this region was the subject of extensive evaluation in an effort to minimise the impact of the pipelines on the surrounding area and maximise reinstatement potential.

When the constraints imposed by the very narrow rocky ridges and the need to avoid the Akhalkalaki District are taken into account, the only feasible route through this area is to descend towards Tsikhisjvari along the valley leading to Tskhratskaro Pass.

Owing to the sensitivity of this area, a desktop assessment was carried out on several options, which resulted in four potential alternatives being selected for field survey and further detailed evaluation. These options A, B, C and D are shown in Figure 3.12.

3.5.8.2 Route assessment

Engineering/construction

All four options have similar engineering and construction issues of installing the pipelines in heavily forested areas. Options A and C are both routed through an area of deep seated landslides, which are regarded as unmanageable from technical and construction points of view.

Terrain/geology

Options B and D both run along rocky ridge lines on the west of Tsikhisjvari whilst Options A and C follow lower routes in softer ground conditions. Unfortunately, Options A and C pass through an area of severe landslips.

Environmental

The environmental and social issues are the most significant criteria for the selection of a pipeline corridor through the area and far outweigh all the other issues.

Approximately 85% of Option A crosses areas of high ecological significance. It comprises large areas of dense high-mountain primary woodland represented by various types of mixed, coniferous and broad-leafed (beech) forests that are important high-mountain habitat for flora. High mountainous oak, a Red Data Book species of Georgia, is common. Overall, the habitat supports high biodiversity and is rare in southern Georgia. The mixed forest provides important habitat for fauna, including bear, wolf, roe deer and wild boar.

Option B goes through dense forest dominated by both conifers (spruce, pine) and broad-leaved trees (beech, maple, wild pear). The western most part of the corridor passes through a highly sensitive area of sub-alpine crook-stem forest dominated by birch. The forest provides important habitat for wildlife and represents a landscape of high aesthetic value.

Option C goes through a dense mixed forest with spruce being the dominant species. High mountain oak, a Georgian Red Data Book species, is common. A number of highly productive economic plants are associated with the forest such as dog-rose and buckthorn. The forest is rich in edible mushrooms that are collected by the local population. In addition to the high conservation value, the forest plays an important role in stabilizing the steep slopes.

Option D, maximises the use of forest clearings, and is further away from the surface water resources of the area. Also, the length of forest crossed by Option D is less than the other options.

Security

There are no significant security issues with any of the options.

Costing

All four options have a high unit cost per kilometre for constructing the pipelines in this area. The economics of the four options were not seriously evaluated as part of the exercise except that Option D is the cheapest. Option C would be the cheapest except for the high costs involved with negotiating the landslide area (if a technical solution is in fact possible).

3.5.8.3 Conclusions

Options A and B were both discounted owing to their potential impacts on flora, fauna and livelihood of local populations.

Options A and C were discounted on account of the unmanageability of crossing the landslide area.

Option D is the most acceptable with regard to the potential landscape impacts, potential for successful reinstatement, least impact on continuous fragments of primary forest, maximum use of forest clearings and distance from the surface water resources of the area. Also, the length of forest crossed by this corridor is less than the other options.

Option D is the preferred route.

3.5.9 Outside Ktsia Tabatskuri Reserve

3.5.9.1 General

Two potential routes, which pass to the north of the Ktsia-Tabatskuri Managed Reserve, were evaluated even though these lay outside the 10km Corridor of Interest. Any alternatives to the south of the managed reserve were discounted owing to significant lengths of corridor passing through Akhalkalaki District.

Both of the route options were rejected at this stage of the route selection process due to the fact that construction of large diameter pipelines in the area would result in significantly more adverse environmental impacts and significantly higher construction safety risks than construction along the original route.

The original route, Option D, and the two rejected alternatives are shown in Figure 3.13.

Owing to the acknowledged environmental and social sensitivity in the Bakuriani area and the Ktsia-Tabatskuri Managed Reserve, further evaluations of potentia l route options were carried out at a later stage of the route selection process. These evaluations are described in detail in Sections 3.7.3 and 3.7.4.

3.5.10 Mtkvari River to Turkish Border

3.5.10.1 Route options

Three potential options were identified for further development in this area – two that cross the Mtkvari River to the northeast of Akhaltsikhe and one to the southeast. These options, shown in Figure 3.14, are:

Option A: crosses the Mtkvari River downstream of the convergence with the Uvraeli River, continues westwards and to the south of Akhaltsikhe before crossing the Potskhovi River close to the Turkish border.

Option B: crosses the Mtkvari River downstream of the convergence with the Potskhovi River, continues westwards and to the north of Akhaltsikhe before turning south and crossing the Potskhovi River. The route then runs south to the Turkish border.

Option C: initially follows the same alignment as Option B but turns south and crosses the Potskhovi River sooner. The route then runs south westwards before crossing the Potskhovi River a second time close o the Turkish border.

3.5.10.2 Route assessment

Engineering/construction

There are a number of deep, incised gullies along Option A and feasible crossings of these can only be achieved by passing close to a significant number of villages. However, the majority of the route is rolling countryside, which presents no significant problems for pipeline construction.

Option B is longer than the other two routes and passes through a landslide area north of the confluence of the two rivers. While this presents a number of routing and construction problems, a suitable route may be identified if necessary.

The terrain for Options B and C is similar to Option A in terms of pipeline construction.

The only potentially difficult area along Option C is immediately west of the first Potskhovi River crossing where the pipeline ascends a stable ridge between a number of potentially unstable hills.

Following the first Potskhovi River crossing, Option C passes through some heavily cultivated land immediately west of Vale, which will result in compensation costs. However, the option to bypass this area would significantly increase the level of construction difficulty to a degree that would be in excess of the anticipated compensation costs.

Although Option C crosses the Potskhovi River twice, the crossing locations are selected to facilitate installation of the pipelines, maximise reinstatement potential and minimise environmental impact.

None of the river crossings for the three route options presents any unmanageable problems with regards to construction.

Terrain/geology

The majority of the route for Option A is typically roiling countryside separated by the deep, incised gullies mentioned above. In addition, Option A also has areas of potential instability characterised by the presence of relatively recent landslides on the steeper sections. The route traverses predominantly cultivated land along some large terraces and through established orchards and vineyards closer to the villages.

The terrain for Option B is a mixture of cultivated and grazing land on the north side of the Potskhovi and is similar to Option A except for there being significantly fewer villages. Option B also has similar problem areas of potential instability and numerous gully crossings.

Option C is routed on lower ground than Option B and so avoids the potential instability and allows the gully crossings to be optimised with regards to construction and reinstatement. The potential impact of the two river crossings is more than offset by the avoidance of steep terrain and areas of instability associated with the other two routes.

There is little or no rock present on any of the routes; the ground conditions being either soft soil or river gravels.

Environmental

For both Options B and C at the Kura and Potskhovi River crossings (north of Vale) there is some riparian forest, which must be conserved as much as possible. Similarly, the scrub west of the Potskhovi River and in the area close to the Turkish border needs to be conserved.

A number of significant archaeological sites were identified along this section of the route for all three options. These sites may be avoided by minor re-routing or surveys to allow 'preservation by record'.

The social impact of Option A is significant due to its close proximity to the local population and the destruction of mature orchards and established vineyards.

Option B is preferable to Option A in terms of social impact but there are several environmental issues associated with the numerous gully crossings and areas of potential instability.

Option C utilises flat open areas wherever possible, which reduces visual impact and facilitates ease of reinstatement.

The broad-scale studies undertaken as part of the Scoping Phase of the SIA did not identify any issues that would affect route choice.

Security

The security through this area is not considered to present a major risk.

Costing

Option A, although the shortest of the three routes, is the most expensive both from construction and compensation points of view.

Option C is cheaper than Option B as it doesn't have the same problems with potential areas of instability and the deep gully crossings. This result still applies when the additional Potskhovi River crossing is included.

3.5.10.3 Route assessment summary

Tabular assessment of selection criteria (with ranking factors).

Table 3.14 Route assessment summary for Mtkvari River to Turkish Border

Selection Factor	Ranking		
	Option A	**Option B**	**Option C**
Engineering/construction	4	4	3
Terrain / Geology	4	4	3
Environment	4	3	2
Security	1	1	1
Cost	4	3	2
Total	**17**	**15**	**11**

Code 1 = relatively easy, no constraints, low cost
2 = some difficulty, some minor constraints, some increased costs
3 = medium difficulty, constraints and cost
4 = significant difficulty, significant constraints, high cost
5 = high degree of difficulty, major constraints, very high cost (route not practical)

3.5.10.4 Conclusions

Option A has a significant social impact due to its close proximity to the local population and the destruction of mature orchards and vineyards. It also has major technical problems relating to land instability and difficult gully crossings.

Option B has less social impact than Option A but has very similar technical problems .

Option C has the least social and environmental impact as well as minimal technical issues. Option C was selected as the preferred route.

3.6 STAGE 3: ROUTE REFINEMENT (100m SPECIFIED CORRIDOR)

3.6.1 General

The objective of this stage was to confirm the validity of the chosen 500m corridor and to undertake further refinement work to hone the corridor width to 100 metres.

The philosophy adopted for this stage was to avoid environmentally and socially sensitive locations and terrain geohazards wherever practicable. If unavoidable, engineering design and/or specific mitigation measures would be employed.

Significant attention was paid to ensuring that both the SCP and BTC pipelines could be safely constructed within the selected 100m corridor.

The route refinement process involved a desktop assessment of the work done to date, followed by a series of field reconnaissance and site investigation trips.

3.6.2 Desktop assessment

The desktop assessment considered the following criteria:

- Constructability (terrain, access, types of ground condition etc)
- Avoid known and potential archaeological sites
- Avoid known environmentally sensitive areas
- Avoid politically sensitive regions
- Avoid areas of unstable ground
- Ensure compatibility with the construction schedule
- Future development
- Technical (excessive bridging, seismic activity, erosion, flooding etc)
- Overall route length and wall thickness

3.6.3 Route reconnaissance and field trips

A number of multi-disciplinary pipeline routing surveys were undertaken in order to:

- Optimise the pipeline geometry
- Confirm the final alignment for topographic survey
- Confirm the pipeline route avoids known constraints to ensure minimal overall impact
- Establish preliminary design criteria for special sections and crossing points
- Identify specific areas that cannot be avoided and that require detailed site investigation as a precursor to designing mitigation measures

Prior to the field trip, the in-country BP security advisor confirmed that, due to perceived security threats and political instability within the Armenian enclave district of Akhalkalaki, the pipeline should be routed outside this region. To comply with this information, the route corridor was confirmed as passing through the Trialeti Mountain Range towards Bakuriani.

3.6.4 Geotechnical assessment

The geotechnical assessment formed an integral element in the route decision-making process as geohazard and geotechnical issues were evaluated continuously throughout development of the route. This continuous evaluation has resulted in a defined route that, wherever possible, avoids the high-risk locations and minimises the potential effect of geohazards on the operating pipeline.

3.6.4.1 Geohazards

The principal geohazards identified during the assessment included:

- Seismically active faults
- Landslides
- Slope instability
- Surface erosion
- River channel migration and riverbed scour

The major high-risk geohazard areas have been avoided during development of the pipeline route; however, there are several locations along the route where avoidance has not been possible. The risks at these locations are considered to be manageable and can be further reduced by measures such as:

- installing the pipeline below the depth of the basal shear surfaces of landslides
- installing the pipeline below the scour depth of rivers
- by improving ground conditions
- installing the pipeline in carefully aligned trenches at fault crossings

These locations can be classified as areas of either potential or actual slope instability. They were identified as requiring site-specific geohazard investigations to confirm the field judgements of landslide depth and hence the feasibility of installing the pipeline beneath the basal shear surfaces.

3.6.4.2 Geotechnical issues

The main geotechnical issues identified during the assessment include:

- Very difficult trenching conditions across the volcanic plateau as the area is underlain by strong to very strong volcanic rocks (basalts and andesites)
- Limited availability of backfill on the volcanic plateau
- Presence of swelling/shrinking soils across the volcanic plateau will affect foundation design
- Presence of aggressive saline soils throughout the lower level sections of the route
- Presence of loess (silty) soils in the plains south and east of Tbilisi
- Difficult reinstatement due to thin upland soils
- Deep soils prone to erosion between Sakire and Akhaltsikhe

The impact these geotechnical issues have on pipeline construction are discussed in more detail in Section 3.6.5.

It should be noted that a detailed geotechnical site investigation will be carried out by the Pipeline Installation Contractor along the pipeline route corridor. The main objectives of this site investigation will be to supplement and confirm the trenching conditions predicted in the geotechnical assessment and allow final confirmation/ selection of construction techniques for the major road, rail, gully and river crossings.

3.6.5 Construction and trenching conditions

On the basis of the geotechnical investigations and the routing surveys, it was identified that the proposed pipeline route in Georgia can be split into three distinct sections – eastern, central and western.

3.6.5.1 Eastern section (84km long)

The first 54km of the pipeline route from the Azerbaijan border traverses relatively easy pipeline terrain consisting of flat agricultural alluvium plains. The pipeline then ascends onto a volcanic plateau and continues for approximately 30km over relatively flat and occasional undulating terrain. The main construction issues through this section can be summarised as follows:

- Easy trenching conditions for the first 40km, high productivity rates
- Variable trenching conditions with varying depth of soils over weathered basalt bedrock for the remaining 30km
- River crossings shall be carried out using open cut techniques and concrete coated pipe
- Potential for trench collapse
- Dewatering and/or well-pointing in areas with high groundwater table

3.6.5.2 Mid section (138km long)

This section of the pipeline route passes through very rugged and remote terrain and is typified by relatively gently sloping (<5°) basalt pediments, broad ridge crests underlain by basalt/andesite bedrock and boulders, ridge slopes of between 10-15°, incised stream and gully channel crossings, gently sloping (5°) foot slopes and occasional 10-15° side slopes. The main construction issues through this section can be summarised as follows:

- Difficult trenching conditions with thin soils and basalt bedrock near surface requiring heavy ripping, hydraulic breaking and localised blasting
- Difficulty in obtaining backfill
- Relatively steep ridge and valley slopes (10-15°) and one 25-30° descent from a ridge crest onto a valley floor
- Relatively steep side slopes (10-15°)
- Surface water drainage required, especially in the localised deep erodible soil areas near top of and on the foot slopes
- Erosion control barriers and trench drainage required on the steeper sections
- Incised stream crossings to be installed in bedrock
- Difficult reinstatement due to erodible and thin soils

3.6.5.3 Western section (28km long)

From the River Kura crossing the pipeline continues to the Turkish border through undulating (slopes between 5° and 10°) low hills and dissected pediment (plateau) slopes crossing a number of incised stream valleys (25-30°). Several stream valleys include partially removed river fill material making them prone to erosion-induced problems. The main construction issues through this section can be summarised as follows:

- Easy trenching conditions through river terrace, high productivity rates
- River crossing shall be carried out using open cut techniques and concrete coated pipe
- Moderate trenching conditions requiring hard digging possible ripping on the low hilly sections
- Erosion control barriers and trench drainage required on the steeper sections
- Difficult reinstatement in areas where deep erodible soils are present

3.7 RE-ROUTE EVALUATIONS

3.7.1 General

A number of sections of the pipeline corridor were evaluated for potential re-routes during the whole period of the route selection process in Georgia. In the majority of cases, these evaluations were carried out as separate exercises to the main route selection and in several instances the re-route options were not adopted for a variety of reasons. The results of these evaluations were used as part of the input data for the selection of the final alignment of the two pipelines (see Section 3.8).

The following sections discuss the significant re-route evaluations that were undertaken.

3.7.2 Rustavi re-route

3.7.2.1 Background

Following the selection of the 500m wide Preferred Route Corridor in the Azerbaijan to Marneuli area (see Section 3.5.4), the Georgian authorities informed the Project that the pipelines could not be routed in the area south of Rustavi due to future strategic military plans.

As a result, an engineering survey was carried out to select a feasible route to the north of Rustavi. The routes are shown in Figure 3.8.

3.7.2.2 Scope of engineering survey

The intention of the survey was to investigate in more detail the Northern Route previously assessed and discounted (see Section 3.5.4) and identify a centreline for the 100m wide corridor. At the same time, the Southern Route was also visited in case the Northern Route proved impracticable or unviable. In determining the refined pipeline route the main considerations were as listed below.

- Ease of construction, including installation of two pipelines in the same corridor
- Proximity to developed industrial and urban areas
- Pipeline length
- Construction logistics
- Access to pipelines
- Effect on environment
- Geological factors (unstable soil, landslip, floodplains, seismic activity, etc)
- Land usage (minimising of cultivated land)
- ROW access during construction
- ROW access during operation

3.7.2.3 Route description

The first section of the route is parallel to the existing Western Route Export Pipeline (WREP) to Pump Station No. 11. From there the pipeline route heads west across a flat plateau towards the Kura River. Immediately before reaching the Kura River, the pipeline descends a small escarpment, crosses a road and a railway line and runs adjacent to a derelict water pump station on the riverbank.

From the Kura River, the pipeline heads west, crosses the main highway to the Azeri border and then west and northwest to bypass a small town and military base. The route then passes through a lightly developed industrial area, to the Tbilisi – Marneuli railway line where it turns south-west following the railway line to the north of Marneuli where it joins the previously selected route.

3.7.2.4 Factors affecting northern route selection

Azerbaijan Border to WREP Pump Station 11

- Ease of Construction

  This section of the pipeline construction is through flat terrain although the first 12km crosses many irrigation canals that will adversely affect construction lay-rates. No rock is expected through this section.

- Environment

  This portion of the pipeline follows the existing WREP pipeline and has been the subject of an earlier environmental survey. No environmental problems were identified in this earlier survey.

- Crossings

  The pipeline must cross a number of irrigation canals and an asphalt road. These crossings may be completed using traditional "open-cut" methods with no difficulty.

- Population

  The pipeline route does not pass close to any centres of population.

- Geological Factors (unstable soil, landslip, floodplains, etc)

  Being a flat plain comprising of stable soil no geological problems are expected. Additionally, little or no rock is expected.

WREP Pump Station 11 to Marneuli Railway Line

- Ease of Construction

  The first portion of this section is across a flat plateau and does not present any construction problems. Also, the section between the Kura River and the Tbilisi-Marneuli railway line is across a flat soil plain that facilitates easy construction. Prior to reaching the railway line there are a number of derelict factories although there is adequate space available for constructing the pipeline.

  The difficult area will be the crossing of the main road to Rustavi, the main railway line to Azerbaijan and the Kura River, all of which occur at the same place. There is also significant industrial development at this crossing point and thus little unused land for constructing the pipeline.

- Environment

  The majority of this section is across relatively flat rolling agricultural / pastoral plain with a number of minor watercourses and some reed beds adjacent to a quarry east of the Kura River.

  It is understood that there are a number of important archaeological sites along the section east of the Kura and care will have to be taken to ensure that no archaeological site is disturbed during the construction. Additionally, the route may require some minor revisions to bypass archaeological sites.

- Crossings

  This section of the pipeline includes the crossing of the Kura River.

  It is possible to construct the pipeline under these obstructions although it is difficult and expensive. A more practical option would be to use directional drilling techniques to cross the rail line and river in one operation and cross the road using traditional thrust boring.

- Population

  The pipeline does not pass directly through any population centres although immediately west of the Kura River there are a large number of multi-story blocks of flats.

  In addition, the industrial areas at the Kura River and Marneuli–Tbilisi rail line will result in the pipeline being classified as Class 2.

- Geological Factors (unstable soil, landslip, floodplains, etc)

  Being largely a flat plain comprising of stable soil no geological problems would be expected. Additionally, little or no rock is expected.

  However, at the Kura River rock is present and a detailed geotechnical investigation will be required in order to determine the optimum method of crossing the river.

Marneuli Railway Line to Main Route

- Ease of Construction

  Construction through this section will be relatively easy, the terrain being relatively flat and there being no significant obstructions.

- Environment

  The route is largely through agricultural / pastoral areas and any environmental impact is expected to be minimal.

- Crossings

  The only crossings along this section are the rail line and road leading into Marneuli where the pipeline joins the previously selected route. These crossings however may be negotiated without difficulty.

- Population

  The pipeline does not pass through any population centres although there is a large town in the vicinity of the pipeline on the opposite side of the main rail line.

- Geological Factors (unstable soil, landslip, floodplains, etc)

  Being largely a flat plain comprising of stable soil no geological problems are expected. Additionally, little or no rock would be expected.

3.7.2.5 Conclusion

It is feasible to install the BTC and SCP pipelines along Northern Route and a 100m wide corridor has been identified for such purpose. The selected route satisfies the Georgian authorities with regards to military requirements and poses no significant environmental, social or construction problems. However, it should be noted that the selected route is several kilometres longer than the original preferred route with a commensurate increase in installed cost.

3.7.3 Bakuriani / Tsikhisjvari Area alternative route evaluation

Selection of a route through this region has resulted in extensive evaluation of many alternative routes in an effort to minimise impact of the pipeline on the surrounding area and maximise reinstatement potential. Several routes have been reviewed and evaluated on more than one occasion in an effort to avoid this sensitive region.

The region contains high value landscapes, primary forests of high conservation value and sensitive water resources. The latter issue being particularly sensitive because the surface waters around Tsikhisjvari collect into the Borjomola River that flows through the Borjomi mineral water park.

Alternative routes to north and south of Tsikhisjvari Area have been evaluated during development of the route. The terrain through these areas is extremely rugged and can be characterised by steep narrow rocky ridges separated by valleys containing deep erodible soils with inherent instability problems. Construction of two large diameter pipelines through this type of terrain is extremely difficult and in some places impossible. Major earthworks, blasting and removal of vast quantities of surplus material to establish a ROW would result in irreversible damage and unacceptable environmental impacts to the surrounding area.

Reinstatement through this type of terrain is also very difficult due to the presence of rock, steep gradients, thin soils and high potential for erosion. The visual impact following reinstatement would be significant and the ROW would remain visible through areas of high landscape value.

The alternative routes to the north of the selected route are detailed in Section 3.7.4 of this report (Bakuriani and Tabatskuri Re-route Evaluation) and the alternative route to the south of the selected route is detailed in Section 3.7.5 of this report (West of Tabatskuri).

Taking into consideration the constraints imposed by the rugged terrain to the north and the requirement to avoid the Akhalkalaki District, the only feasible route through this area is the selected route via Tskhratskaro Pass, Tsikhisjvari and Kodiana Pass. This route avoids the majority of rugged terrain and the final alignment has been chosen to maximise reinstatement potential.

Having established the only feasible route through this region and optimised the final route alignment to mitigate any residual terrain related impacts, it was recognised that the potential impact of the oil pipeline on the sensitive groundwater resources in the region needed to be understood.

The town of Borjomi and the mineral water park are located some 15km from the selected pipeline route, however the surface waters around Tsikhisjvari collect into the Borjomola River and flow through the mineral water park. In order to determine the potential impact of an oil spill in the area, a detailed analysis was carried out to understand the local hydrogeological regime and the potential for oil spills to contaminate the groundwater resources. (see report by Professor John Lloyd contained as Appendix 1 in the ESIA Addendum).

A summary of the report is given below:

Four hydrogeological conditions in need of discussion were identified in the area:

1. Groundwater in the Cretaceous calcareous and the Palaeocene flisch sequences used by the Georgian Glass and Mineral Water Company (GGMWC) as a 'mineralised' source.

2. Groundwater in volcano-clastic and lagoonal deposits along the pipeline ROW.

3. Groundwater in lavas in the interfluve of the Borjomola and Gujaretis Tskali catchments used by Borjomi as a water supply and the GGMWC as a 'fresh' source.

4. Groundwater in valley alluvium in which is intimately linked to surface water and from which some local water supplies are obtained.

The following conclusions were reached as a result of the analysis:

- The Cretaceous system (item 1) would not be affected in the event of an oil spillage
- The lavas in the interfluve between the Borjomola and Gujaretis Tskali catchments (item 3) would not be affected in the event of an oil spillage
- In the event of a spillage into the volcanoclastic and lagoonal deposits (item 2) along the pipeline ROW, the hydrogeological characteristics are such that contaminant travel times would be sufficiently slow to permit effective remediation
- Water supplies drawn from the river valley alluvium in the River Borjomola (item 4) could be contaminated by hydrocarbons in the river waters in the event of an oil spillage

3.7.4 Bakuriani and Tabatskuri re-route evaluation

3.7.4.1 Background

The base case route for the BTC and SCP pipelines passes through two sensitive areas within the Tabatskuri and Bakuriani Regions of Central Georgia. The two areas are referred to as:

- Prospective Development of the Big Bakuriani Territories
- Ktsia-Tabatskuri Managed Reserve

There are several issues associated with the alignment through these two areas that were considered could result in potential opposition to the pipeline route during development of both projects.

A desktop review was initiated to identify an alternative pipeline route that would avoid the two sensitive areas whilst maintaining the project goal of minimum environmental impact. A provisional 1km wide corridor was identified during this review and a route survey field trip was organised to prove the route.

This provisional 1km corridor formed the basis of the route survey.

3.7.4.2 Scope and methodology of route survey

The initial scope for the route survey was to evaluate the feasibility of constructing two pipelines within the provisional 1km corridor identified during the desktop review.

Alternative routes would also be identified and evaluated during the route survey to provide the optimum 1km wide corridor that would avoid the two sensitive areas within the Tabatskuri and Bakuriani Regions of Georgia.

The route survey was carried out using a combination of 1:25,000 scale topographical maps and 1:15,000 scale colour aerial photography.

Transportation was restricted to a combination of 4x4 vehicles to gain access to the routes and walking when vehicular access was not possible.

Each potential route was evaluated in terms of the technical feasibility to construct and operate two large diameter pipelines and the potential environmental impact. The selected alternative route would be centred on a 1km corridor to allow the final pipeline alignment to be optimised during the route definition survey.

3.7.4.3 Route description

Three alternative routes were reviewed:

Base case (existing) route

The base case route continues west of Avranlo and traverses open pasture with moderate (10°) slopes. The ground is well drained and the pasture is cut for winter hay. The altitude through this section of the route is 1,750m, rising to 2,300m.

This area is remote and during the winter months becomes inaccessible to wheeled vehicles. After approximately 6km, the pipeline route rises through more rugged terrain, with a steep rocky ascent onto a small plateau, passing east of Mt. Tavkvetili, a volcano south of the Trialeti mountain Range. The route descends the plateau into the Narianis Veli wetland, entering the Ktsia–Tabatskuri Managed Reserve – a total length of approximately 12km.

The terrain through this section is again open pasture and the pipeline route avoided the lower wet plain by remaining in the slightly higher undulating dry valley sides. The route ascended over a narrow col descending towards Tabatskuri village, passing approximately 2km north of Tabatskuri Lake.

To avoid the environmentally sensitive Narianis Veli Wetlands, the route ascends onto a rounded dome volcano and rose to a high point of 2,485m. The ground conditions through this section are deep soils and boulders. The pipeline route exits the Ktsia-Tabatskuri Managed Reserve for a distance of 3km at this point.

The route continues west over a second slightly lower volcano before approaching Tskhratskaro Pass (“Nine Springs”). The elevation at this point is 2,454m. The route up to the pass is through soils and rock.

The route exits the Ktsia-Tabatskuri Managed Reserve, and immediately enters the Prospective Development of the Big Bakuriani Territories. The pipeline remains in this area for a distance of 9km.

The pipeline route descends the valley and crosses the narrow winding track in two places. The pipeline route continues along the valley floor for approximately 4km before crossing a small stream and heading west through 2km of deciduous woodland and several minor stream crossings. The route exits the woodland and passes to the south of the small village of Tsikhisdjvari.

The pipeline route then ascends a shallow sloping (5°) ridge approximately 50m wide and continues west towards Sakire. Approximately 2km of the route along the ridge passes through a mixture of deciduous woodland crossed by numerous logging tracks. Wherever possible the pipeline route utilises existing clearings.

Beyond Sakire, there are a number of gully crossings in open pasture.

It is worth noting that the pipeline route is reasonably level which in most cases will not require benching. Access to all parts of the route can be obtained during normal weather conditions.

The base case route is shown in red on Figures 3.15, 3.16 and 3.17.

Provisional re-route 1km corridor

The provisional 1km corridor identified during the desktop review followed the Didi-Djamjama and Gudjareskal River Valleys and was rejected early during the route survey due to the following:

- The river valleys are too narrow even with a reduced ROW
- The valley sides are too steep and dissected by incised gullies
- Sections of the valley sides are unstable
- Construction of the ROW through the valley between Rekha and Gudjareti would require the river to be re-directed
- Removal and disposal of excavated material to form ROW would be impracticable
- The corridor passed through sections of mature forest along the valley floor and sides
- Construction of the ROW would involve crossing a number of deeply incised river gorges (250m deep by 500m wide)
- There are no existing access points between Rekha and Gudjareti (section length approximately 14km)
- The corridor passed through areas of primary woodland and forest habitat

The route of the Provisional Re-Route 1km Corridor is shown between the parallel lines (coloured blue) on Figures 3.15, 3.16 and 3.17.

Selected re-route corridor

The re-route commences west of Avranlo at an elevation of 1,750m and heads northwest towards the Trialeti Mountain Range. The ground is open pasture used for livestock grazing and is also cut for winter hay.

Initially, the terrain is moderately hilly rising to 2,000m, some benching will be required during construction of the ROW. The pipeline route crosses several small streams in the first 6 – 7km.

After 8km the route heads north, ascending a spur (slope 20°) onto a narrow ridge, elevation 2,359m, in the Trialeti Range. The route then turns and heads west following the natural undulating ridgeline, which contains several rock outcrops and the north face is covered with wild plants and fauna.

The route descends into a valley at elevation 1,800m and crosses several minor gullies. There is a reasonable amount of benching required in this section. The route ascends again to a ridgeline before heading west along this ridge for approximately 1.5km before a steep descent of 45 degrees is required. Turning north to avoid a large landslide area the route descends 400m in elevation through forest, into a valley and minor river crossing.

The route ascends 300m out of the stream valley through decomposing forest and possible unstable ground.

Heading west over small hillocks, the route follows a ridgeline and undulates between minor peaks. This ridge is narrow and lightly wooded and dominates the surrounding countryside. Several large birds of prey were noted.

Next the route descends steeply along a narrow ridge to a minor track and stream crossing.

For the next 13km, the route passes through a naturally regenerating primary forest area. The route ascends 275m in elevation to a peak following an undulating narrow ridge of varying width, overlooking Bakuriani (holiday and ski resort) to the south.

Approximately 7km beyond the peak, the pipeline route descends into the Borjomi valley, crossing the main Bakuriani-Borjomi road, traverses east to a minor river crossing before ascending and entering the Prospective Development of the Big Bakuriani Territories. The route continues through this area for a distance of 6.6km.

The route crosses a narrow gauge railway (Bakuriani to Borjomi) and a disused narrow gauge railway. There is one major river crossing in rock and there is one area of possible minor ground instability.

The route of the Selected Re-route Corridor is shown as a solid line (coloured orange) on Figures 3.15, 3.16 and 3.17.

3.7.4.4 Re-route constraints

- Ridges

ROW Ridge Width (m)	Length (km)
2 to 20 m	14.2 km
10 to 20 m	3.4 km

- Crossings

Crossing Type	Ascent/Descent Slope	Quantity
Steam/River	<15°	9
Stream/Valley	15 to 30°	4
Stream/Gorge	>30°	3

- ROW Slope Angles

ROW Slope Angle	Length (km)
0 to 10°	22.6 km
10 to 20°	15.8 km
20 to 30°	6.4 km
30 to 45°	1.9 km

- Woodland/Forest Sections

Woodland/Forest	Length (km)
Sparse Woodland	3.0 km
Primary Sub-Alpine Woodland	5.0 km
Primary Alpine Forest	17.0 km

3.7.4.5 Conclusions

The route survey initially reviewed the provisional 1km corridor but this was rejected as technically unfeasible. The terrain to the north of the existing base case route is significantly steeper, rugged and is characterised by narrow rocky ridgelines separated by unstable valleys containing deep erodible soils. Several alternative routes were considered during the survey before the selected re-route was identified.

The total length of the re-route section is 46.75km compared with 46.1km for the base case route length. The re-route also passes through approximately 25km of forest and woodland compared with approximately 4km of woodland for the base case route length.

The re-route section will involve constructing the ROW on top of ridges for a distance of approximately 18km. The width of the ridges varies considerably and in many places they are only 2m wide. Construction of the ROW will involve significant flattening of the ridges that are in some cases are forested.

One section of the re-route follows the narrow forested ridge that forms the boundary of the Bakuriani Ski Resort.

Construction access will be extremely difficult and may require the use of helicopters and complex winching operations during line pipe stringing.

The Environmental Survey Report for the area has categorised a number of the sections along the route with a conservation value as high.

The existing base case route section traverses significantly easier terrain than the alternative re-route and has the following distinct advantages:

- Reduced HSE risks due to less severe terrain
- Reduced environmental impact
- Easier ROW reinstatement
- Fewer woodland and forested sections
- Reduced construction complexity

- Less steep sided stream/gully crossings
- No ridge sections
- Fewer steep ascents and descents
- Less ROW benching

3.7.5 West of Tabatskuri

3.7.5.1 Background

During the early part of 2002, GIOC proposed an alternative route that avoids the environmentally sensitive Tsikhisdjvari by traversing the southern flanks of Mt Karakia. As a result, a field reconnaissance trip was made and a detailed assessment made using the information gathered together the results of previous studies and fieldwork in the area.

In addition to the base case route (AGT Route) previously identified for the project and the route proposed by GIOC (the Karakia Route), a second alternative route (the BP Central Route) was assessed. These three routes are shown on Figure 3.18, viz:

- Karakia Route (southern flanks of Mt. Karakia and south of Akhaltsikhe)
- BP Central Route (via Aspindza)
- AGT Route (via Bakuriani area)

3.7.5.2 Scope and methodology of the work

The assessments of the three routes considered terrain issues that would hinder and/or prevent the construction and operation of the pipelines. These issues include:

- the effects of geohazards e.g. landslides, surface erosion, river channel change
- the geotechnical aspects of constructability eg trench excavatability, availability of suitable trench backfill

Assessment of the Karakia and BP Central Routes was made by walk-over, drive-over in 4x4 vehicles and by helicopter fly-over. The comparative assessment of the AGT Route was made using previous and existing knowledge of the route and by helicopter fly-over.

The methodology was based on a series of steps using terrain evaluation techniques:

- Identification of the terrain and geohazard factors to be taken into account in identifying an 'acceptable route'
- Development of a classification of terrain and geohazard constraints for the routing of the pipelines
- Evaluation of constraints on 1:25,000 scale topographic maps and production of a Constraints Map depicting the distribution of constraint classes over the areas being assessed
- Ground truthing of the Constraints Map for the alternative routes by walk-over, drive-over and/or helicopter fly-over
- Calculation of simple statistics that summarise the route characteristics
- Description of the key areas of constraints traversed by the three routes

3.7.5.3 Overview of terrain and geohazard factors for pipeline routing

Terrain conditions, such as slope steepness, and specific geohazards, such as stability and erosion, are important factors in identifying acceptable routes for pipelines. Factors requiring particular attention in selecting acceptable route(s) for the section of the AGT Pipelines considered here include:

- Combined width of the right of way for the two pipelines: generally 44m with additional width at crossings; short lengths may be handled as 'special sections' with widths of not less than 25m
- Longitudinal gradient: minimise the lengths of pipeline with longitudinal gradients of more than 35 degrees; the practical maximum gradient is 45 degrees
- Side gradient/benching: minimise the lengths of pipeline in sidelong ground; practical maximum side gradient is 40 degrees
- Stability (landslides): avoid unstable ground and land likely to become unstable during the life of the pipeline
- Incised gullies: beware of actively eroding incised gullies adjacent to the right of way; minimise crossings of incised gullies
- River crossings: minimise number and length of crossings; allow for bed scour, bank instability, bank migration and changes in channel position
- Excavatability of the right of way and pipe trench: minimise rock excavation
- Spoil management: minimise difficulties with temporary storage and replacement or disposal of spoil, including minimising cost of processing spoil for pipe backfill and padding
- Reinstatement: maximise the potential for complete reinstatement of the right of way and other works

These factors need to be considered together. For example, the traverse of a gently sloping, narrow and sinuous ridge or spur in soils may be less acceptable than the ascent of a broad but more steeply sloping hillside in rock.

3.7.5.4 Classification of terrain and geohazard constraints for pipeline routing

A classification of terrain and geohazard constraints was developed in order to provide a simple summary suitable for the comparison of the three pipeline routes considered in this report. The classification, which is given in the table below, is illustrated by the terrain block models (Figures 3.19 to 3.23).

Table 3.15 Classification of terrain geohazard constraints for pipeline routing

Constraints Class	Description	Examples
I Few or No Constraints (See Note 4)	Acceptable routes are easy to locate; routine pipeline construction methods can be applied	- 'Dish Meadow' (above Damala); - Lower part of descent from Tskhratskaro Pass towards Tsikhisdjvari; - Agricultural land west of the Mtkvari (Kura) West River Crossing; - Agricultural land between Potskhovi River Crossing No. 1 and Vale
II Minor Constraints (See Note 4)	Combinations of moderately steep terrain, landsliding, gullying and surface erosion mean that there are some limitations on pipeline routing; however, acceptable routes are readily identified	- Minadze Plain (excluding mudslide area); - Middle part of descent from Tskhratskaro Pass towards Tsikhisdjvari; - Agricultural land north of the Mtkvari (Kura) River near Akhaltsikhe; - Ascent to 'Dish Meadow' (above Damala)
III Major Constraints	Combinations of steep terrain, landsliding, gullying and surface erosion mean that there are few acceptable routes; such routes may only lie in one direction and/or may require civil engineering works; this class also includes major river crossings and is likely to require site-specific geotechnical investigations	- Upper part of descent from Tskhratskaro Pass towards Tsikhisdjvari; - Minadze Plain Mudslide crossing; - Kodiana Pass; - Northeast trending ridge east of the south of Velis Keli
IV Extreme Constraints	Combinations of steep rugged terrain, landsliding, gullying and surface erosion mean that there are unlikely to be acceptable routes; short excursions into Class IV may be feasible with major and extensive civil engineering works; will require site-specific geotechnical investigations	- North facing slope of Velis Kedi (ridge) leading down to the Ota River; - North facing slopes between Tiseli and Tkemlana, leading down to the Mtkvari (Kura) River; - Southern flanks of Mt. Karakia
V 'No Go'	Terrain constraints are such that pipeline construction is not possible (See Notes 2 and 3)	- Major landslide complexes; - North facing slope of Velis Kedi (ridge) leading down to the Ota River and the Mt. Karakia massif

3.7.5.5 Summary of route characteristics

The classification of terrain and geohazard constraints set out on Table 3.15 was used as a basis for depicting the distribution of constraint classes along the three routes. The length of each route lying within the constraints classes is summarised in Table 3.16 below:

Table 3.16 Length of routes in the terrain and geohazard constraint classes

Constraints Class	Length of Route in Constraints Class (km)		
	Karakia Route	BP Central Route (via Aspindza)	AGT Route (via Tsikhisdjvari area)
I Little or No Constraints	7.3	15.9	12.5
I^R Little or No Constraints	0.6	7.8	0.1
II Minor Constraints	19.4	28.7	32.5
II^R Minor Constraints	11.2	6.5	1.1
III Major Constraints	21.8	14.3	28.5
IV Extreme Constraints	11.6	7.5	2.9
V 'No go'	7.3	0.0	0.0
Total length of route (km)	79.2	80.7	77.5

Note: ^{R} indicates that heavy ripping or blasting, together with increased processing for padding and backfill is likely to be required.

Key areas of constraints

Constraint Classes IV and V are 'Severe Constraints' and 'No Go' respectively. This section briefly describes the Class IV and V areas that are traversed by the three routes.

- Class V areas

  The Karakia Route traverses three areas where, for geohazard, geotechnical and constructability reasons, it was judged that there are no acceptable routes for the AGT Pipelines. They were therefore classified as Class V, leading to the conclusion that the Karakia Route is not possible. These three Class V areas are:

  – Mt. Karakia Massif and the Velis Kedi ridge – an area of rugged mountainous terrain with steep narrow rocky ridges, deep gorges, and unstable areas
  – Landslide complex west of the Mtkvari (Kura) River, downstream of Aspindza - this complex comprises major mudslides and rotational and translational landslides, which extend from river level almost to the top of the Kura Gorge
  – Possible landslide complex south of Akhaltsikhe

Class V is not traversed by either the AGT or BP Central Routes.

- Class IV areas

The Karakia Route traverses three areas judged to be Class IV:

- Areas around the flanks of Mt. Karakia Massif – rocky ridges and gorges, with landsliding
- Small areas near the Mtkvari (Kura) River downstream of Aspindza
- Area from near Muskhi , via Adriatsminda Village to south of Akhaltsikhe – rocky ridges and gorges, with landsliding

The BP Central Route traverses three areas judged to be Class IV:

- Descent from 'Dish Meadow' – descent on a narrow ridge that commences in Class III but becomes Class IV
- Northwest of Aspindza – the route passes through a narrow strip of Class IV adjacent to major landslide complexes
- Ascent onto Minadze Plain – the final part of this ascent is on a series of narrow ridges that are Class IV

The AGT Route traverses one area of Class IV:

- Tiseli & Tkemlana – an area of instability and erosion requiring careful routing to avoid problems

Near the Turkish border all three routes traverse an area where the landforms suggest the presence of a landslide complex. This area was visited as part of the Construction Corridor Assessment for the AGT Route and was assessed to be stable. The landforms were assessed to be the result of the disposition of volcanic rocks, including volcanic domes and ridges, lava flows and pyroclastic deposits.

3.7.5.6 Conclusions

The principal conclusions that may be drawn from the evaluation are:

- The routes are approximately the same length. The Karakia Route has the less refined alignment. It is considered that production of a refined route that minimises particular hazards or difficulties would increase its overall length (but see note below about Class V areas along this route)
- The BP Central Route traverses significantly more Class I (including I^R) – 23.7km (mostly in Class I), compared with 7.9km for the Karakia Route, and 12.6 for the AGT Route
- All three routes traverse broadly the same lengths of Class II (including II^R) – 30.6 to 35.2km. But note that the AGT Route has much less in Class II-R. Class II-R occurs on the lava flows and rocky areas south of Velis Kedi ridge (east of Aspindza) and west of the Mtkvari (Kura) River
- The AGT Route traverses the greatest length of Class III (Major Constraints) – 28.5km. The BP Central Route traverses the least length of Class III – 14.3km
- The Karakia Route traverses significantly more Class IV (Severe Constraints) than the other two routes – 11.6km, compared with 2.9km for the AGT Route

- The Karakia Route is the only one that traverses Class V ('No Go') – three lengths with a total length 7.3km (as described in Section 3.7.5.5 above) (see Photos 8 to 12 at the end of Section 3). And, as such, is therefore judged not to be possible
- The Class V ('No Go') areas along the Karakia Route could be avoided by:
  - adopting the AGT Route (via the Tsikhisdjvari Area) - going down Tskhratskaro Pass (Class III) and thence via Tsikhisdjvari (Classes I and II), Kodiana Pass (Class III), Tiseli & Tkemlana (Class IV) to Minadze Plain (Class II, with one area of Class III);

  or by

  - adopting the BP Central Route (Via the Aspindza Area) - going south of the Mt. Karakia Massif, and then avoiding the traverse of the Velis Kedi Ridge by traversing the lavas that lead up to 'Dish Meadow' (Classes I and II); then descending towards Aspindza (Class IV); and, whilst avoiding eroded and land slipped ground, ascending through Class II, III and IV to join the AGT route on Minadze Plain

3.8 STAGE 4: SCP AND BTC CENTRELINE ALIGNMENT

3.8.1 General

The objective of this stage is to select the final alignment for both the BTC and the SCP pipelines within the 44m FCI-ROW and prepare route alignment sheets for both lines at a scale of 1:2,500 scale.

3.8.2 Discussion

The pipeline route, using the centreline of the 100m corridor as the basis, was walked for its entire length. The 44m FCI-ROW was verified 'on-the-ground' as being suitable and minor deviations to the centrelines of the BTC and SCP pipelines were identified. These deviations were carefully evaluated by all relevant disciplines within the project before being accepted.

Other work undertaken during this stage and providing input into the final route selection includes:

- Assessment of and consultation with local communities
- Detailed assessment of cultural heritage sites through field investigations
- Detailed reinstatement survey and preparation of reinstatement specification
- Detailed geotechnical surveys and laboratory testing of landslide and mudslide areas
- Detailed hydrology surveys of major river crossings
- Collection of river bed sediments samples
- Detailed assessment of dry gorges
- Final refinement of seismic crossing designs
- Detailed topographic surveys

Some of this work is currently ongoing with final issue of route alignment sheets planned for September/October 2002.

3.9 REFERENCES

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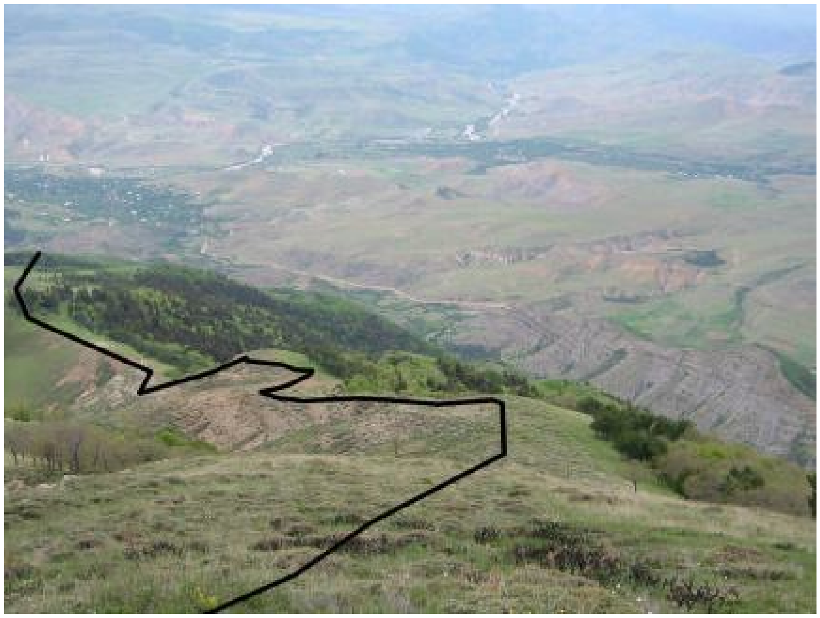
PHOTOGRAPHS

Photos 1 to 4: Difficult descent from the volcanic plateau above Aspindza



Photos 5 to 7: Borjomi – Kharagauli National Park

Photos 8 to 12: Karakia Route

PROJECT DESCRIPTION

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4 PROJECT DESCRIPTION

4.1 INTRODUCTION

This section of the ESIA Addendum addresses feedback from the public disclosure and consultation period in relation to environmental and engineering issues. With the exception of issues that relate to potential environmental impacts all responses have been supplied by the engineering firms, and BP, who are undertaking the engineering design of the pipeline and facilities on behalf of BTC Co.

Within each section the concerns, suggestions and requests for additional information received from the project stakeholders are summarised and a response is provided. As far as practical the order of appearance of each issue follows by the normal sequence of major infrastructure development: pre-construction, construction and normal operation.

In the period in between the issue of the Draft for Disclosure version of the ESIA Report in April 2002, and the preparation of this Addendum (September 2002), the project design Base Case has continued to be developed by the Define stage engineering design teams.

Construction contractors have also now been selected to provide detailed design, construction, and installation services.

Detailed execution plans require approval by the BP Engineering Management team prior to implementation. However, the following sections describe both:

- The significant developments to the project plans that have taken place, and now form the base case proposal for the project
- The preliminary plans proposed (by the Contractors) that are considered likely to become base case

4.1.1 Pig traps and pigging

The pipeline shall be piggable, and suitable for the use of intelligent pigs.

Appropriate facilities will be provided at all terminals, pump stations, intermediate pigging stations and pressure reduction stations, to allow for intelligence pigging and wax handling, etc.

The number and location of intermediate pigging stations will be confirmed following final review of the Wax Management Plan in December 2002. In the meantime, the intermediate pigging station, IPSG1, will be considered as an optional item (and subject to engineering definition only). The IPSG1 is currently proposed as an option at KP 204.5, and will be subject to engineering definition.

All intermediate pigging stations will have no operations personnel, but will have 24 hours per day security personnel on duty.

Power supply at IP is generated locally using 2 x 100% diesel engine driven generators ie 1 x 100% with 1 x 100% backup.

4.1.2 Co-location of the custody metering facilities, the Georgian off-take, and the proposed BTC PS-G1

PSG1 will be located at KP 3.8 and co-located with the SCP Georgian Off-take Station.

Environmental advantages include:

- Shared single access road instead of two separate roads
- Synergies of shared utilities (water supply, wastewater treatment, electricity generation equipment) and facilities
- Reduced footprint
- Energy efficiencies
- Improved security

4.1.3 Valve stations

There will be 16 block valves and 10 check valves. Figure 4.19 shows the location of the valves along the route.

4.1.4 Pipeline wall thickness

In Georgia, the Base Case design necessitates that for a 46" OD grade API 5L X70 linepipe, a design wall thickness of between 12.7mm and 23.8mm is required depending on the MAOP, and location of the pipe, in the following range: 12.7mm to 23.8mm.

The precise range of wall thickness shall be verified in line with design development.

4.1.5 Proposed pipe yards and worker camp sites

The construction contractor has proposed the following Pipe Yards:

- Gatchiani
- Marneuli
- Tetritskaro
- Tsalka 2
- Tsikhisjarvi
- Atskuri
- Akhaltsike

The construction contractor has proposed the following worker camps:

- Marneuli
- Tsalka
- Akhaltsike

Hotel accommodation may be used at Bakuriani.

4.1.6 Leak detection

A modern leak detection system (LDS) will be installed. It will operate by comparing actual profiles of flow, pressure, temperature and density with modelled profiles of the same parameters. The time taken to detect a leak will be dependent on the size and location of the leak. The accuracy and repeatability of the instrumentation (flow, pressure, temperature) will be selected to optimise the LDS which will ensure it remains reliable.

The leak detection system shall include metering facilities at entry to the pipeline at Sangachal, at intermediate pump stations, and at exit from the pipeline at the Ceyhan Terminal.

4.1.7 Pump stations

The proposed pump stations PSG1 and PSG2 are expected to occupy an area of approximately 8 to 9 hectares and will include the following facilities:

- Five mainline pumps with turbine drivers in parallel (four would operate at 80% capacity or greater, with a fifth on standby)

- Crude oil topping units and produced fuel (CTD) storage tanks with bund(s) (for the fuel production should gas not be available from the proposed SCP. A dedicated flare will be associated with this facility if crude a topping plant is installed

- A crude surge relief tank at PSG1 will be installed

- Site for future installation of a fuel gas conditioning unit (pressure control, filtering, heating) and metering (provided by SCP) in the event that Shah Deniz gas is available for the pump turbine drivers and site generators

- Utilities (power generation, potable water, nitrogen, air, open and closed drain systems)

- Wastewater treatment facilities

- Firewater system including; fire water storage tanks, ring main, jockey pumps, an electrically driven fire pump, two diesel driven fire pumps, fire monitors, foam monitors, a deluge system within the pump house, sprinkler systems within all buildings, and a retention pond

- Three diesel/natural gas fuelled generators to provide on-site power generation

- Gas conditioning (including pressure control, filtering, heating, etc) and metering facilities (provided by the SCP facilities) in the event that the pump turbine and generator drivers are gas fuelled

- Fiscal metering package (PSG1 only). An additional gas metering package may be installed for fiscal metering of exported gas for the SCP Export project

- Local control room, controls and telecommunications system with an uninterruptible power supply (UPS), offices, warehousing, workshops, accommodation and a security gate house

- On-site power generation will be initially provided by three (two duty, one standby) diesel fuelled generators, followed by three (two duty, one standby) gas fuelled generators when SCP gas becomes available. The diesel-fuelled generators will be retained as "back-up" in the event of loss of SCP gas

4.1.8 Export system monitoring and pipeline surveillance

Closed circuit television (CCTV) and intruder alarm systems will be provided at each facility and block valve site for the purposes of security surveillance.

4.1.9 Helicopters

Provision will be made for the use of helicopters to support normal and emergency operations. In particular, they will be used to facilitate emergency response, such as medical evacuation or spill equipment, and normal or intermittent surveillance of the corridor should events require prompt investigation.

The strategic need, locations, and the minimum requirements to facilitate helicopter services will continue to be developed during the detailed design.

4.2 PROJECT DESIGN BASIS

4.2.1 Issue: Facility design

Description of Issue
General: A comment was made that the HGA requires a design life of 40-60 years for the development, which may not be addressed by the 40, 30, 20 year duration proposed in the current design. In addition, further information is sought on the following: • Pipeline diameter and reasoning behind 46" vs 42" • Anticorrosive coating • Pipeline thickness (along the section and their justification eg pressure, environmental sensitivity, etc) • Application of safety factors to the pipeline design Crude Oil Characteristics: A request was made for more detailed description of the oil being pumped. Condensate from Shah Deniz is likely to have different characteristics than the design crude. A request was made for additional information to be provided on the transport (spiking or batching) of condensate and adequacy of equipment and design selected. A comment was also made on whether or not the condensate injection in the oil line has been taken into account in the ERA. Hydraulic Design: Further information was sought on pumping characteristics at reduced and full flow, together with the corresponding hydraulic conditions, surge conditions and how are the SD condensates likely to be pumped (spiking, batching, etc).
Issue Drawn from Comments: 166, 322, 788, 789, 792, 863, 865, 867, 1098, 1430, 1511, 1531, 1700, 1753, 1762, 1771, 1772, 1775, 1776, 1777, 1778, 1779, 1780, 1782, 1788, 1790, 1791, 1795, 1802, 1808, 1825, 1906, 2016, 2268, 2274, 2302, 2561, 3078, 3150, 3216
Issue Relates to Following Sections of ESIA: Section 5

Response To Issue

Design life

The Project ESIA and the Project Design Document (PDD) both indicate consistently that the Design Life of the various Project elements are: 40 years for the pipeline, 30 years for the facilities (pump stations, pigging stations and other AGIs), with the exception of the oil pumps and drivers that will have a design life of 20 years. The PDD further indicates that the project service periods of 40 to 60 years referenced in the HGA will be achieved by way of a comprehensive program of regular inspection, preventive maintenance, and timely upgrade/replacement of material and equipment.

Therefore, it is incorrect to state that the HGA would not address the 40, 30 and 20 years quoted in the PDD or the ESIA. Both sets of design life periods are consistent and the longer design life expectancies are achieved through enhanced service and maintenance programs.

Hydraulic design

The flow at pump station PSG1 and PSG2 is controlled by varying:

- The number of pumps in operation
- The speed of the operating pumps

The table below shows the operating conditions at PSG1 and PSG2 for differing throughputs of crude.

Under various surge conditions the maximum surge relief volume at PSG1 is 1,050m^3 and a maximum flowrate of 4,600m^3/hr. The surge discharge set point at PSG1 is set at 5,000kPa.

If shipped the condensates could be either batched, or more probably injected into and blended, with the main product stream. At present no facilities have been included for the batching of products within the BTC Pipeline system, however, the retrofitting of such facilities is not a major task.

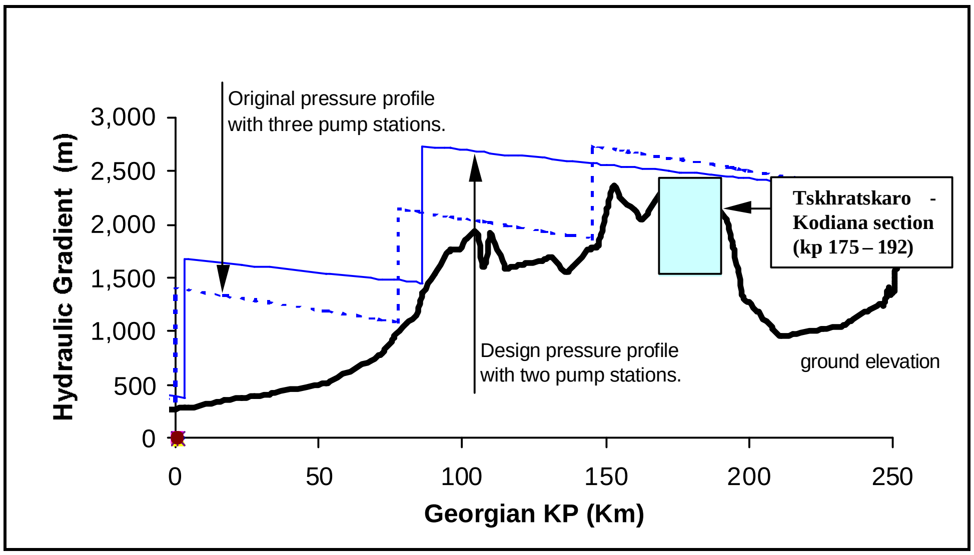
Throughput			Number of Operating Pumps and Station Hydraulic Conditions												
			Pump Station G1							Pump Station G2					
Mta	%	m^3/h	Pumps	Power	Temperature		Pressure		Pumps	Power	Temperature		Pressure	
					Inlet	Outlet	Inlet	Outlet			Inlet	Outlet	Inlet	Outlet
			No.	kW	°C	°C	kPa	KPa	No.	kW	°C	°C	kPa	kPa
50.0	100	6,700	4	24,226	28.6	29.9	600	11,582	4	23,662	27.4	28.8	600	11,327
45.0	90	6,030	3	21,228	26.9	28.3	623	11,327	3	20,453	25.6	26.9	623	10,916
40.0	80	5,360	3	18,318	25.5	26.8	644	11,035	3	17,808	24.0	25.2	644	10,736
35.0	70	4,690	3	15,730	23.5	24.8	663	10,775	3	15,078	21.9	23.2	663	10,362
32.5	65	4,355	3	14,542	22.5	23.9	671	10,654	3	14,009	20.9	22.2	671	10,291
30.0	60	4,020	2	13,133	21.4	22.7	679	10,543	2	12,898	19.6	20.9	679	10,343
25.0	50	3,350	2	10,691	19.4	20.6	693	10,334	2	10,415	17.5	18.8	693	10,068
15.0	30	2,010	1	6,244	14.9	16.3	712	10,003	1	6,062	13.1	14.4	712	9,693
5.0	10	670	1	2,788	10.4	14.5	798	9,798	1	2,745	9.9	13.9	723	9,598

Pipeline diameter

The 46-inch diameter pipeline with two pumping stations is the preferred design alternative for the BTC Project. Two pump stations provide sufficient energy to move the product through the pipeline, meet industry codes and standards, and best meet the project's HSES goals. Specifically, the benefits include reducing:

- Exposure to safety risks to personnel and pipeline operations
- Complexity to pipeline operations
- Risk to pipeline (mechanical) failure to operate
- Potential visual and nuisance impacts
- Emissions
- Reduced operating pressures within the Borjomi area (see figure below)
- Permanent land take and temporary land disturbance
- Accessibility to remote, environmentally sensitive areas

Where the two pump station option may have increased risk (eg, increased operating pressures, larger inventory), the project incorporated adequate engineering controls such that any manageable difference was mitigated.



Wall thickness

The wall thickness is initially based on the maximum operating pressure within that section and takes account of the ground profile, and the maximum combination of the steady state and transient operating conditions. The standard factor of safety of 0.72, as specified by ASME B31.4, is used.

The resulting hydraulic wall thickness is then checked to ensure that it meets certain criteria, none of which are pressure related. These include:

- Minimum thresholds for robustness within environmentally sensitive areas (ie not less than 12mm), specifically the wall thickness at KP 107 to 111, 119 – 129 and in the Thratskaro - Kodiana section were considered to ensure thickness exceeded 12mm
- Checking that the wall thickness plus other construction parameters satisfy the requirements of API 1104 for both the rail and road crossings. The analysis has identified that the hydraulic wall thickness is adequate for all road crossings and all but one of the rail crossings where the hydraulic wall thickness of 14.3mm is increased to 15.9mm
- Applying additional wall thickness for the HDDs, ie not less than 21.4mm
- Reviewing the strains imposed at faults crossings during an earth quake. The wall thickness at the Vale Fault is increased to 23.8mm from 23.0mm

Pipeline coating

The pipeline coating consists of a three (3) layer polyethylene coating. This comprises of a primary coat of fusion bonded epoxy at 250 / 400 microns, plus the polyethylene adhesive at 150 / 250 microns, and the polyethylene topcoat at 3mm. The field joint material is a 100% solids, epoxy-urethane (SP-2888) applied at a dry film thickness of 1mm.

4.2.2 Issue: Block valve specification

Description of Issue A request was made for the time taken to shut down the pipeline system in the event of a spill to be improved, as the periods stipulated in the ESIA allow for the spill of substantial amounts of the product.
Issue Drawn from Comments: 324, 761
Issue Relates to Following Sections of ESIA: Section 5

Response To Issue

The times to shut down the pipeline system were determined in the early stages of the design process. More detailed consideration of each stage in the detection and shut down process has highlighted the possibility of shutting down the system faster. Specifically it has been determined that the pumps could be shut down within 2 minutes and the valves in Georgia could be closed down within 7 minutes.

Spill volumes associated with full bore rupture have subsequently been determined for the pipeline route in Georgia. This assessment, assumed a shut down time of 10 minutes (1+2+7 minutes for detection, pump shutdown and valve closure respectively compared to 1+ 10 + 10 = 21 minutes used in the risk analysis), and confirmed that spill volumes could be significantly reduced (in excess of 30%) for the full bore rupture case.

However to ensure a conservative approach is taken to developing oil spill response measures and incident management procedures, the earlier more conservative assumptions are being retained as the “base case”.

4.2.3 Issue: Small valve leak detection

Description of Issue

The ESIA states that small contamination may permanently remain in the surface fissures and fractures due to the accumulation of oil. Queries were raised on how will this affect the fresh and mineral waters in the region; how will an oil spill affect the Borjomi mineral water deposit and Borjomi water content and quality.

Further information should be provided on why inspections of the sensitive aquifer area differ from the standard pipeline inspection programme. Further consideration is requested to be given to the ability to detect underground leakage plus consideration given to management and monitoring systems including automated systems which will detect minor/pinhole spillages, especially in areas of groundwater sensitivity.

Issue Drawn from Comments: 330, 892, 1670, 2205, 2303, 3207, 3210

Issue Relates to Following Sections of ESIA: Section 5, Section 10.4

Response To Issue

Small contamination

In the unlikely event of an oil spill of any magnitude, the efforts of the spill response plan and action will be focused towards the containment of any contamination within as small an area as possible. This will be achieved through the following steps:

- Systematic inspection of pipeline ROW to detect small leaks
- Prompt investigation of the extent of contamination which has occurred as a result of a spill
- Prompt installation of a system to achieve contaminant recovery and hydraulic containment of the contaminated site. This is explained in more detail in Section 5.12 of this Addendum
- Groundwater monitoring to ensure effective containment of the contaminated area

On this basis only the most superficial deposits of fresh groundwater in the immediate proximity of the spill site would be affected by any oil spill.

The possibility of contamination of the Borjomi mineral waters has been studied in detail. It has been determined that even in the event of a large scale oil spill in the Tsikisjvari area the mineral water deposits could not possibly be affected. Appendix 1 describes the findings of the studies carried out in the Borjomi area.

Pipeline inspection programme

Along the whole pipeline route, the management of the integrity of the pipeline will, primarily, focus on the prevention of leaks. This process begins during the procurement / construction phase with strict controls on the quality of the elements and construction of the pipeline system.

During pipeline operations, the integrity of the system will be managed through the PIMS (Pipeline Integrity Management System), which will define the structure of the inspection, monitoring and maintenance of the pipeline system. In defining the methods and frequencies of inspection, monitoring and maintenance, the PIMS will take into account the various levels of risks and sensitivities in the areas through which the pipeline passes.

The majority of small leaks found in pipeline systems are the result of corrosion. Consequently, management of corrosion is a primary element in the prevention of leaks. The pipeline will be externally coated and provided with a substantial cathodic protection (CP) system to prevent corrosion induced leaks. The CP system data will be monitored and will be supplemented by regular DCVG & CIPS surveys to detect coating damage and to confirm CP system performance.

A base line corrosion survey, using intelligent pigs, will be undertaken, following line-fill and once sufficient throughput is available, to serve as a comparison for subsequent surveys. These comparisons will allow corrosion growth rates to be measured and will allow mitigation measures to be instituted if necessary.

The pipeline will be intensively patrolled to prevent 3rd party damage and, again, the patrol structure will reflect the risk levels and sensitivities applicable to the various patrol areas.

Notwithstanding the extensive measures taken to prevent leaks, the pipeline system will also be provided with a world class, computer based, leak detection system; covering the full extent of the pipeline. It is recognised, however, that, even the best of this type of system, cannot detect very small leaks. This is currently being addressed in a study into the applicability and effectiveness of various techniques to enhance both the prevention and detection of small leaks in the more sensitive areas. Groundwater monitoring will for instance be undertaken in the section between Tkhratskaro and Kodiana to ensure early detection of even the smallest leak.

4.2.4 Issue: AGI lightning protection

Description of Issue
A reviewer suggested that damages from lightning should be considered, and that AGIs and stacks should be fitted with lightning rods.
Issue Drawn from Comments: 1511
Issue Relates to Following Sections of ESIA: Section 5

Response To Issue

In order to mitigate the risk of damage due to lightning strikes, a Lightning Risk Assessment Study will be performed in the detailed design phase of the project. The methods used in the assessment study will be in accordance with the international standard IEC 61024. Following the results of the study whatever is considered necessary will be designed and installed to provide the required level of protection via a Lightning Protection System (LPS). An LPS typically consists of the following:

- Air Terminal System

- Down Conductors
- Earth Termination System
- Bonding
- Fittings (necessary to connect the systems)
- Surge Protection

In addition, earthing may also be installed to provide low impedance earth paths for the LPS.

4.2.5 Issue: Facilities design

Description of Issue

General:

Further information was requested on the basic dimensions, quantity of land taken, wall and ceiling materials required for the facilities. 3D Views / small scale drawings for pump station, metering station, pigging stations, surge tanks and block valve stations have been requested. A comment also stated that all structures should be approved by the Georgian Government prior to construction.

Pump Stations:

Requests were made for a layout of pump stations to show the immediate environment topography, prevailing winds, oil containment and bunding, piping and Instrument diagram for each pump station covering main flow and utilities.

A request was made for additional information to be provided on:

- Tank characteristics and location
- Bunding and contained hard standing areas
- Fuel consumption for the pump drivers

The reviewers noted that in Sections 5.6.2.4 and 5.6.2.5 diesel appears to be being used as a synonymous term for CTD. In respect of pump driver diesel storage, however, the bracketed remark "contingent on the adoption of diesel fuel alternative" is confusing as CTD/diesel use is already proposed.

It was highlighted that from the June 2002 enquiry notes with GIOC that initially 2 No. 850m^3 tanks will be sited at each pump station for pump driver fuel storage. These are significant volumes and in lieu of details we stress the importance of appropriate bunding, separation, leak detection and fire protection on these tanks. Also, general project consideration to fuel transport and storage procedures, training and bunding are imperative due to large quantities involved.

Numerous comments were made of the selection process followed for the drivers and additional information is required on the following:

- Cost-benefit analysis for the pump drivers
- Actual energy usage / emissions contrast for the drivers

Further information should be provided on bunding for 110% tank capacity.

No indication is given as to the anticipated frequency and duration of flaring.

Additional information is required on the constructability and environmental implications of combining stack emissions into a single, or single multi-flue stack are considered. Additional information is also requested on the D1 stack height analysis & consideration the multiple sources within this process.

Issue Drawn from Comments: 864; 867; 870; 869; 899; 1700; 1753; 1761; 1762; 1773; 1774; 1775; 1776; 1788; 1790; 1791; 1793; 1808

Issue Relates to Following Sections of ESIA: Section 5.6

Response To Issue

Pipeline and facilities

Small scale maps, with layout of river crossings, pump station and pigging station are included below.

Appendix E Annex 1 (Landscape Management Plan) of the ESIA provides some information in Section 1.5.1; General recommendations at AGIs in Section 1.5.1, which is part of Section 1.5, Landscape Plan. Three dimensional impressions of the facilities are also enclosed in the Landscape Plan.

A number of landscape mitigation measures have been put forward by the landscape architect, recommendations for AGIs include:

- Facility walls will be finished (texture, colour, etc)
- Trees and shrubs will be used for screening, as appropriate, to blend with the surrounding natural landscape
- Non-natural, visually active and metallic colours and textures will be avoided. Colours sympathetic to the natural landscape will be used, including brown, grey and green colours and very limited black, yellow and red
- The height and mass of buildings will be minimised, for example by using pitched roofs where possible

The current design of all facility buildings has been progressed to preparing building specifications for 4 generic types of buildings. For example, of the larger buildings at PSG1 and PSG2 two, the pump station control building and the accommodation block are "Type B", whereas the pump shelter is "Type C".

Figure 4-1: Pump station layout

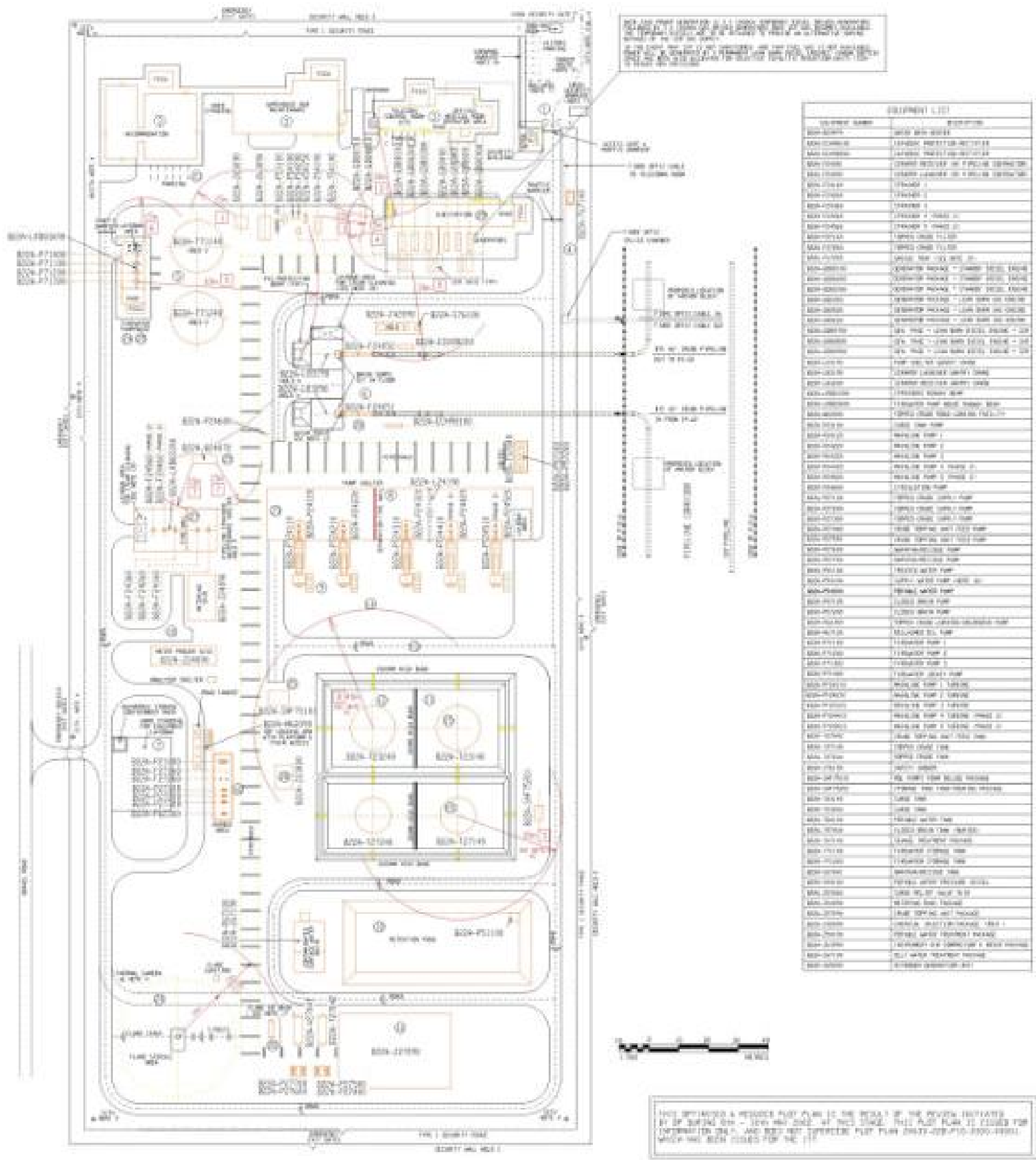
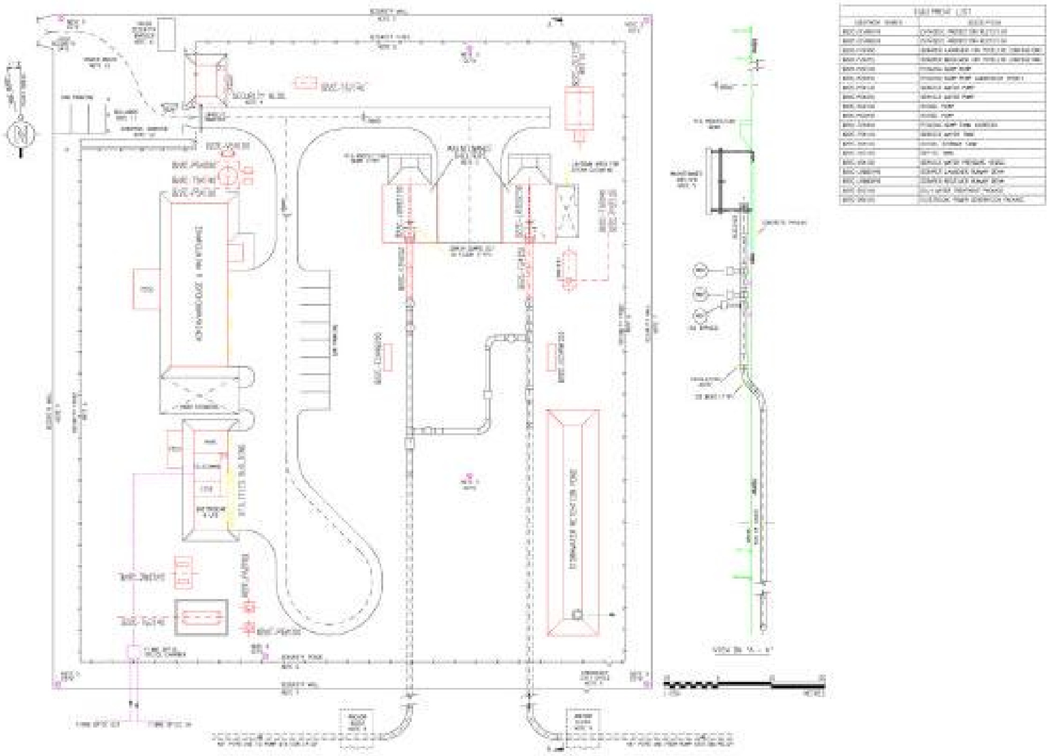


Figure 4-2: Pigging station layout



Building specifications

The specifications for these building types are as follows:

Building "Type A" - Enclosed heated industrial building – comprising:

- Steel structure, (painted), with insulated profiled metal cladding to walls and roof
- Roller Shutter insulated vehicular doors, nominally 4.0m wide x 4.5m high
- Hinged insulated personnel doors nominally 0.9m wide x 2.0m high
- Openings in cladding for HVAC louvres and services
- Foundations to be concrete strip footings. Ground slab to be concrete to falls
- Underside of concrete slab to be insulated for 2.0m and external face of foundations

Building "Type B" - Enclosed heated office building – comprising:

- Steel structure with masonry blockwork over-clad with insulated metal mini-rib cladding
- Roof to be insulated profiled metal cladding
- Windows to be double glazed, tinted and with thermal break
- Hinged insulated equipment doors, nominally 2.0m wide x 3.0m high
- Hinged insulated personnel doors, nominally 0.9m wide x 2.0m high
- Foundations to be concrete strip footings, insulated to external face
- Ground slab to be concrete with screed and underside of slab to be insulated for 2.0m. Internal walls to be masonry

Building "Type C" - Open Shelter – comprising:

- Steel structure, (painted), with profiled metal cladding to roof and walls
- Wall cladding to start 2.5m above concrete slab on long elevations and be taken down to slab on short elevations, subject to achieving 50% free area
- Central ridge vent to roof
- Foundations to be concrete strip footings insulated on external face

Building "Type D" - Prefabricated modular units - comprising:

- Steel structure with insulated metal cladding
- Windows to be double-glazed, tinted and with thermal break
- Hinged insulated personnel doors to be nominally 0.9m wide x 2.0m high
- Floor to be an integral part of structure with epoxy paint finish
- Unit to have structural facility for fixing to concrete ground slab

In terms of the specifications for metal cladding on roofs and walls 5 categories are defined. The specification states that such materials will have to comply with the relevant national and local standards.

Details of precise finishes, etc are not currently available. During detailed design the EPC contractor will develop these in accordance with the requirements of the applicable specifications, the commitments of the ESIA and the requirements of the Georgian authorities.

In terms of the potential for changes to the overall visual appearance since April the most significant change has been the optimisation of the sites (ie reducing the footprint and re-configuring the arrangement of certain of the elements within the plot plans). Otherwise, the outline of the buildings in largely the same as before.

Crude top distillate

The distillate output from the crude topping units has a specification consistent with the fuel requirements of the gas turbine drivers for the main pumps. This output quality is consistent with, and as good as, diesel fuel with a recognised ASTM analysis, in accordance with the type defined by ASTM D975-01 Grade 2D. It should be noted that, during Phase 1, the gas turbines and generators at the pump stations may be run on natural gas rather than topped crude distillate. This changeover is anticipated when pipeline throughput exceeds 300,000bd.

The storage tanks are sized to provide 14 days storage at a pipeline throughput of 300,000bd. At this stage, it is anticipated that the pump gas turbine drivers and generators will change over to natural gas fuel. The output from the CTP will only be used on an intermittent basis thereafter. If natural gas fuel does not become available, storage capacity at 500,000bd pipeline throughput is 9 days (Phase 1). Bunding and separation of the tanks will be in accordance with recognised standards. Appropriate training will be given to pump station operatives.

Pump station design details

Layout of pump stations showing also the immediate environment topography, prevailing winds, oil containment and bunding are shown in Figures 4.3 and 4.4. The engineering drawings available to date are shown in Figures 4.1 and 4.2.

Contained hard-standing areas are concrete-paved areas from which spillage from process equipment or normal operational activities falls onto the ground and is contained by kerbs or walls, and prevented from infiltrating through to the surrounding ground.

There are a number of such runoff controlled areas within the pump stations, eg around process plant, the tanker loading and unloading area, or waste management area, etc. The majority of such areas are connected, via normally-closed valves, to the oily water sewer. Storm water arising on these areas flows via the oily water sewer and separator (if appropriate to the source area) to the inlet chamber of the contaminated surface water retention basin and then to the retention pond. Water is held here and if required tested prior to a controlled release from the facility to a local water course.

Design of tanks and bunded areas will be in accordance with best practice, and make allowances for the prevailing climatic conditions. The final design of these aspects of the facilities will be developed during detailed design. Tanks will be fitted with monitors, and will be inspected and, as appropriate pumped out under manual control, during each working shift. They will be designed to have sufficient excess capacity to cope with any excessive rainfall that may occur between shift changes. Emergency response planning will also be developed to address the situations that may prevail at each location during detailed design.

Other contained hard-standing areas, eg for hazardous materials storage, associated with specific wastes are drained via catch basins into sealed chambers which are to be emptied periodically by an approved disposer.

The concept of manifolding turbine exhaust ducting was addressed very early in the project with the turbine manufacturers. The response received indicated that this would not be recommended or supported by the manufacturer for safety reasons. If a standby machine start sequence was attempted, coincident with a flame out then the complete system would be subjected to a significant overpressure condition.

Environmental monitoring activities associated with the pump stations are described in the Impact and Mitigation Section of this Addendum.

The use of few large pumps has not been considered as this was considered outside the boundaries of modern day pump technology and best practice experience. If fewer but larger pumps were adopted it is anticipated that the reliability and safety of the Project could be adversely impacted. Additionally, smaller pumps are required to allow the system to operate at flowrates down to 100mbd (compared with the design capacity of 1,000mbd). Thus, each pump will have a capacity of 250mbd, which will allow it to operate down to 100mbd.

Each mainline oil pump will be driven by a dedicated diesel fuelled turbine (initially 3 pumps, followed by 5 pumps) at each pump station. Each turbine will provide approximately 8MW duty at peak production, hence consuming 96GJ/hr of diesel.

During the design process specific attention has been given to reducing emissions from the pump stations. A key decision made as part of the design process was the adoption of turbines that could be converted to run on gas, which will result in a significant reduction in emissions for the majority of the project lifetime.

It is anticipated that SCP gas will become available approximately two years after BTC commences operation. Until then, BTC will be fuelled by crude topped distillate.

Storage tanks at the pump station sites

Details of all tanks at the Georgia facilities are as follows:

PSG1	
Firewater Storage Tank (x 2)	20m diameter x 15m high (3,900m^3 working capacity)
Surge Tank (x 2)	14m diameter x 10m high (1,200m^3 working capacity)
Topped Crude Tank (x 2)	11m diameter x 9m high (850m^3 capacity)
Crude Topping Unit Feed Tank	3m diameter x 9m long (64m^3 capacity)
Naphtha / Residue Tank	3m diameter x 9m long (64m^3 capacity)
Potable Water Tank	2m diameter x 3m high (10m^3 capacity)
Pigging Sump Tank	2.5m diameter x 6m long (30m^3 capacity)
Closed Drain Tank	2m diameter x 6.4m long (20m^3 capacity)
Plus 2 diesel day tanks	

PSG2	
Firewater Storage Tank (x 2)	20m diameter x 15m high (3,900m^3 working capacity)
Topped Crude Tank (x 2)	11m diameter x 9m high (850m^3 capacity)
Crude Topping Unit Feed Tank	3m diameter x 9m long (64m^3 capacity)
Naphtha / Residue Tank	3m diameter x 9m long (64m^3 capacity)
Potable Water Tank	2m diameter x 3m high (10m^3 capacity)
Pigging Sump Tank	2.5m diameter x 6m long (30m^3 capacity)
Closed Drain Tank	2m diameter x 6.4m long (20m^3 capacity)
Plus 2 diesel day tanks	

IP G1	
Potable Water Tank	3.5m diameter x 3m high (30m^3 capacity)
Pigging Sump Tank	2.5m diameter x 6m long (30m^3 capacity)
Diesel Storage Tank	2.5m diameter x 6m long (30m^3 capacity)

Flaring at the pump station sites

Flaring is not a planned event and will only occur during "upset" conditions. Consideration of existing industry practice indicates that such circumstances will occur once or twice annually. It is not possible to precisely quantify the duration of flaring, and therefore the amounts of hydrocarbons likely to be to be disposed of in this way, and the resultant emissions. However, during the design process data was used which assumed an annual discharge to the flare of 18 tonnes of hydrocarbons based on two separate events. One event was based on the loss of the condenser in crude topping unit for 30 minutes and the other on a fire in which the contents of the crude topping unit would be released. When burnt in the flare, the sum total of CO_2 released to atmosphere due to the two events would be 54 tonnes.

Pigging facilities

Layout of the pigging station is provided in Figure 4.2 above.

Pipeline valves

The selected block valve configuration and numbers have been designed in accordance with design standards specified in the HGA. The standards selected are appropriate to the project and demonstrate through the following quotations that the approach taken by the engineering teams is based on a sound foundation of industry best practice. Indeed none of the major pipeline specifications prescribe specific spacing of block valves for crude oil pipelines. The most prescriptive of the documents, NEN 3650 and BS8010, do in fact suggest that spacing should be based on a risk analysis or QRA, as has been done for this project.

ASME B31.4 Clause 434.15.2 "Mainline block valves shall be installed on the upstream side of major river crossings and public water supply reservoirs. Either block or check valve shall be installed on the downstream side of major river crossings and public water supply reservoirs.

A mainline block valve shall be installed at mainline pump stations, and a block or check shall be installed at other locations appropriate to thee terrain features."

NEN 3650 Clause 5.4 "The design shall seek to reduce the environmental risk (probability and effect of leakage) presented by the system to an acceptable minimum".

Clause 6.1 "Every transport pipeline shall be designed, constructed and operated such that the additional risk to the surrounding area is acceptable.

A safety evaluation should in principle be carried out prior to any change in circumstance ie for all new transport pipelines.

This safety evaluation shall be based on analysis of the individual risk and an evaluation of the design, the organisational and technical measures and the nature of the surrounding area".

Clause 6.1.1 "In new situations, the value for the individual risk shall not exceed 10^{-6} per year."

BS8010 Clause 2.3.1 "The pipeline designer should give consideration to the preparation of a safety evaluation for pipeline design and construction in accordance with this section."

Clause 2.3.1 "Where a risk analysis is required as part of the safety evaluation it should include the following:

- The identification of all failure modes
- A statistically based assessment of the failure mode and frequency
- A detailed evaluation of the consequences of failure from small holes up to full bore rupture including reference to population density
- Prevailing weather conditions
- Time taken to initiate pipeline shutdown

The risk analysis should culminate in an evaluation of risk along the pipeline."

Clause 2.6.12 "Section isolating valves should be installed at the beginning and end of the pipeline and at a spacing along the pipeline appropriate to the substance being conveyed to limit the extent of a possible leek. The spacing of section isolating valves should reflect the conclusion of any safety evaluation prepared."

Clause 2.6.12.2 "For pipelines designed to convey category B (oil) substances, section isolating valves should be installed at location which limit drain down of pipeline contents at any low points to not more than the volume contained in a 16km length of the pipeline."

ISO 13623 Draft Ref clause 6.11 "Section isolation valves should be installed at the beginning and end of a pipeline and where required for:

- Operation and maintenance
- Control of emergencies
- Limiting potential spill volumes. Account should be taken of topography, ease of access for operation and maintenance, security and proximity to normally occupied buildings when locating the valves.

Figure 4-3: Location plan of Pump Station PS1

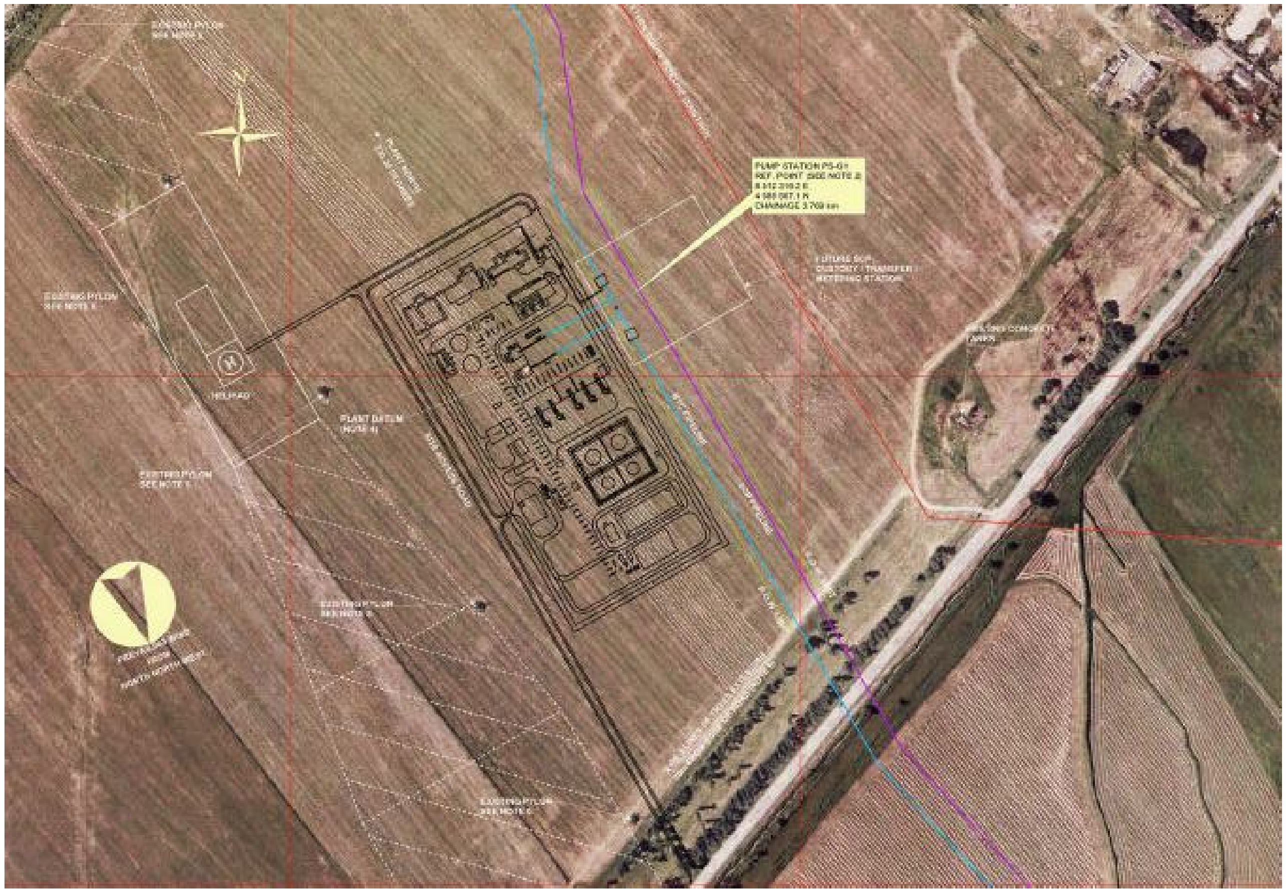
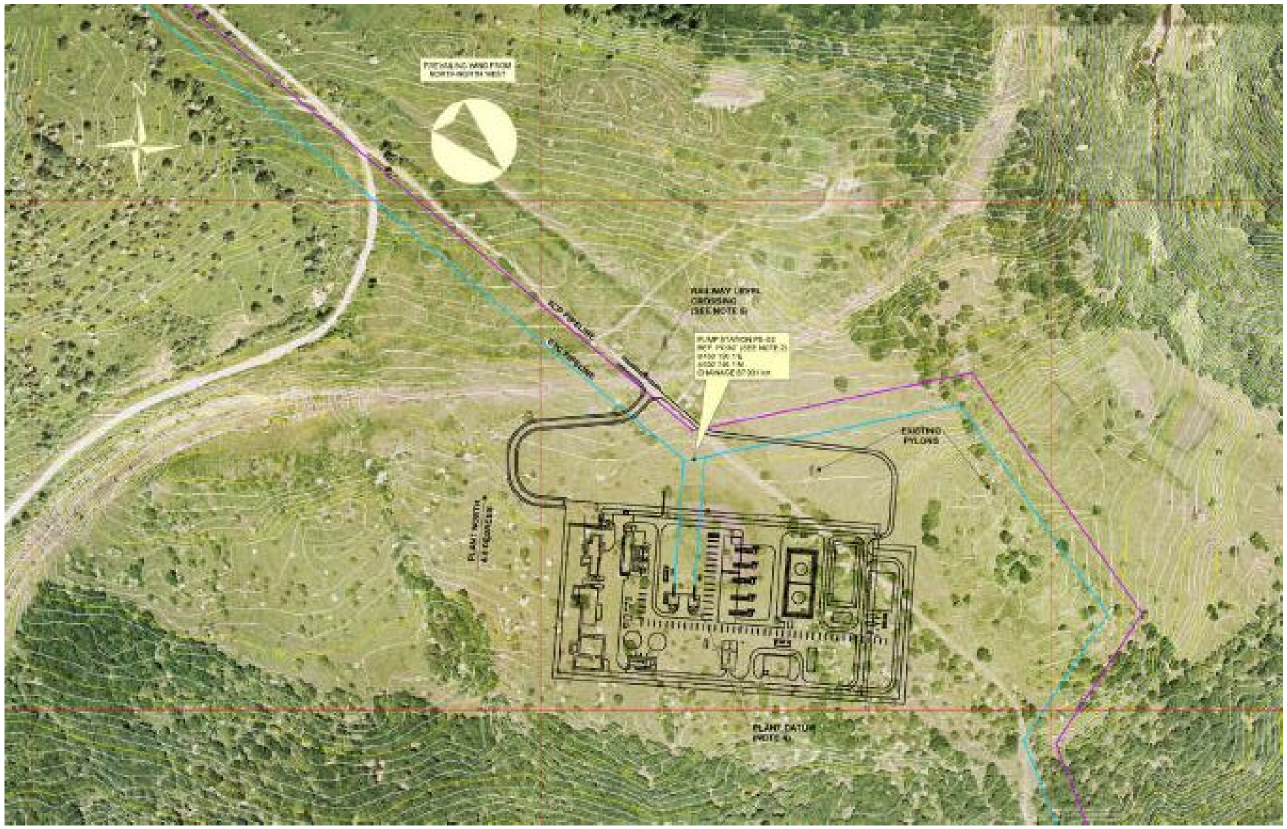


Figure 4-4: Location plan of Pump Station PS2



4.3 OUTLINE OF PIPELINE SYSTEM CONSTRUCTION

4.3.1 Issue: Construction overview

Description of Issue

Additional details have been requested by a reviewer for additional details of civil engineering and procedures, to manage construction. In addition, the number of construction spreads, and details of information such as start location, description of main spreads, river crossings, special points, steep slopes, hydrotest, reinstatement, etc; construction schedule showing their deployment on site, has also been requested.

Additional details have been requested through the review process for issues associated with the residual visual impact on Mt Tavketili and any further consideration deemed appropriate.

The statement "for example, at landslide areas, the pipeline can be installed below the depth of the basal shear surface" was noted. Such methodology requires careful consideration of cutback angles, construction safety and the potential for removing restraining force at landslide toe. There may be issues of excessive width of ROW.

Reviewer comments indicate more detail is required on the fault crossings, specific layout for major river crossings and landslide crossings, with such details as alignment sheets, and layout of tunnelling site.

A note was also made that there appears to be little study presented in the ESIA in relation to the potential for and implications of flash flood damage particularly in relation to rivers not classified as major. We would be interested in information specifying identified trouble areas. We would also note it is not clear what early warning and response procedures are in place for these.

River Hydrology surveys and scour studies were undertaken for major crossings - which have been requested by a reviewer.

Concern was expressed that insufficient specification/constraints have been established for the contractor's methodology, particularly in relation to river crossings and geotechnical and seismic risk. It has been noted that inappropriately chosen fording can lead to unnecessary silt-loading and erosion of the watercourse and that plant should not operate in stream waters unless absolutely necessary. On this basis it was recommended that guidelines are developed for the contractors or that review of their bid include this basis.

Details of the proposed nature of monitoring for river crossings has been requested in light of a recommendation that this include a photo-survey, with initial bank profiles referenced in more critical crossings.

Issue Drawn from Comments: 177, 327, 334, 347, 358, 374, 406, 411, 475, 523, 658, 688, 716, 799, 800, 801, 832, 837, 884, 889, 995, 1087, 1090, 1092, 1111, 1408, 1529, 1530, 1654, 1656, 1758, 1765, 1766, 1767, 1794, 1879, 1892, 2200, 2294, 2298, 2300, 2319, 2364, 2379, 2380, 2385, 2388, 2389, 2415, 2416, 2459, 2610, 3003, 3019, 3023, 3025, 3027, 3030, 3048, 3049, 3051, 3053, 3071, 3082, 3083, 3095, 3096, 3107, 3111, 3144, 3155, 3158, 3159, 3166, 3169, 3170, 3171, 3191, 3194, 3196, 3198, 3200, 3213.

Issue Relates to Following Sections of ESIA: Section 5

Response To Issue

The responses to this issue are provided below in the sequence of activities normally associated with pipeline construction. Also, a description of pipeline construction is attached to this Addendum as Appendix 8.

Pipeline overview

The construction of the pipeline will be carried out in a number of sequential processes. These processes and typical plant usage are described below and include the civil engineering aspects of the pipeline installation.

Pre-entry survey

Carried out by the Contractor, BTC Company, and the land owner/user through whose land the ROW runs. This provides an agreed record of the 'as-found' condition of the entire length of the ROW through Georgia from the Azerbaijan border to the Turkish border. It will also include areas for camps, offices, storage, other temporary facilities, access tracks to be used and public roads.

Pre-construction site survey/setting out

Prior to commencement of clearing activities a survey team will delineate the centreline of the pipeline and the entire pipeline ROW using survey pegs.

ROW layout

With reference to the pre-entry agreements the Clear and Grade crews will, as necessary; erect stock fencing, support existing fences or modify as agreed with the owner, make safe temporary access at all existing road and track crossings, clear the full width of the ROW of debris and other obstructions, preserve drainage channels/systems or provide temporary measures to maintain services, install temporary flume pipes at ditches and minor watercourse crossings, remove those trees selected for removal, mark and protect trees to remain. For areas such as those where abnormal working conditions are required, eg, steep slopes, a detailed procedure will be drawn up.

Topsoil strip

The boundaries of the ROW will be physically delineated. Topsoil, or the top strata that holds the seed bed, will be stripped and stored to one side of the ROW for use on reinstatement. Where necessary the subgrade will be graded to provide a suitable surface for the pipeline operation. At this time temporary access roads will be graded in accordance with the agreement reached in the pre-entry survey. Where necessary at this stage, surplus subsoil from the ROW will be stored separately from topsoil to avoid contamination.

Stringing

Once topsoil strip has been completed the lengths of pipe to be used in the line will be delivered to the ROW and laid out along the pipeline route on sandbags. This will be carried out in such a way as to avoid blocking access routes and in areas of steep slope, for example, the pipe will be axially and laterally restrained. Where rock blasting is required the line pipe will be strung after blasting.

Crossings

A series of typical crossing drawings is provided for information in Figures 4.5 to 4.14 below. The final design of specific crossings will be at the discretion of the construction contractor.

Calculations have been performed to ensure that the pipeline will not be exposed by a design flash flood (one in 200 year event) during the design life of the pipeline. Particular attention has been applied to flash flooding and the potential for initiating debris flows in mountain streams. Operations will monitor river flow rain levels and meteorological information. The pipeline crossings will be inspected by operations during the frequent walk through and after each significant rain event.

For all river crossings, studies and designs have been performed to ensure that the pipeline will not be exposed, during the design life of the pipeline, due to either vertical or lateral erosion. For the Kura West, Potskhovi 1 and Potskhovi 2 RVX's scour calculations have been performed in accordance with CIRIA Manual on Scour at Bridges and other Hydraulic structures (RP611:2002) for a 1:200 year event. This gave scour depths of 0.57m, 0.91m and 0.72m for the respective rivers. Each of these river crossings will be installed at a minimum horizontal depth of 4m below the lowest point of the river bed for a distance exceeding the extent of the river channel allowing for lateral migration over the life of the pipeline.

With respect to river crossings, in addition to the specific contract requirements, all river crossings will have method statements assigned to them. These will detail all construction and restoration procedures and will incorporate the requirements of the Water Crossing Design and Installation Manual AGA PR-237-9428.

Specification for the crossing of seismically active faults is provided in the fault crossing drawings.

The pipeline crossings will be inspected by operations during the frequent walk through and after each significant rain event. Bed and bank profiles will be surveyed to ensure the pipeline is not at risk of exposure.

Figure 4-5 Mtkvari East crossing

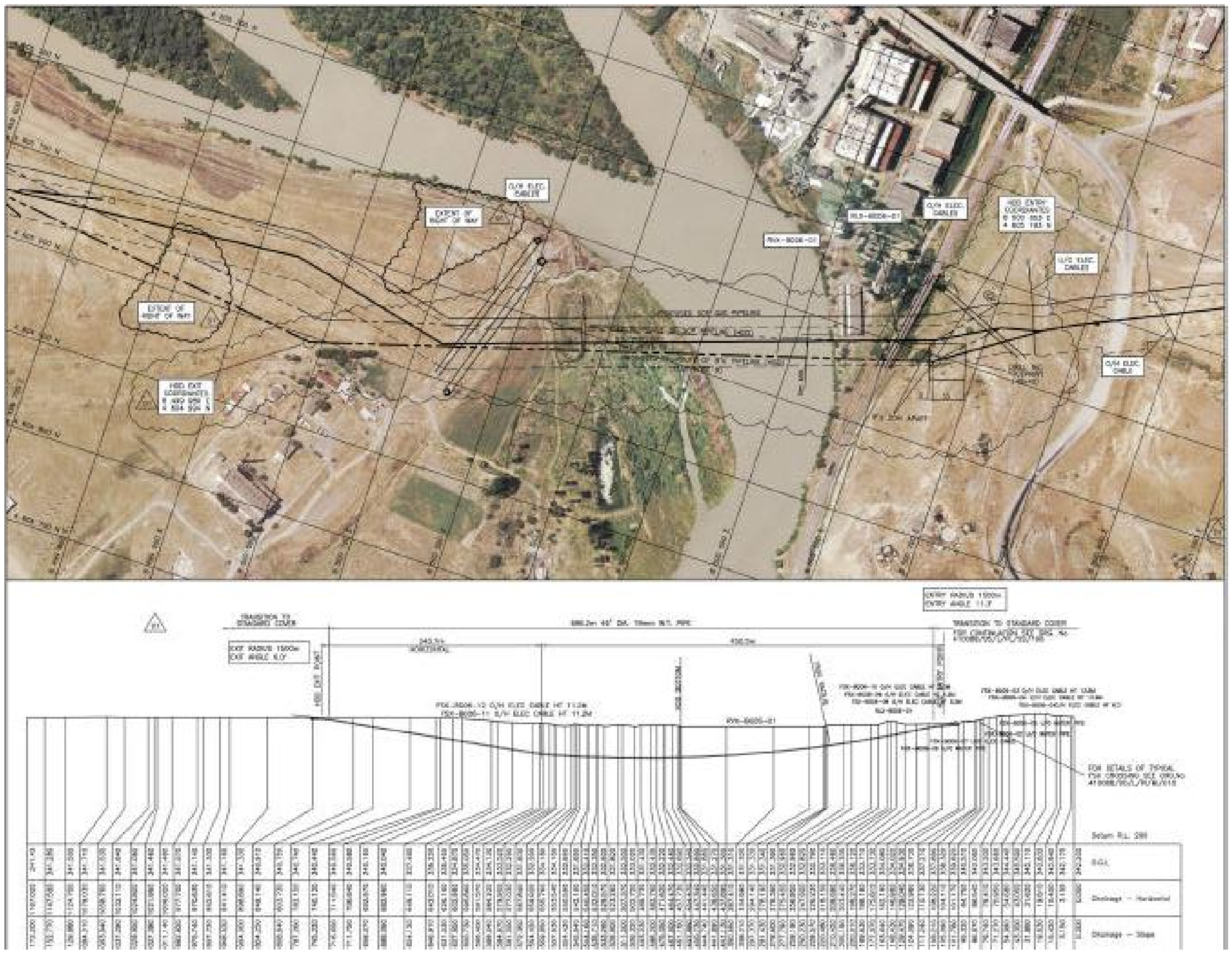


Figure 4-6 Potskovi 1 crossing

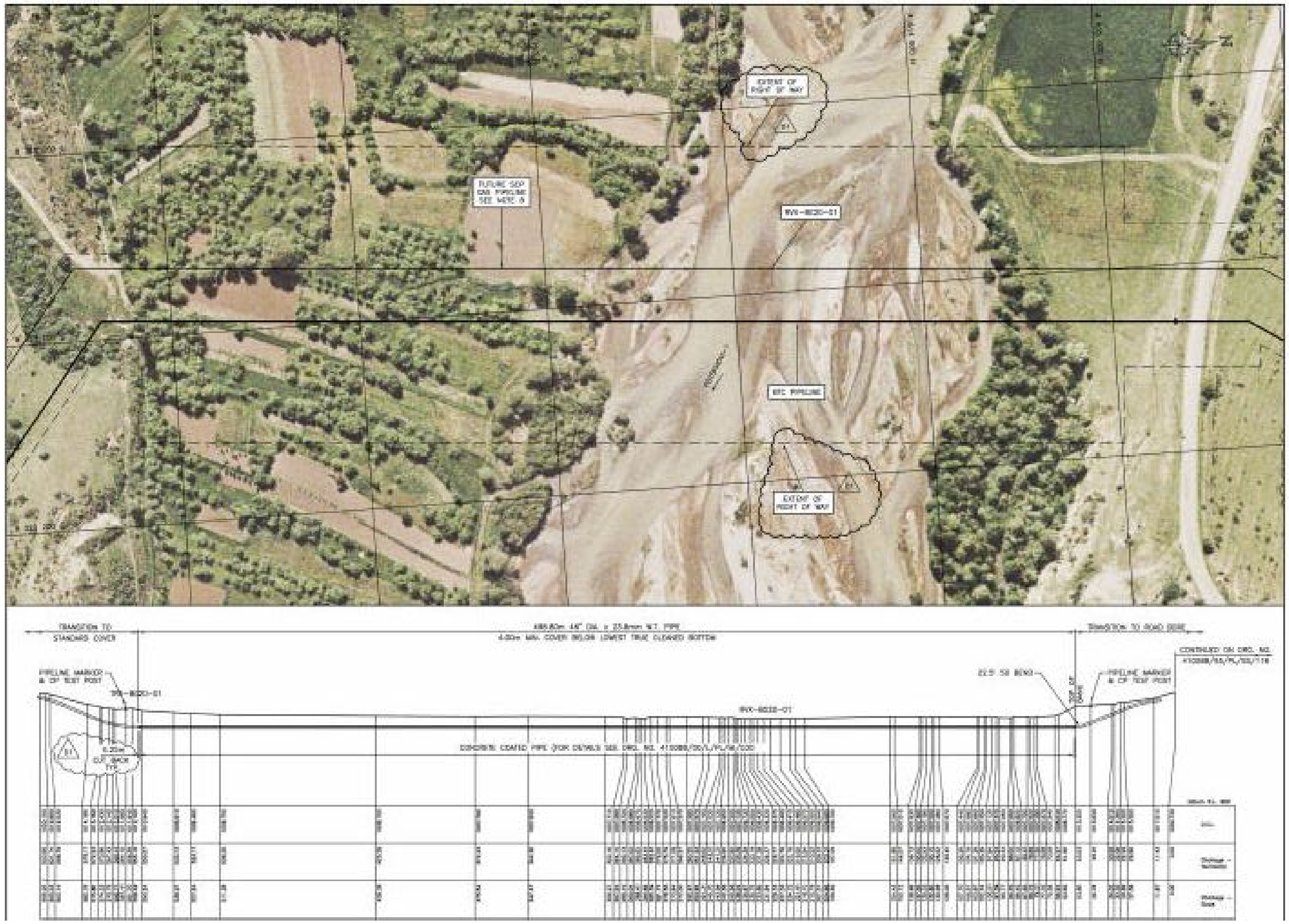


Figure 4-7 Potskovi 2 crossing

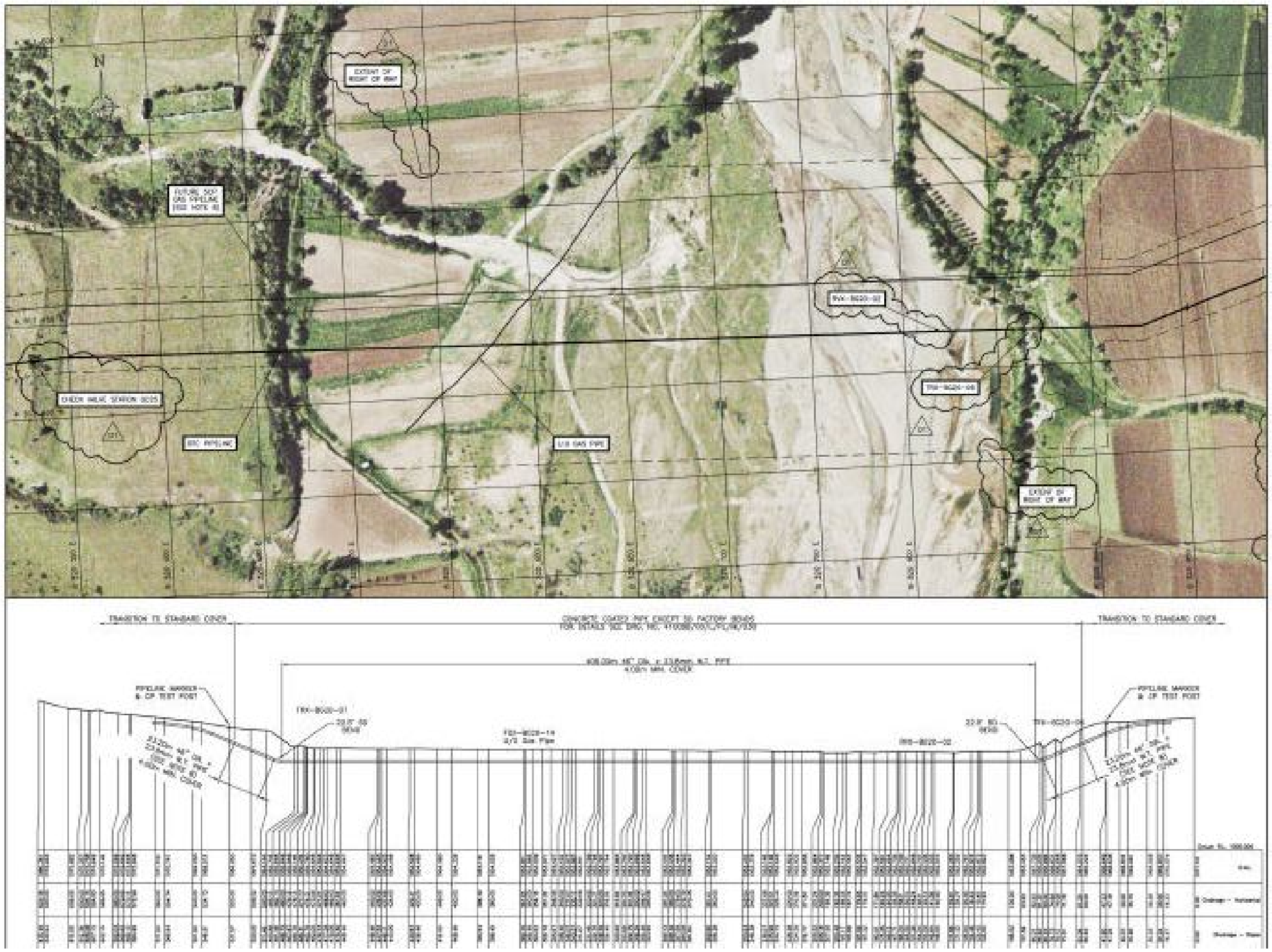


Figure 4-8 Algeti crossing

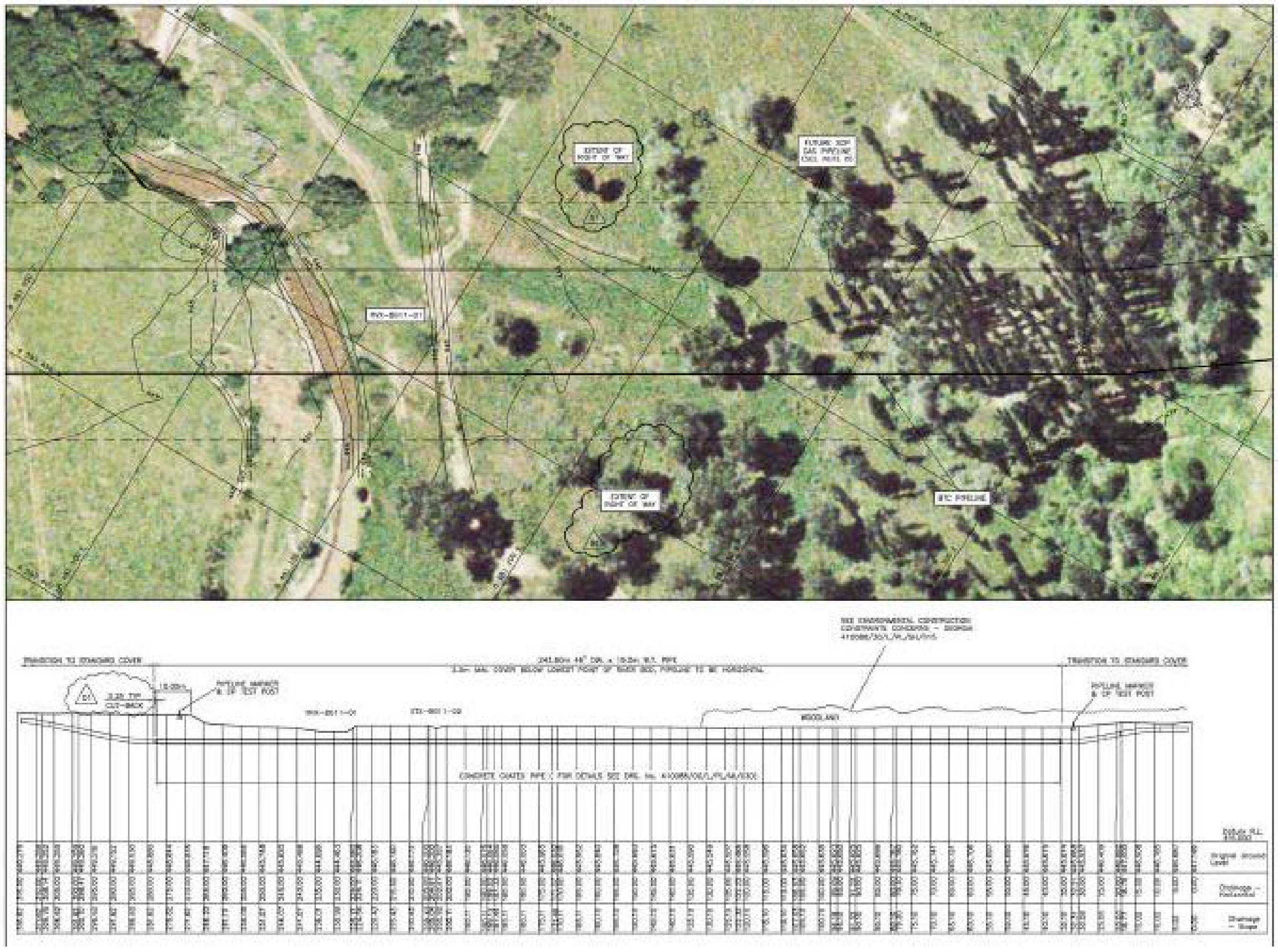


Figure 4-9 Typical trench details

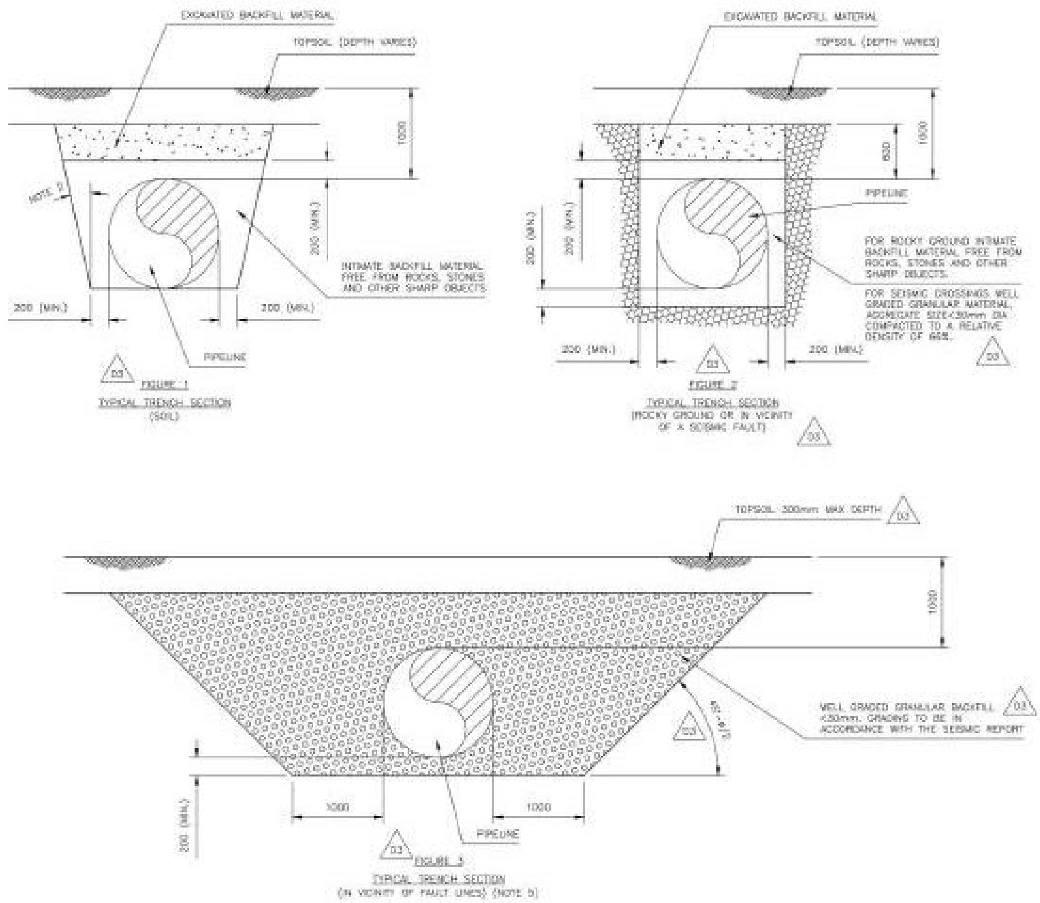


Figure 4-10 Typical thrust / Auger bored road crossing

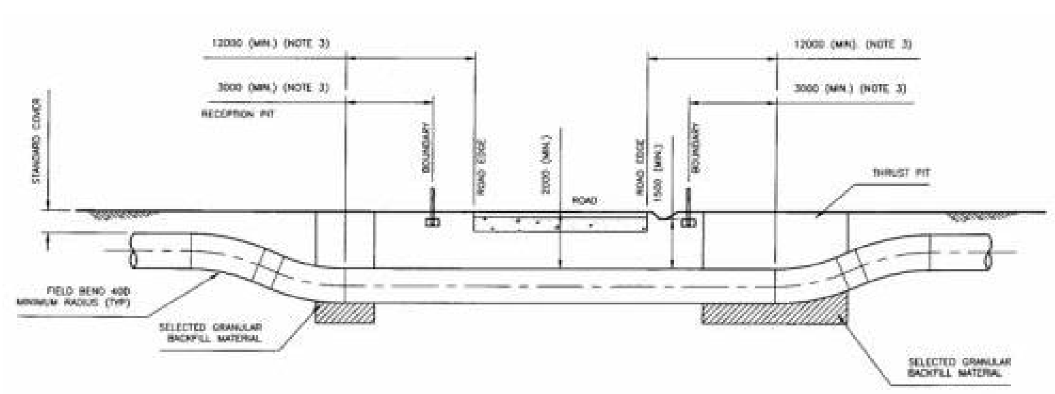


Figure 4-11 Typical open cut road crossing

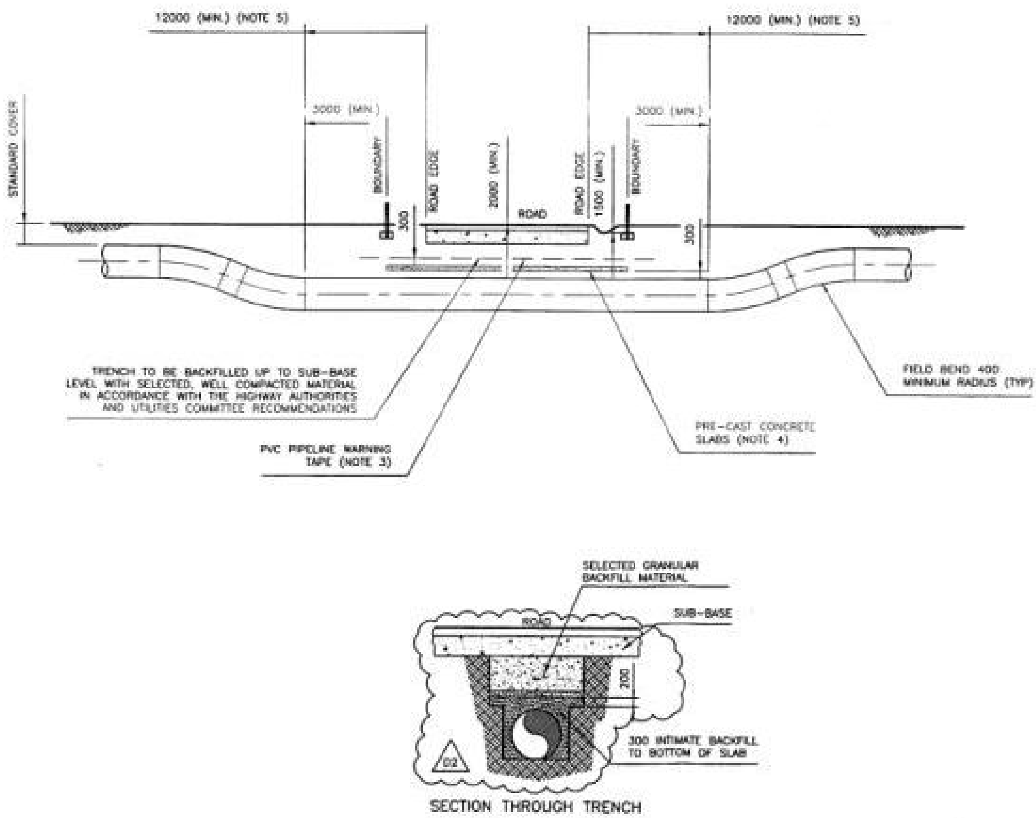


Figure 4-12 Typical open cut stone track crossing

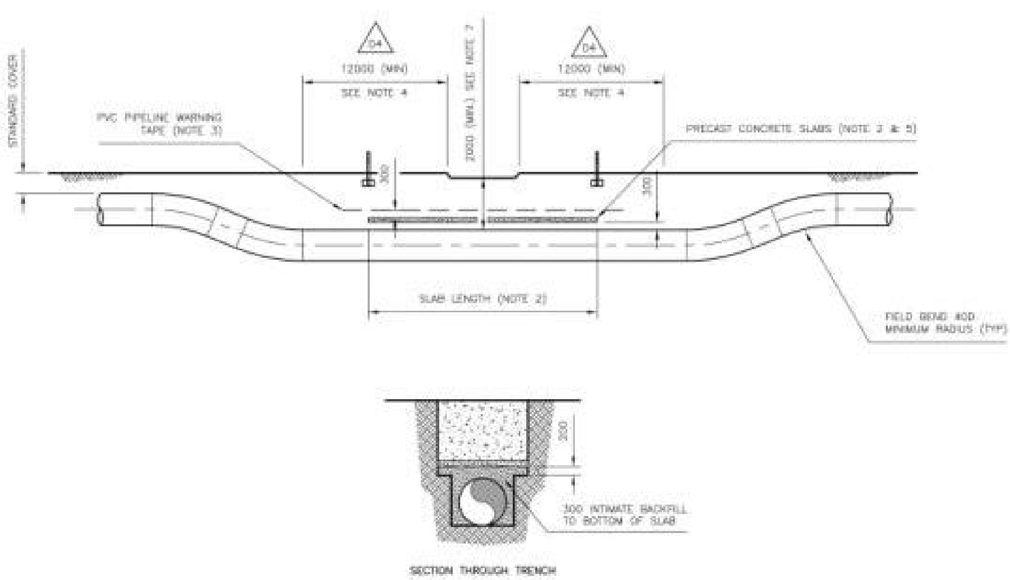


Figure 4-13 Typical major water course crossing

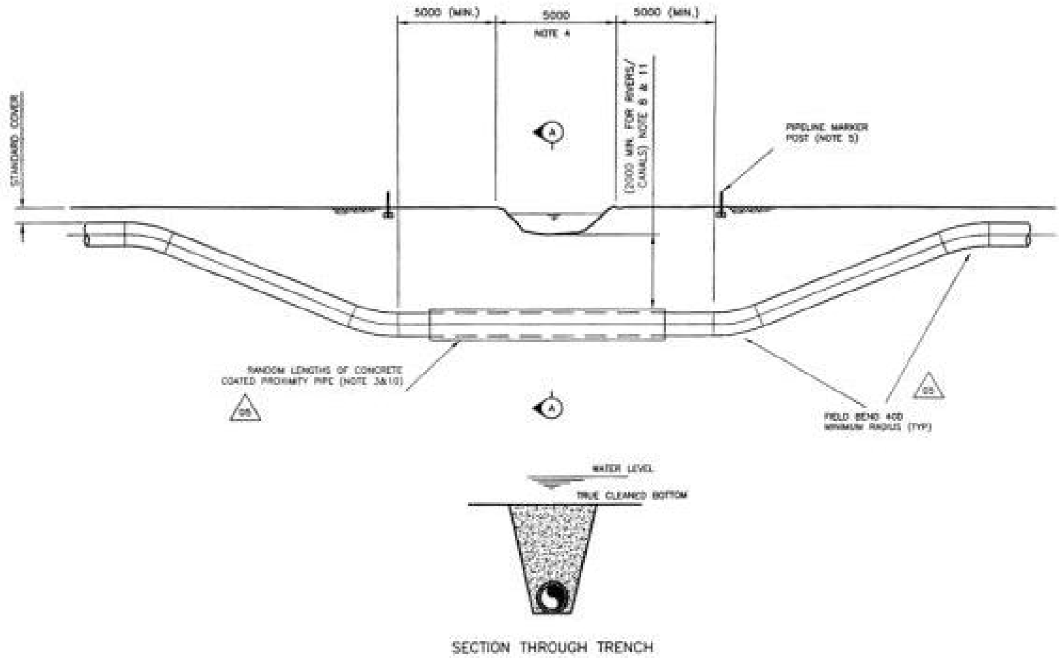
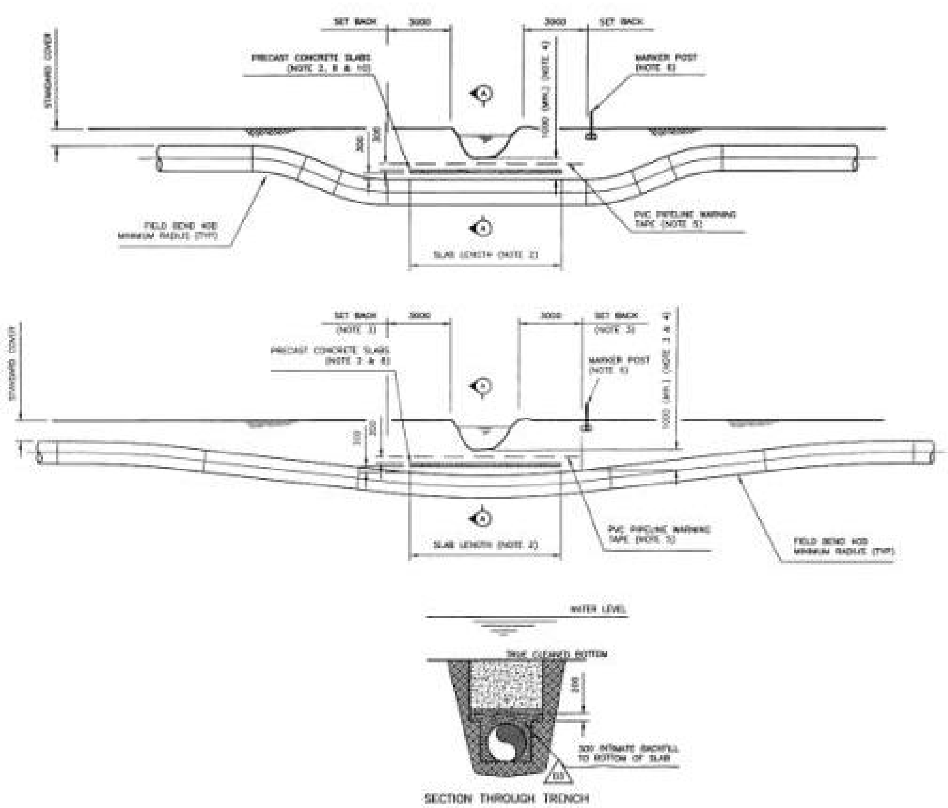


Figure 4-14 Typical minor water course crossing



Trench excavation

Trench excavation in normal areas will be by means of trenching machine, excavator or bulldozer with ripper, or a combination of these. The pipe trench will be excavated along the pegged alignment to a sufficient depth to provide the specified cover, whilst allowing for any additional depth required for bottom padding. In hard ground locations (not requiring blasting) a bulldozer with ripper will proceed ahead of the trenching machine or excavator.

Windrows of excavated material will be formed as the operation continues and care will be taken to ensure that this is not contaminated with organic or other foreign materials to produce unsatisfactory backfill. Gaps will be left in the windrows at intervals to allow for run-off of rainwater.

Where rock is encountered and blasting is required, care will be taken to ensure that the vibration from the operation does not cause harm to sites of historic/religious significance. Where this cannot be controlled the trench will be excavated by other means, eg, chemical fracture or 'silent demolition'. In all cases the blasting operation will be the subject of a safety case, specific agreed procedures and will be closely scrutinised at all times. In addition to Georgian statutory requirements all blasting will be carried out in accordance with ANSI A10.7 Construction & Demolition - Commercial Explosives and Blasting Agents - Safety Requirements for Transportation, Storage, Handling and Use.

It is acknowledged that the haulage of spoil from and backfill to the ROW is a potential safety risk. This, added to the environmental concerns regarding the removal and disposal of spoil and the suitability of available borrow pits, has prompted the Contractor to propose that rock excavated from the trench is crushed and graded using mobile plant. It is the intention that, where feasible, the treated material will be carefully returned to the trench as backfill, so as not to impact the pipe coating.

At locations where further work is required once the welded pipeline is in the trench, eg, tie-ins and at valve locations, the trench will be widened into bellholes and supported by timbers or battered back to allow for safe working.

In order to reduce the hazard of excessive lengths of open trench the construction schedule and excavation operation will be organised to ensure that the trench is left open for a minimum practical period.

The possibility of employing a berm at Tavketili was an early suggestion by one of the parties involved (WS Atkins) as an alternative to trenching in that specific area only. However, the pipeline in the Tavketili area will be trenched and carefully reinstated.

There are only two locations where it is proposed to install the pipeline under the basal shear surface. We agree that the design of the pipeline trench at these two locations needs careful consideration in order to avoid reactivation of the landslides or collapse of the trench. The project will ensure that all the necessary precautions are taken.

Pre & post construction drainage

The contractor will detail all drainage mitigation measures in his Erosion Control Plan. In outline these requirements will be constructed with a view to minimising local impact and will not be undertaken in farming areas without prior consultation and agreements with the respective land owners/users. In low-lying areas the drainage system may be extended to connect with existing drainage networks. Where the ROW traverses side slopes, a drainage ditch will be excavated at the base of the graded side slope and will become a permanent feature after construction.

On long slopes subject to rainwater flow temporary silt-fences may be installed to prevent erosion during the construction period. Should such slopes end in a watercourse then a temporary rock-filled berm may also be considered. A temporary collection channel may be formed at the edge of the slope with a sediment trap at the bottom of the run, if necessary.

In any steep areas where the excavated trench is likely to provide a sluice and hence initiate erosion at the bottom of the slope it may be necessary to temporarily backfill the trench immediately after excavation. This would then be opened only for pipe construction at a later date and during an appropriate weather window.

Permanent drainage features will incorporate much of the above. Additionally pipeline trenches on steep slopes will be packed with trench breakers incorporating water discharge culverts. Silt fences would be extended each side beyond the confines of the ROW. Rock filter berms will be constructed to protect watercourses. Where conditions dictate, diversion berms will be constructed, possibly using erosion matting where soil conditions require. Side collection channels may be lined with geotextile membrane and a riprap base. Any sediment traps that are to become permanent would be terminated with a rock-fill discharge backed with a silt-fence immediately above any adjacent watercourse if necessary.

Care will be taken in the construction of drainage systems to ensure that the relevant landowners are aware of the proposed systems and agree to their usage.

Crossings (rail, road, river, etc)

Road and river crossings will be carried out using open cut and non open-cut techniques.

Open cut generally involves trenching part way across the road or river, installing the pipe, and backfilling/reinstating. The remaining section of the road or river is then trenched, the connecting pipe installed and the trench backfilled and made good. At each stage the appropriate diversions and safety measures are put in place to direct the flow of vehicles or water (as appropriate) to one side of the works on the open part of the road/river.

For some rivers where river diversions and non open-cut techniques are not appropriate the trench may be dug across the river using a long-reach excavator mounted on, for example, a barge or a submersible wide-track substructure. The previously welded, tested and concreted pipe lengths are then pulled across the river on floatation devices, which would then be removed to allow the pipe to settle into the trench. Bedding checks are carried out prior to backfilling with the trench arising material.

Reinstatement will be completed, as per the requirements of each river crossing procedure, along with any riverbank erosion control measures.

In general non open-cut road and rail construction will be carried out using the auger bore technique. One large pit will be excavated to the side of the road/rail track on the line of the pipeline and another will be excavated on the opposite side of the road to receive the pipeline. This will be of sufficient size and depth to allow an augering machine to operate safely. This machine will be used to form a bore under the road/rail track through which the pipeline will be pushed. The bore will encompass adjacent services where possible but as a minimum casings, where used, will extend 3m beyond the road/rail track boundary. The pipeline itself will run straight either side of the road for a distance of at least 12m to allow room for road expansion.

Once the pipeline is under the road/rail track it is capped and the pits temporarily backfilled awaiting tie-in to the main pipeline spread.

Some crossings may be made using horizontal directional drilling (HDD) method crossings, such as the crossing of the Kura East River. In this operation a directional drill is used to bore a hole under the geographical feature to be crossed. This borehole is then made larger with reaming strings until the required diameter has been drilled. The borehole is kept open by the use of drilling mud, eg, bentonite. A previously welded and tested pipe string is then pulled through the borehole using the HDD rig. This operation requires sufficient land-take at either end to accommodate, respectively, the HDD rig and the pipe string.

Welding

It is intended that an automatic welding process will be used for the mainline spread. The welding spread will consist of two excavator-mounted pipe-facing machines, internal line-up clamps, two sideboom-mounted pre-heat and automatic welding equipment sets, plus Hiab truck-mounted habitats. The trucks would carry pre-heat equipment, welding generators, etc.

In areas where automatic welding is not possible, for example at tie-ins, then manual welding techniques will be used.

Joint coating, including coating repairs

Once the pipe joints have been tested to ensure compliance with the welding specifications, the joint area will be prepared for application of coating to provide continuation of the main pipe coating (the pipe is supplied pre-coated). The preparation of the joint, the handling, application and storage of the jointing materials will all be subject to a specific construction procedure, to be agreed between the Contractor and BTC Company.

Once the pipe coating has been inspected along the section length, to ensure that there are no coating defects, it is ready to be lowered in. In the unlikely event that any defects are found in pipe coating, these will be repaired using the same coating material.

Padding/intimate backfill

Where the bottom of the pipe trench is in rock or has hard protrusions capable of damaging the pipe coating it will be taken down to a greater depth than normal to accommodate soft padding, whilst maintaining the correct depth cover from the pipe to the finished ground level. In accordance with the project environmental requirements, material for this operation will only be imported if suitable material cannot be selected from the excavated trench material.

Once pipe bedding is complete the pipe is lowered in.

Backfilling/completion

Above the padding, excavated material will be returned to the trench, selected to prevent damage to the pipe coating.

Reinstatement

Reinstatement will commence after each section of pipeline has been installed and the trench backfilled. The extent of reinstatement of the ROW will be for the BTC portion of the ROW only; the portion that will be affected by SCP installation activities will not be reinstated unless the timing of the SCP installation is likely to be more than 12 months after BTC. In this case the whole of the ROW will be fully reinstated.

Reinstatement of crossings, access roads and temporary camps and facilities will be in compliance with the Reinstatement Specification and individual method statements, which will lay down the type of reinstatement and relative timings.

Special points and sections, etc

Special points and sections include those that are considered to be close to inhabited settlements, locations where other existing facilities obstruct the free flow of construction, pinch points necessitating a narrower ROW width, narrow ridge lines, rapid run-off channels in mountainous areas, and any locations where a succession of ravines and gullies etc may impede normal pipeline progress. Detailed construction methods will be developed to deal with each of these, and special crews working separately from the mainline spread will be dedicated to the completion of the special sections.

Particular areas considered to be special sections are a 3km section at the Kodiana Pass near KP 190 and the active mudslide across the Minadze plain near KP 216. These will require deep excavation of the pipe trench, and in the case of Kodiana Pass, dual lay of the SCP with the BTC pipeline.

Steep slopes, side long ground working lengths, seismic faults, landslide zones and swamps all pose specific problems for construction. These will be the subject of detailed procedures and method statements that will clearly identify the construction techniques to be followed for each, and how associated risks will be assessed and mitigated.

Hydrostatic testing

Hydrostatic testing of the pipeline will be carried out after each section of line to be tested has been backfilled and the relevant part of the ROW finally reinstated. The length of any section of line to be tested will not exceed 60km, although in practice shorter test sections will be planned to take account of access, topography, and water supply locations. Some testing will done ahead of mainline testing; this will be the pre-testing of crossings made by trenchless techniques, other major crossings, and pipeline block valve assemblies.

All testing will be in accordance with detailed method statements approved by BTC Company, and the Contractor's Test Plan, which will be developed after the Contractor, has conducted his pre-entry and pre-construction surveys.

Procedures to manage construction

Construction will be managed using several levels of plans and procedures. At the highest level, construction will be controlled and managed in accordance with the Contract Execution Plan, which will describe the management and control of Engineering, Procurement, Construction and Commissioning. It will reference all the Contractor's management procedures, method statements and supporting working procedures, and be subject to BTC Company approval.

In addition to the Contract Execution Plan, Method Statements will be produced for each type of work activity and will include:

- Scope of work to which method statement applies
- Related activity and method statements
- Health and safety issues, including hazards, risks and mitigation
- Environmental damage control and reinstatement procedure
- Training and competence of personnel
- Process to be applied
- Documentation, including drawings, specifications and process procedures
- Quality Surveillance activity and procedures
- Personnel, roles, functions
- Equipment
- Materials
- Reporting
- Close out of activity

Interface Management and Co-ordination will be in accordance with the Interface Plan, which identifies the interfaces between construction and other disciplines and organisations, including third parties such as land owners/users and local authorities.

The Quality Plan, and associated Inspection and Test Plans, cover the quality of construction workmanship. Deviations discovered during the course of construction will be remedied by application of the Corrective Action Procedure.

Construction progress is monitored and controlled in accordance with the Contract Programme and March Plan using an approved planning and progress measurement system, augmented by the operation of a Pipe Tracking System that details the continuing status of pipeline activities from manufacture and delivery through construction, testing and final acceptance.

Spread activities

Regarding construction schedule, the following has been developed in conjunction with the selected Contractors. It is important to note that the Schedule is still being developed and refined. however, preliminary detail, consistent with project objectives, indicates that a single spread is likely to be used for constructing the pipeline in Georgia. The following is also likely:

- The BTC spread will begin installation at KP 75 around April 2003. It will move westwards and arrive at the Turkish border between Oct-Nov 2003. The spread will then demobilise and move to KP 0 whereupon it will again move westwards to finish at KP 75 around Feb 2004
- For the SCP line, it will also begin installation at KP 75 after completing the installation of the BTC line. It will however move eastwards and arrive at KP 0 around March –

April 2004, whereupon the spread will travel to the Turkish border and commence installing the line back towards KP 75. It is anticipated that installation should be completed around Oct-Nov 2004

- Between these points the spread will move at a rate between approximately 500 and 1,200m per day, depending upon the type of terrain
- Larger individual crossings are estimated to require 1 to 2 weeks, with the exception of major crossings which may take up to 2-3 months
- Camps will begin operation around February 2003, with the initial camp being located near Tsalka. The main operational periods are as indicated are discussed elsewhere in this document. However, limited facilities will remain after construction and testing in order to provide bases for care and maintenance and emergency response crews during the Contractor's Defects Liability Period

4.3.2 Issue: Pipeline Right of Way (ROW)

Description of Issue:

A reviewer requested that the methodology for setting the 500m corridor, particularly in relation to safety and avoiding objects and sites eg cultural, environmentally significant, be clarified, in addition to providing an explanation of the location of the 100m, 44m and 32m zones.

In addition, details of assessment of the road tanker movements of CTD each day, which are noted to be significant, have been requested, including details of risk associated with spill of CTD during transport. A likely transport route is also requested.

Additional details of fuelling procedures is requested, including details of bunding and interceptors at areas of refuelling.

Issue Drawn from Comments: 119, 147, 193, 195, 196, 1507, 1727, 1747, 1795, 1806, 2289, 3141

Issue Relates to Following Sections of ESIA: Section 5.

Response To Issue:

Responses to the above are presented below.

Selection of 500m corridor

The methodology used for the selection of the 500m corridors is described in detail in Section 3 of this Addendum.

Road tanker movements

The number of tanker journeys required to transport fuel from PSG1 to PSG2 is dependent on the tanker size and pump rate. BTC Co has estimated tanker trips assuming 8.5m^3 tankers are utilised. However, an assessment of options for use of tankers up to 20m^3 is being undertaken. Assuming the smaller tankers are used, an average of 11 tanker trips per day will be required during 2005 with up to 15 per day in 2006. The number of tanker trips will be likely to drop significantly after 2006 as either SCP gas becomes available or a topping plant is constructed at PS G2.

Tankers will make use only of roads in a suitable condition. On departure from PS G1 tankers will travel from Gardabani, past Rustavi and on to Kvemo Teleti. They will then take the main road to Tetritskaro via Marneuli. Upon reaching Tetritskaro they will take the track north through Tetritskaro forest to reach PSG2.

The risks associated with the transportation of the fuel have been considered and the transportation plan will be developed to ensure risks to the BTC contractors and public are minimised. Specifically tankers will meet present BP vehicle standards, drivers will be undergo an evaluation prior to employment and will complete driver training.

Fuelling and spill procedures are presented in Section 4.9.1 of this Addendum.

4.3.3 Issue: Access roads

Description of Issue A reviewer has asked for details of the haulage routes during pipeline construction, including details of emergency access to reinstated area. Noise impact to local receptors near haulage routes was also an area where additional details were requested. Another area where reviewers have requested additional information is related to the extent of upgrade of infrastructure (roads, waste disposal access).
Issue Drawn from Comments: 357, 895, 1505, 1518, 1744, 1751, 1754, 2014, 2072, 2206, 2391, 2392, 2654, 2687
Issue Relates to Following Sections of ESIA: Section 5.

Response To Issue

The road infrastructure along the route has been visited and considered in considerable detail both by engineering teams and environmental teams. Potential routes for accessing the ROW have been identified for movement of construction materials and equipment, and probable routes for operational phase activities have been identified. Transportation, routes, and aspects considered in evaluating existing infrastructure are discussed in the draft ESIA Baseline Section 8.13.6 and are illustrated in Map 8.17.

Upgrade of existing roads related to the project may require:

a) Minor Upgrade - to repair the existing road to its former state, or better.

b) Major Upgrade - rebuilding the road or track to a standard that matches, and is compatible with, the adjoining access road in order to meet performance requirements for the project.

c) New Road – completely new road across previously undeveloped ground.

Any route used by BTC/SCP Co. will not be left in worse state than in which it was found. Pre-existing conditions and final condition requirements will be agreed between BTC Co's representative and the local authorities by means of records, photographic and video surveys, etc.

Also refer to Section 4.3.4 below "Pipe and Equipment Transport to the ROW" that contains detail on transport of equipment, material and people. Also refer to Section 4.9.1 on waste management and to Section 5.4 for traffic related noise issues.

4.3.4 Issue: Pipe and equipment transport to the ROW

Description of Issue

Provide more details on transport.

Reviewers have also requested that ship movements for delivery of pipe sections be clarified, and details be provided of other transport types, fuel sources, noise levels of use, and emissions.

Plans have been requested which include for transport of personnel from camp to corridor; what is the 'reach' of each camp; and will existing roads be used or will there be construction access along pipeline; personnel transport means- especially steep slopes; driver training for steep slopes; safety policy; emergency evacuation plan. These transport related clarifications have also included the transport of raw materials; construction- inland heavy machinery (Solar Mars 100/pump package); operation- transport of liquid fuel from PSG1 to PSG2 (volume, number of movements per day, hazards).

Review comments for locations of temporary bridge has also arisen.

Issue Drawn from Comments: 885, 1517, 1634, 1701, 1708, 1709, 1770, 1797, 1806, 2118

Issue Relates to Following Sections of ESIA: Section 5.

Response To Issue

Transport details

Linepipe will be transported by ship to Poti Port and to the port at Batumi. From the ports it will be transported by rail to the relevant pipe storage yard. From the pipe storage yards it will be transported by road to the Right of Way, and along the Right of Way for stringing out at its intended locations. For rail movement of linepipe, a standard high sided rail carriage (VOK) (see photograph below) will be used.

For rail movement of larger items of equipment, specialist rolling stock will be used to ensure that safe working margins are maintained on transport envelopes throughout the Trans Caucasus rail system.

	Internal measurements of wagon body						Freight wagon				Hatch discharging	
Type of wagon and extras	No. of axles	Length m	Width m	Height m	Capacity m3	Area of loading space m2	Max. payload t	Tare weight t	Length inc. buffers m	Axle weight t	No.	Measurements m
Steel body	4	12.076	2.750	2.060	73.0	35.0	69.0	22.0	13.920	22.7	14	1.327 x 1.540
Steel body with hand brake	4	11.988	2.750	2.080	70.2	34.1	69.0	23.2	14.410	23.05	14	1.327 x 1.540
Steel body	4	11.988	2.750	1.900	58.5	34.7	64.0	22.4	13.920	21.6	14	1.327 x 1.540
Steel body with fixed ends	4	12.700	2.750	2.060	76.0	35.0	69.0	22.5	13.920	22.9	14	1.327 x 1.540
Steel body without bottom hatch	4	12.088	2.750	2.060	73.0	34.1	69.0	21.1	13.920	22.5	-	-

Linepipe will be transported on trucks with pole trailers on public roads from the pipe storage yard, temporary access roads and the ROW. Equipment will be transported on flatbed trucks, articulated trucks, or low loaders, depending on the type and weight of load being carried.

Initial indications are that the Contractor's equipment will come from Europe, UAE, and Kazakhstan. Equipment from Europe and UAE will be shipped to the port at Poti or Batumi, and then by rail to the nearest railhead to where the item is required. It is anticipated that equipment from Kazakhstan will be transported to a Caspian port for onward shipping to Baku. From Baku, although road transport has not been ruled out, the preliminary indications are that equipment will be moved by rail to Georgia, unless it is too large for rail transport, in which case it will go by road.

Ship movements and associated risk

Provisional schedules indicate that 27 sailings are required for linepipe for BTC and a similar number for SCP. At an average of three vessels per month, the overall supply period will be 9 months approximately for each. There will be a number of other shipments for the Contractor's equipment, and materials for the aboveground facilities installations.

With such a tight schedule risks have been minimised by adopting a two port philosophy. The primary options are that Georgian supplies will run through Batumi, with Azerbaijan supplies running through Poti. In the event of catastrophic failure of one port the other could be used as an alternate. Having examined port and rail operating capacities currently and historically, though the tonnages are significant, they do not place under excessive strain any of the infrastructure within either country.

Transport types

Fuel for road transport will generally be diesel fuel, stored in fuelling facilities constructed in accordance with UK best practice. All vehicles are subject to a strict maintenance regime that includes monitoring of noise and emission levels. Additionally the Contractor is required to establish vehicle maintenance facilities in accordance with UK best practice, with particular attention given to:

- Provision of appropriate hard standing and bunded areas for storage of fuels, chemicals, lubricants and other fluids
- Suitable construction of inspection pits to ensure containment of wastes
- Provision for containment of hazardous materials such as waste oil, oil-containing items such as oil filters, batteries, hydraulic fluids and any other wastes arising from vehicle maintenance and servicing

Refuelling of vehicles is expected to take place at semi-permanent locations such as pipe dumps, railheads and worker camps, and at various other locations along the FCI-ROW, according to the progress of construction. Refuelling vehicles (road tankers) may therefore be required.

Fuel storage tanks, refuelling and maintenance points will not be located within 50m of any watercourse or dry riverbed. Fuel storage areas will be securely fenced, locked to prevent unauthorised access and provided with suitable hazard signage in accordance with UK best practice. Basic oil spill clean up equipment (absorbents etc) will be provided at fuel storage areas.

Where vehicles and equipment are refuelled on the Right of Way, for example side booms and trenching excavators, again, this will not be done within 50m of any watercourse, well or dry riverbed. Wherever refuelling takes place, drip trays and absorbent pads will be placed beneath any potential spill point before refuelling begins. Soiled absorbent pads and materials will be treated as hazardous waste.

All vehicles will be maintained so that their noise and emissions do not cause nuisance to workers or local people. Vehicles and equipment purchased 'as new' will comply with European Community emission standards in force on the purchase date.

Vehicles/ equipment not purchased 'as new' will be maintained so that noise and emissions levels are no greater than when the vehicle / equipment was new.

Method statements will be produced to cover vehicle / equipment emission measurement and routine maintenance. Routine maintenance will be to a high standard to ensure that vehicles are safe and that emissions and noise are minimised.

Raw materials and heavy machinery transportation

Where possible it will be the intention to source and procure raw materials within Georgia. As with other consignments and where the infrastructure will allow, these will be moved by rail to the nearest railhead to the site. From there they will be moved by road to their intended destinations. If rail transportation is not considered feasible, then road transportation will be used. Bulk material (eg sand, gravel) will be transported in large capacity dump (tipper) trucks; bagged materials and smaller items on flatbed or side loading trucks.

Road transportation of heavy machinery will be on low loaders.

For the most part transportation of construction material will be from an access point along the ROW to its destination.

Personnel transportation

The Contractor will develop a detailed Transportation Management Plan that will reflect the critical importance placed by the Project on controlling and managing the movements of vehicles and transport of heavy loads necessary for the pipeline and facility construction work. The plan will be applied to all aspects of transportation including health and safety, driver training, community safety awareness, traffic management, etc.

Camp Location/'Reach' details:

Camp	Location (Approx. KP)	Reach (Approx. KP)
Gatchiani	(28)	0 - 45
Kotishi	(62)	45 - 92
Tsalka	(122)	92 - 148
Andezit	(175)	148 - 202
Akhaltsikhe	(227)	202 - 248

ROW access from camps and storage yards
Access from the camp and/or pipe storage yard will spend the shortest time possible on public roads in order to gain access to the ROW.

Personnel transport means, especially steep slopes
Generally 4WD vehicles or crew buses will transport crews. Transport up steep slopes will be the subject of location/terrain specific procedures. Based on the assessments carried out in drawing up the procedure, 4WD vehicles and buses may be barred access.

Driver training
The Contractor has indicated that only experienced drivers possessing a licence valid for Georgia and who have successfully completed a BP approved defensive driving course will be employed. Medical checks will also be carried out annually to ensure overall fitness levels.

The Contractor will assess the competence of each driver and all drivers will be put through a course that addresses the following topics:

- Daily vehicle checks
- Host country driving laws and regulations
- Defensive driving techniques
- Tyre changing
- When to use 4WD and how to use the gear shifts, particularly for steep slopes
- Off-road environment training: ascending/descending inclines, crossing watercourses, driving on snow/mud/sand, etc
- Understanding the vehicles operating limits
- Vehicle care, ie, over revving of engine, proper use of the clutch, safe breaking, etc
- What to do in the event of an accident
- Reporting defects

- Securing loads - mainly for truck drivers

An Emergency Response Plan will be developed addressing all eventualities including, for example, fire, explosion, collapse of structures, serious injuries, medivac, spillage of chemicals and exposure to toxic substances.

The plan will be developed in consultation and co-operation with the local authorities and emergency services and integrate with BTC/SCP Co's Emergency Response plan. The plan will also address response to natural occurrences such as lightning, storms and floods and in addition security issues such as civil unrest or terrorist activity.

The Emergency Response Plan will include all arrangements for evacuation and, where necessary, repatriation of non-resident and expatriate personnel and third country nationals. It will detail the emergency organisation, resources and equipment, identification and testing of equipment and facilities, the responsibilities of key personnel, communications to be made, from where assistance should be sought, site evacuation, and rescue of persons. It will include a medical emergency plan for dealing with injuries and illnesses. Periodic drills, including liaison with external organisations, training and incorporation of lessons learned, will form part of the plan.

All equipment resources and facilities required by the Emergency Response Plan including of medivac facilities will be provided. A qualified Emergency Response Team, will also be available continuously 24 hours a day throughout duration of the Construction.

At each worker camp and worksite, a listing of Contractor's key personnel, including persons responsible for the Emergency Response Team, complete with contact details and telephone numbers will be displayed.

Emergency response planning will include procedures for dealing with environmental emergencies on a 24-hour call-out basis.

Temporary bridge

The temporary bridge was identified as a possible requirement in the early stages of planning transport routes from camps and pipeyards. It was thought that one temporary bridge may be required to cross the river adjacent to the proposed Atskuri pipe-yard. If yard and bridge are required, the contractor will confirm this. Preliminary plans submitted by the contractor indicate that they are not likely to be required.

4.3.5 Issue: Temporary construction facilities

Description of Issue

Reviewers have requested additional information on the following:

- The criteria for selecting sites, and probable locations of construction camps and pipe yards
- The constraints on selected laydown areas, particularly those that may be used for river crossings
- Descriptions of BTC and SCP shared temporary facilities

- Waste treatment and water supply

In general, details were requested for the process of selection of worker camps locations and time frames for their use.

Issue Drawn from Comments: 231, 876, 878, 896, 899, 900, 1504, 1506, 1618, 1666, 1710, 1724, 1796, 1798, 2110, 2119, 3075

Issue Relates to Following Sections of ESIA: Section 5.

Response To Issue

Input from construction contractor

At the time of preparing the Draft ESIA, construction contractors had only recently been selected. This Addendum, and the revised Project Description herein do contain limited preliminary plans that have been provided by the selected Contractor.

The Contractor will mobilise soon after Contract Award its senior personnel responsible for establishment of temporary facilities, and prepare the requisite documentation for BTC Company and relevant Authority approval so that camp and office units may be mobilised, catering, fuel supply and waste management subcontracts placed, and the work of the Community Liaison Teams initiated.

During the Contractor's tender process, all of the camp requirements in terms of accommodation, messing, offices, utilities, etc were identified. Initially, the sites to be investigated are located at Gatchiani, Kotishi, Tsalka, Andezeti and Akhaltsikhe. It should be noted, however, that the extent of rock trenching will require a dedicated 'fly' camp for associated personnel operating well ahead of the main spread arrival.

Following approval by BTC Company of the HSE, Waste Management and the Community Relations Plans, the Contractor's Community Relations Officers responsible for the initial camp area and in the rock trenching zone will commence work within the local communities to finalise land access and temporary usage formalities, and to discuss any other relevant issues.

Coincident with the establishment of the first camp, the work required to access the land for the second camp shall be initiated. The Contractor will ensure that all issues affecting temporary land usage for camps and pipe dumps are fully addressed and resolved well in advance of the planned start of construction and first pipe deliveries.

Site offices and camps will move with the progress of the main spread. Both covered and open storage will be provided, and construction plant and equipment yards included, along with the maintenance and fuelling facilities necessary for the Project. The Contractor's construction plant and equipment mobilised from overseas will have been fully serviced prior to shipment and any locally hired equipment fully inspected for HSE compliance and serviced prior to transfer to site.

The first camp will be fully operational and ready for the scheduled start of construction activities. This will permit the camp erection crew to move ahead and prepare the infrastructure for the second camp so that when construction has progressed to where the second camp is required, this facility will be ready and available for occupation. The first camp will then be reduced to a fly camp to allow back-end completion, and its mobile units would then be moved forward as a basis for the third camp location. This progressive movement would be followed through to project completion.

Pipe yards

Establishment of pipe yards will follow a similar pattern to the above works described for the camps, with significant further work required to establish acceptable routes for the heavy traffic loadings. This will be addressed in the Contractor's Transport Management Plan. The rail yards will be surveyed to assess requirements for upgrading. Any necessary track re-alignment work will be arranged in conjunction with the local railway authorities.

Community awareness programmes will be initiated, and will be inclusive of traffic safety campaigns, particularly targeting local schools as, once west of Rustavi, they may have had little or no prior experience of major truck movements in their region.

Access roads will be subject to full pre-entry surveys consisting of digital photography recorded in hard copy and signed off by the local authorities before any upgrades are initiated and regular project traffic movements commence. They will then be maintained as required to permit safe movement of vehicles.

Multiple option for locations – selection criteria

The proposed locations and criteria for the selection of camps, offices and storage facilities were provided in the ESIA Draft for Disclosure (Sections 5.7.7.1 and 5.7.7.3).

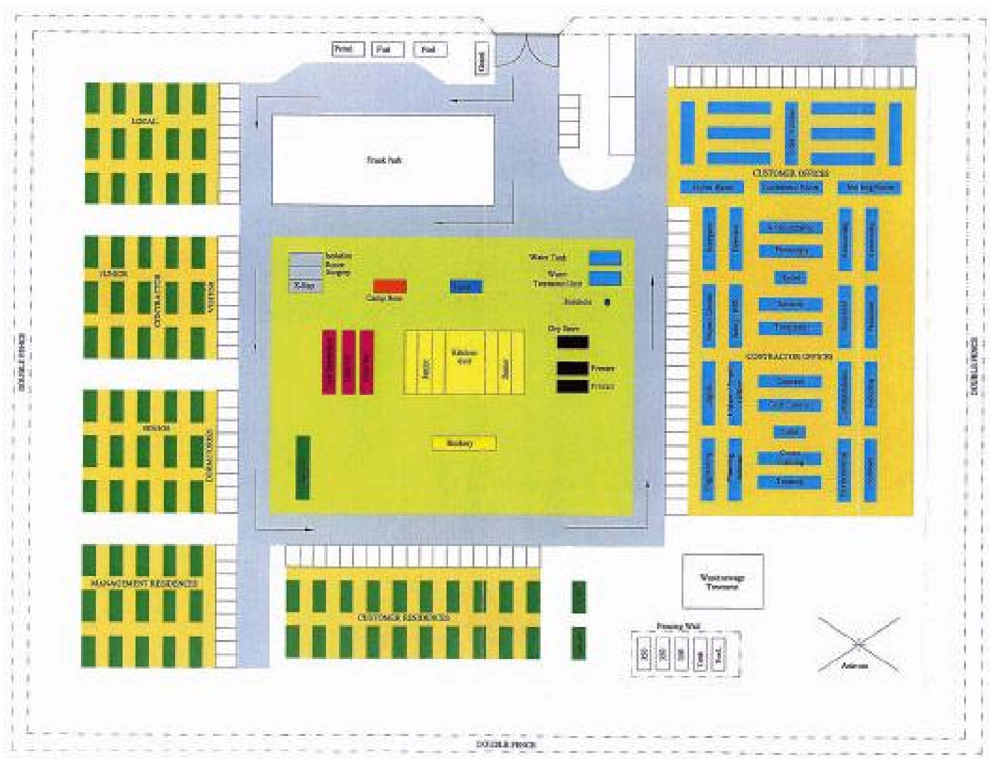
Other criteria that are required to be taken into account are:

- Availability of the site from the landowner
- Environmental sensitivity of the area, including potential odours, air emissions, noise (particularly during evenings and throughout the night), and dust impacts on local communities
- Geo-technical and topographical features of the site
- Socio-economic impact on the local community
- Provision of food, water, power supplies, and waste disposal facilities whose discharges and waste streams are both acceptable and sustainable to/within the local environment
- Security of personnel, the campsite, the workshops and the other buildings, compounds and stores where equipment and materials may be held and where personnel will work, eat and rest
- The logistics and access to proposed Pipe/Storage yards and other material supply routes
- Operational life of the camp, for example, temporary or semi-permanent, etc
- Locations that minimise the risk to the workforce, the environment and the asset especially concerned with the reduction of road related traffic accidents, daily road travel for personnel and road conditions
- Limiting road travel times between camps and the Right of Way to one hour in order to reduce the exposure of the workforce to possible road traffic accidents

Detail camps and laydowns

The Contractor has not yet prepared detailed plans for camps and storage laydown facilities. However, an indicative camp and office layout is provided in Figure 4.15 below.

Figure 4-15 Typical camp layout



The Contractor will implement a Waste Management Plan, approved by BTC Company, for the safe treatment and disposal of all wastes from camp operation. In camps, sewage treatment plants will be installed, and agreement made with BTC Company for dealing with treated water and treated sludge. Sanitary waste and wastewater at pipe storage yards will be collected in holding tanks for periodic removal and safe disposal.

Other wastes, ie, recyclable, domestic, non-hazardous and hazardous etc will all be processed in accordance with approved procedures.

Pipe laydown areas are required to be level. The Contractor will grade and fill with suitable material each area as necessary. At the end of pipe laydown and storage activities, the Contractor will reinstate the land to at least its original condition, to the satisfaction of owners and occupiers as applicable.

Camp location and usage details

The Contractor's project management offices will be based in Tbilisi. Construction management will be controlled from the main camp locations.

There will be no fly camps located at special sections, etc; all construction works will be managed and accommodated at the locations stated below. However, owing to the nature of the operation it may be necessary to set up a semi-mobile camp facility dedicated to the rock blasting.

The camps at the locations indicated below will grow and decline as the spread moves through the country. The specification for the operation and condition of the camps is the same throughout the entire life of the camp from erection to removal.

<table>
<tr><th>Camps</th><th>Peak Usage</th><th>Occupation Period</th><th>Reach (Approx. KP)</th><th>Camp Size (m^2)</th></tr>
<tr><td>Facilities Contractor</td><td></td><td></td><td></td><td></td></tr>
<tr><td>PS-G1</td><td>320</td><td>Mar 03 - Aug 04</td><td>N/A</td><td>~90,000</td></tr>
<tr><td>PS-G2</td><td>320</td><td>May 03 - Aug 04</td><td>N/A</td><td>~65,000</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Pipeline Contractor</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Gatchiani</td><td rowspan="5">1,400 personnel at peak total. Assume approx. 1,000 spread across the camps, the remainder being local staff.</td><td>SCP following BTC
Aug 03 – Jul 04</td><td>0 – 45</td><td>~70,000</td></tr>
<tr><td>Kotishi</td><td>SCP following BTC
Oct 03 – mid Mar 04</td><td>45 – 92</td><td>~70,000</td></tr>
<tr><td>Tsalka</td><td>BTC Feb 03 – mid Oct 03
SCP Jun 04 – mid Oct 04</td><td>92 – 148</td><td>~70,000</td></tr>
<tr><td>Andezeti</td><td>BTC Jun 03 – Oct 03
SCP May 04 – Aug 04</td><td>148 – 202</td><td>~70,000</td></tr>
<tr><td>Akhaltsikhe</td><td>BTC Sep 03 – Nov 03
SCP Mar 04 – Jun 04</td><td>202 – 248</td><td>~70,000</td></tr>
</table>

The Occupation Period for each camp is that currently planned for main construction phase of occupancy. There will be reduced occupancy levels in between and following the main construction phase to cater for follow-on activities requiring lower numbers of resources, eg completion of hydrostatic testing, de-watering and pipeline drying, care & maintenance of pipeline and associated facilities until Start-up. In addition, standby crews and equipment need accommodating during the contractors' Defect Liability Periods, which extends to approximately 18 months after completing construction.

Following the completion of the SCP, and shortly after the last phase of occupation for each camp discussed above, the majority of the camp facilities will be dismantled and removed, and the affected land reinstated. The minor remaining facilities will be used to support follow-on activities such as reinstatement. When these are no longer required, they too will be dismantled and removed, allowing final reinstatement of the camp areas to be completed.

BTC and SCP shared facilities

Please refer to the revised Project Description. The Project Strategy is to commence construction of the SCP system immediately after the completion of the SCP Pipeline. Therefore, all the temporary facilities used for BTC will be re-used for SCP.

Constraints on selection of laydown areas

The Contractor will conduct a detailed survey of potential pipe laydown areas to check suitability against the selection criteria referred to herein.

Location of worker camps

The Contractor does not intend to construct camps at unidentified locations. However, a small camp will be required to support rock-trenching activities, which will be performed ahead of mainline operations. It is anticipated that this will be contained within the Right of Way. The Contractor's Community Liaison Officer for this section will ensure all potentially affected receptors are considered and fully discussed with local inhabitants.

4.3.6 Issue: General mitigation measures associated with pipeline construction

Description of Issue
A request was made for a timescale to be provided for the fuelling and spill procedures being developed. A query was made as to whether re-fuelling be undertaken to prevent fugitive emissions of VOCs. Comments were made that the project emphasises that there will be a large amount of re-fuelling undertaken in combination with sensitive environments, and that consideration should be given to centralised bunded areas with interceptors. Comments were made which request additional information on the dust suppression water volume estimates project water use. Comments were made that there appears to be little study presented in the ESIA in relation to the potential for and implications of flash flood damage particularly in relation to rivers not classified as major. We would be interested in information specifying identified trouble areas. We would also note it is not clear what early warning and response procedures are in place for these.
Issue Drawn from Comments: 386, 672, 1086, 1659, 1746, 1748, 1749, 1878, 1892, 1893, 1894, 1934, 2129, 2130, 2131, 2147, 2225, 2226, 2262, 2327, 2354, 2403, 3159
Issue Relates to Following Sections of ESIA: Section 5, Section 10.2.

Response To Issue

Refuelling

The contractor will develop a Pollution Prevention Management plan as outlined in Table 14.1. (Section 14.3.1.1) This includes, amongst other requirements, refuelling procedures. These will be developed by the contractor and approved by BTC/SCP Co. In general, refuelling will not be allowed on rivers floodplains and groundwater sensitive areas. This mitigation measure is mentioned in the draft ESIA document (Mitigation 13 in Section 10). Section 4.9.1 contains further information on re-fuelling procedures.

No specific measures will be taken to recover VOCs or minimise their emissions during refuelling as the main fuel will be diesel which does not have a significant faction of VOCs.

Dust management

The amount of water required for dust suppression will be dependent on the prevailing conditions and construction activities. The contractor is required to make adequate provision for dust suppression. The volumes are not considered to be significant in the Georgian section of the route.

River crossing monitoring

Studies and calculations have been performed to ensure that the pipeline will not be exposed by a flash flood during the design life of the pipeline (see Section 4.3.1 of this Addendum). Particular attention has been applied to flash flooding and the potential for debris flows in mountain streams. Operations will monitor river flow, rain levels and other meteorological information. The pipeline crossings will be inspected by operations during the frequent pipeline patrols and after each significant rain event.

4.4 TESTING AND COMMISSIONING

4.4.1 Issue: Hydrotest water

Description of Issue Additional details of the number of sections, where water will be taken from and discharged to during pipeline hydrostatic testing has been requested by a reviewer.
Issue Drawn from Comments: 144, 791, 893, 1510, 1567, 2123, 2182, 3151
Issue Relates to Following Sections of ESIA: Section 5

Response To Issue

The number of sections and abstraction and discharge points will be determined as part of the construction planning process which is about to start (September, 2002). However, a set of general rules has been set out, and some specific studies have already been made. The results of the studies indicate the following:

There will be at least four sections, each of 60 km. In fact, the number of sections is likely to be higher (for example, 10 or 20) because it is not possible to test lengths which include large elevation differences at the same time. Section lengths will also need to be adjusted to the actual abstraction and discharge locations. The total amount of water required is about 250,000m^3.

The initial studies concluded that only the larger watercourses on or near the pipeline route should be used. These are:

- River Kura (near Rustavi)
- Lake Kumisi
- Lake Tsalka
- Lake Tabatskuri
- River Kura (near Akhaltsike)
- River Potskhovi (near Vale)

The same water-bodies will be used to receive used hydrotest water after use. At present, it is planned to avoid the addition of treatment chemicals to the hydrotest water. However, corrosion inhibitor, oxygen scavenger and biocide may need to be used. If it is necessary to use such chemicals, those with the minimum ecological effect will be given significantly higher weighting in the evaluation process.

Before discharge, to minimise environmental impacts, and if deemed necessary by the regulatory authority, hydrotest waters will be treated. Water will only be discharged if parameters and flows are in accordance with the regulatory standards. An environmental permit will be required to undertake these activities.

4.5 REINSTATEMENT AND EROSION CONTROL

4.5.1 Issue: Reinstatement and erosion associated with the construction of the SCP and BTC pipelines

Description of Issue

Comments state that given the high susceptibility of the pipeline route to erosion (64% of the landscape termed high to very severe risk) there is limited identification of location specific erosion risks and methods of minimisation. The effort, monitoring and protection given to reinstatement will need to be made appropriate to the specific location.

Reviewers have sought further clarification on the construction schedule for BTC and SCP with regard to partial and complete erosion control and its effect on SCP construction on geohazards should SCP be constructed immediately, 2, or 4 years after BTC.

A reviewer has commented that temporary reinstatement is defined as being implemented only should permanent reinstatement not be possible within 12 months. It is later suggested only where sections of ROW are likely to undergo severe erosion – clarification of this point has been sought.

It has also been noted that there is little information specifying erosion control at crossing reinstatements, and the further information to be submitted does not appear to be subject to external scrutiny.

A comment was made that requested further description of the reinstatement measures for all temporary installations - camps and laydowns, waste disposal sites, and borrow pits.

Issue Drawn from Comments: 280, 359, 498, 550, 589, 774, 777, 793, 794, 840, 841, 843, 866, 898, 904, 1057, 1078, 1079, 1161, 1213, 1226, 1234, 1311, 1423, 1425, 1428, 1461, 1515, 1516, 1521, 1532, 1545, 1546, 1550, 1568, 1575, 1632, 1650, 1651, 1658, 1799, 1803, 1804, 1852, 1881, 1931, 2020, 2127, 2134, 2135, 2164, 2183, 2192, 2216, 2272, 2316, 2347, 2355, 2367, 2369, 2381, 2382, 2383, 2389, 2391, 2392, 2395, 2396, 2398, 2399, 2427, 2444, 2463, 2556, 2581, 2687, 2973, 2974, 3040, 3053, 3076, 3115, 3159, 3169, 3213

Issue Relates to Following Sections of ESIA: Section 5

Response To Issue

Erosion control and reinstatement are principal challenges for any pipeline project. The BTC and SCP projects have invested considerable time and effort to develop solutions that deliver world-class reinstatement.

The base case is for full erosion control to be installed across the FCI-ROW after BTC construction. If the SCP installation follows on directly after the BTC pipeline installation, full reinstatement will be carried out on the sections of the FCI-ROW that will not be disturbed by SCP construction activities. Interim reinstatement will be performed on the remaining portion of the FCI-ROW.

Interim reinstatement measures will function for the full period to the start of installation of the SCP. If the SCP project is not sanctioned, or if the period between construction of the two pipelines extends beyond 12 months, full reinstatement will be performed over the FCI-ROW. Where the installation contractor plans, or finds it necessary, to de-mobilise from any route section due to the onset of winter weather a method statement will be developed, detailing all temporary erosion control measures required to stabilise the FCI-ROW during the entire demobilisation period. If SCP construction follows on directly from BTC the disturbance due to double handling of the FCI-ROW, establishment of access routes and mobilisation of machinery and personnel and their subsequent impacts will be minimised. If the SCP construction is delayed by 2 or 4 years after BTC, the environmental and social impacts should be considered as if it were an individual pipeline project.

Sedimentation and erosion control devices have been specified along with reinstatement requirements at crossings and along the FCI-ROW. Construction method statements will be developed by the contractor once the construction has been defined; these will meet the environmental requirements stated in the ESIA document, and require approval by BTC/SCP Co.

The potential for erosion has been assessed in detail along the entire route with all sections allocated erosion potential classes as outlined in Section 8.6.3 of the Draft ESIA. . Soil erosion control (both interim and final) measures have been developed for each erosion class and are described in Appendix A, Annex I of the Draft ESIA. These protection measures will be used as the basis for marking out the FCI-ROW prior to commencement of clearance at any given location, In setting out the erosion control measures due regard will be given to construction methods, land use, and topography.

The criteria for temporary reinstatement is all areas must achieve Erosion class 3 (moderate erosion of less than 10 tonnes/ha for a 1 hour, 10 year return period storm) or better for the duration of the construction.

The cumulative effect associated with the co-existence of both BTC and SCP pipelines are described in Section 13.5.2 of the draft ESIA document in relation to all environmental components affected.

The cumulative effect of the reinstatement of both pipelines ROW will depend on the time lapse between the two construction projects. Permanent reinstatement measures are however planned in case of significant delay of the SCP project as explained above.

On this basis it is expected that the reinstatement activities will have an overall beneficial effect on the soils, landscape and natural habitats.

Camps and laydown areas will be restored to their pre-existing conditions. In some cases these areas may be able to be utilised by local communities and this will be negotiated with relevant authorities and the communities.

The waste disposal site that will be used for hazardous waste will be the subject of an environmental impact assessment pursuant to obtaining a construction permit and a waste disposal licence. It is expected that the site will be operated beyond the lives of the BTC and SCP project and will be reinstated in accordance to the terms of its licence.

Any borrow pits or inert waste disposal sites that may be developed as part of the pipeline construction activities will also be subject to an environmental permit and will be reinstated according to the permit's conditions. If aggregate is to be procured from existing quarries, BTC/SCP Co or its contractor will have no responsibility for reinstatement as this would lie with the quarry owners and its terms would be stipulated within the mineral extraction licence.

4.5.2 Issue: Erosion control associated with landslides

Description of Issue

Reviewers state that a statement in the SCP Report suggests that "in areas of high environmental quality, traditional trenching techniques would leave a scar on the landscape that could well be impossible to reinstate satisfactorily. 'Berm' landforms would need to be carefully designed to achieve the natural forms of the stone streams etc. In doing so, the adoption of such a technique would place the environmentally compatible design of the pipeline at the forefront of the new and exciting disciplines of landform replication and soft engineering." Further explanation of the above is requested. In addition, it is noted that this statement has implications in terms of the majority of the route, where buried pipeline runs through areas of medium-high environmental quality.

Comments were made that it is suggested that the residual visual impact on Mt Tavkvetili is significant and that further consideration should be given to avoiding this area or implementing further mitigation measures to reduce potential impact. This may comprise the employment of a berm, as mentioned in the WS Atkins report, a construction methodology which is still not clearly noted in the ESIA.

It is noted that the Shah Deniz report indicates that the Mt Tavkvetili section will be an above-ground berm rather than buried. While there are good reasons to avoid undermining the slope, blasting and consequent falling debris, this methodology is likely to have a significant visual impact on that landscape. Also, the source or method of borrow material needs consideration.

Comments were that the Shah Deniz geotechnical report states "it is understood to be unnecessary to bury the pipeline... and that artificial berms may be used where appropriate". Specific environmental consideration, impact mitigation proposals and agreement is requested before such construction is undertaken. It is also noted that if such a technique could be executed safely and with relatively lower environmental impact, it might be applied for the purpose of environmental, rather than constructability, benefit eg in areas of shallow groundwater.

Comments suggests that here is little information specifying erosion control at crossing reinstatements, and the further information to be submitted does not appear to be subject to external scrutiny.

Issue Drawn from Comments: 1765, 1766, 1767, 2294, 3048, 3049, 3053, 3159, 3169

Issue Relates to Following Sections of ESIA: Section 5.9

Response To Issue

The above comments are understood to be particularly in respect of crossing of rock areas prevalent in the Mt Tavketili area. Several suggestions are quoted in various project documents developed throughout the life of the project, but these are mere "suggestions" or "understandings" of the authors at the time of writing and do not constitute an instruction to the installation contractor. These suggestions were not however included in the ESIA document itself as they were not part of the intended design.

The idea of a berm should not be regarded as a new visual linear feature that will be distinguishable from its current natural surroundings. It was found that the natural rock piles, screes, spreads, garlands, streams and outcrops local to the area, have the necessary relief for them to be replicated as pipeline berms ie carefully restored, the presence of a pipeline would be difficult to distinguish and this perhaps will be established relatively quickly compared to vegetated areas elsewhere on the route.

It should be understood that it is a requirement for the pipelines to be installed in virgin ground, ie. the suggested berms are not there to avoid trenching and provide a full embankment condition, but may be used to reduce the amount of trenching required. For example, the pipeline may only be buried with minimal cover to the crown of the pipe, and the berms used to provide additional cover, but at the same time in keeping with the natural surroundings. These berms do not necessarily need to be installed in a precise linear manner but can be landscaped so that they blend in with the existing streams and outcrops trends.

Due to the nature of the rock screes, blasting is not anticipated in this area. Perhaps individual excessively large boulders may need to be broken to facilitate handling by using a pecker attachment or local controlled blasting of individual boulders/rocks. Should blasting be required the effects of blasting are always very carefully considered taking into account existing facilities, personnel and the environment. These operations are subject to the strictest method statements, procedures and specific task risk assessments.

The installation and reinstatement of the rock area of Mt Tavkvetili will be subject to a specific method statement by the installation contractor. This will not be approved by Company without prior liaison and agreement with BTC Co environmental management.

4.6 OPERATION, CONTROL AND MAINTENANCE

4.6.1 Issue: Manual inspection of pipeline

Description of Issue

A comment was made that there is a concern here as to frequency of inspection achievable by horseback and the time-consuming nature of this transport mode. Additional information should be provided on the transport mode for inspection, expanding on the likely limitations on access (spatially and seasonally) using these techniques.

A comment was made that it is difficult to determine the nature and frequency of pipeline inspections and maintenance visits from the ESIA. A comment was made of whether or not consideration been given to ensuring the appropriate number of experienced personnel can be applied to this task, and that how acceptable is the practicability of the frequency of inspection for each pipeline section.

Issue Drawn from Comments: 529, 794, 1549, 1756, 1807

Issue Relates to Following Sections of ESIA: Section 5.10

Response To Issue

It is recognized that pipeline patrol by horse back is time consuming. It is also one of the few methods of accessing all areas of the pipeline route on a regular basis. It forms part of an integrated approach to pipeline integrity. It is a visible reminder to people living and working along the pipeline route of the presence of the pipeline and the fact that regular patrols take place. It is presently carried out on the Western Route Oil Pipeline. It should also be noted that patrolling by horseback does not have a negative impact on the reinstatement success, compared to for example vehicles. The likely limitations are similar for all forms of patrolling – with the possible exception of aerial surveys which is subject to its own set of restrictions. It will be possible to have access to all sections of the pipeline in all weather conditions for dealing with emergency situations (eg by helicopter, or snow vehicle).

Resource requirements have been identified and allocation has been made in the operations manpower plan. The manpower plan also identifies the need for early recruitment of key staff and adequate training for all staff.

Consideration will be made of utilizing staff trained on existing WREP pipeline operations prior to start up of BTC in order to gain the necessary skills and expertise.

Section 5.11.2 of the Draft ESIA outlines typical options that may be considered.

4.6.2 Issue: Facilities

Description of Issue

A comment was made on the frequency of emissions monitoring, regular check methods on combustion emissions eg stack opacity / O_2 etc.

Additional information is required on fuel supply facilities for power generators, for example, in terms of connections to the bulk tanks.

The term "crude oil consumption" is used in terms of the pump drivers on page 26 of the PDD. The figure quoted in the PDD should in fact refer to CTD consumption per turbine unit.

Notwithstanding the 9+ days storage capacity, the CTD production capacity needs to be sufficiently greater than anticipated fuel usage, particularly in Phase I, to allow for, for example, downtime of the CTD.

Issue Drawn from Comments: 685, 869, 1362, 1786, 1787, 1789, 1907

Issue Relates to Following Sections of ESIA: Section 5.10

Response To Issue

Crude oil vs CTD consumption

The term used should be consumption of topped crude rather than “crude oil consumption”. Both the gas turbine pump drivers and the pump station generators use topped crude distillate for fuel. This has an analysis equivalent to good quality diesel fuel.

Storage of fuel

Storage level complies with a requirement for 14 days storage at pipeline capacity of 300,000bbld. Storage capacity at the end of Phase 1 (500,000bbld) is 9 days. However, at pipeline capacity above 300,000bbld, the pump drivers and generators are expected to be fuelled by gas, rather than topped crude. In this case, storage at the pump station will only be required for intermittent operation of the pumps and generators if gas supplies are unavailable.

Supply of fuel to generators

The generators are supplied with topped crude fuel from the bulk tanks through a ring main fuel header system.

4.6.3 Issue: Leak Detection System (LDS)

Description of Issue

A comment was made that the leak detection system is currently under development hence the reviewers assume no significant change in the LDS from details in the ESIA and PDD will take place.

The ESIA notes that the leak detection system "may also be able to identify smaller leaks over a longer period of time". The comments also highlights that while this may be beneficial, uncertainty in the effectiveness for small leaks means this method should not be relied upon and there is a need to address leaks of that scale through other strategies.

A comment was made that leaks less than 1% could result in significant flows going undetected for long periods (ie up to a maximum of ten thousand barrels per day). Based on the average volumes given in the oil spill assessment for leak, hole and rupture, a "leak" falls under the detection threshold and for the assumed response time would have to be detected by either visual inspection or pigging.

Although a certain leak size can be detected across the metering stations, one in Georgia, one in Turkey, it is unclear how well the LD system will specifically locate the leak within the significant distance in between the stations, as it is not clear what sensory devices, and where, form part of the LD system.

Issue Drawn from Comments: 700, 1512, 1763, 1764, 1780, 1781, 1782, 1783,1784, 1785, 1913, 2125, 2278, 2303, 2304, 3207, 3210

Issue Relates to Following Sections of ESIA: Section 5.10

Response To Issue

Leak detection system

The leak detection system selected combines all the proven leak detection technologies identified in API-1155 complete with a 99.8% availability. These are:

- Mass/Volume Balance Analysis
- Pressure Point/Drop Analysis
- Acoustic Pressure Wave Analysis
- Real Time Transient Model (Based on Hydraulic Model)
- Statistical Analysis

The selected leak detection system can identify leaks below 0.5% of the flow during steady state operating conditions in less than one hour, and also down to below 0.2% under static conditions within the same time period. Under transient conditions the time period will be around two hours. Secondary methods for detecting smaller leaks will include visual inspections of the ROW and groundwater monitoring.

We concur that the "leak" in the "Oil Spill Assessment" is below the threshold of the leak detection system. The Oil Spill Assessment based a leak on 0.1% flow and a hole as 10% flow. The detection rate from the model has assumed that the leak will be identified by other sources within 48 hours.

The selected leak detection system will provide the location of the leak from the nearest upstream facility (Block Valve Site, Inter-Pigging Station or Pump Station). This information will be displayed on the operators' screen as a marker displaying the magnitude of the "Leak Rate" in appropriate units and location of the leak in "Metres" from the upstream facility. The accuracy of the leak location depends on the operating parameters for the section of line (Tight Flow, Slack Flow, Steady State Flows, Transient Flows, etc), but for the longest section of line under worst conditions the location accuracy is anticipated to be better than 1.0km.

4.6.4 Issue: Monitoring of the river crossings

Description of Issue Additional information was requested on the proposed nature of monitoring for river crossings. Reviewers would recommend that such monitoring include a photo-survey, with initial bank profiles referenced in more critical crossings.
Issue Drawn from Comments: 832, 1758, 1794, 2200, 2364, 3213
Issue Relates to Following Sections of ESIA: Section 5.10

Response To Issue

In addition to the normal pipeline patrol, periodic surveys will be carried out of all river crossing points and any other potentially affected water and ground locations. The frequency of the survey will be determined by the nature of the river and, in particular, the tendency towards river bed and bank movement.

Inspection and survey will address two main areas, pipeline cover (river bed level) and river bank erosion. Inspection/survey will also take place up and downstream of the defined river crossing and will report on the condition of the river bed and bank and on any activities that may affect the river crossing in the future.

Photographic records will be available from pre- and post-construction. These, along with the as-built drawings, will form the baseline for subsequent surveys. In order for accurate surveys to be carried out it will be necessary to have local reference points (monitor or monument markers) to which any survey can be referenced.

Periodic surveys will be carried out to determine the profile of the river bed and any erosion or deposition. The exact method used to carry out the survey will vary dependant upon the size, depth and speed of the river.

4.6.5 Issue: Pigging

Description of Issue

Intelligent pigging will be carried out every five to ten years to check pipeline integrity. As such. Reviewers suggest that the latter will offer limited value in the context of leak detection - although has obvious benefits for prevention.

Additional information on the frequency of pigging was requested.

Issue Drawn from Comments: 541, 864, 870, 1783, 1792

Issue Relates to Following Sections of ESIA: Section 5.10

Response To Issue

It is true that intelligent pigging is not carried out to find leaks or escapes, and is indeed used primarily as a tool for prevention by providing a snap shot assessment of the state of the pipeline's integrity.

Anomalies in a pipeline are not unusual and are the result of manufacturing processes. If the integrity of the pipeline survives the hydrostatic test, any anomaly may play no further part in the integrity of the pipeline.

Intelligent pigging is initially carried out prior to hydrotesting to provide a fingerprint of the pipeline, a record of the pipeline showing the variations in wall thickness, and any defects or anomalies that are present. The results of the "baseline" survey, post hydrotesting, are also analysed to determine whether any major anomalies have occurred between hydrotesting and the baseline intelligent pig run.

Subsequent Intelligent Pig runs indicate whether any of the original anomalies have grown compared to the original baseline survey, or if any new anomalies are present. These anomalies are then assessed to determine the potential for deterioration with resulting risk to the integrity of the pipeline. Anomalies that are determined to pose a risk to the pipeline integrity, either now or in the future will be repaired. The intent is to locate and repair those anomalies before they become a problem. It is a preventative action carried out as part of Pipeline Integrity Monitoring by the Operations Team to ensure integrity is maintained.

By analysing anomaly growth and the presence of any new anomalies a decision can also be made regarding the frequency of Intelligent Pigging required. Pipeline companies alter the frequency of intelligent pigging in the light of these results and general operating experience, hence every five to ten years is a likely frequency.

4.6.6 Issue: Emergency Response Plans (ERPs)

Description of Issue
A request was made for facility and population evacuation plans to be given greater profile in the appropriate project documents. Reviewers have requested additional information on surveillance program for oil spill and emergency response plans - frequency, methods, number of personnel, transportation. A comment was made that ERPs should include accidents, natural disasters, plant and equipment breakdown, hazardous material spills, explosions and security issues.
Issue Drawn from Comments: 97, 156, 171, 213, 833, 897, 1668, 1757
Issue Relates to Following Sections of ESIA: Section 5.10

Response To Issue

The Oil Spill Response Framework document details the various documents that are being refined or developed for BTC and include:

Incident Management Plan	This is the over arching document that details the procedures to be followed in response to any incidents in the BP Azerbaijan Business Unit region
Country Specific OSRP	Separate OSRPs will be developed for each country along the BTC corridor. These will be integrated with the existing OSRP's prepared for the WREP, NREP and other onshore facilities
Containment Manuals (Onshore) Coastal Sensitivity and Shoreline Protection Manuals Offshore Response Manuals	These include specific proposed response and containment sites. Details such as environmental sensitivity, river (and sea current) data, maps and/or aerial photographs etc

As depicted the Operator uses the term Incident Management Planning (IMP) rather than ERP. The IMP describes how all types of incidents will be responded to including accidents, natural disasters, plant and equipment breakdowns, hazardous material spills, explosions and security issues. Procedures for evacuation at each main facility will be developed in accordance with the IMP.

The operations team is currently assessing the resources that will be required to ensure the safe and efficient operation of the pipeline and associated facilities. A key part of this planning is determination of staff numbers, training requirements and where these staff are to be located. Associated with this process is determination of the pipeline monitoring schedules and methods. The monitoring programme will be developed to ensure the pipeline, facilities and ROW are well maintained and any potential problems are identified. Whilst no oil spills are anticipated, pipeline monitoring will incorporate methods to ensure rapid identification of an oil spill. The primary tools for monitoring for any leak will be the Integrated Control and Safety System (ICSS) and pipeline patrols.

Oil spill equipment and resource requirements will be evaluated as part of the Oil Spill Planning efforts currently under way. Development of operations and OSR plans set out above is being undertaken in accordance with the programme of activities outlined in the OSR Framework Document included in the Draft ESIA, Appendix E, Annex V.

4.6.7 Issue: Air emissions from AGI sites

Description of Issue

A series of requests for additional information has been requested regarding the operation of the pump stations sites, including the planned status of the power generators of PSG1 and PSG2 with regard to NOx and other air pollution requirements and whether they initially would be 'dual fuel' systems. Additional details were requested of the incinerators needed during construction and operations.

There was also an additional query concerning why waste heat recovery was not considered on line pump drivers.

Issue Drawn from Comments: 1717, 1719, 1738, 2068, 2069

Issue Relates to Following Sections of ESIA: Section 5.14

Response To Issue

Turbine pump drivers

During pump station design a detailed option selection process was undertaken to establish the most appropriate technology for mechanical drivers of crude pumps ('pump drivers'). This option selection process considered the project environmental requirements (compliance with the HGA), technical and logistical considerations, operational considerations and cost-benefit.

It was concluded that installation of four pumps and drivers rated to 25% of maximum throughput would provide the best engineering and environmental solution. This configuration allows the staged installation at each pump station and was selected on the following basis:

- Power output can be very closely matched to the hydraulic power requirements permitting each driver to operate at optimum loads
- The turbines will be operating in the range that will ensure good NO_x reduction from the dry low NO_x technology
- Use of duel fuel turbines allows a straight forward conversion from operation on distillate to gas should SCP gas become available

- NOx levels for the turbine solution are significantly lower that those from reciprocating engines
- Turbines have a significantly better power to weight ratio than reciprocating engines. Selection of turbines therefore minimized potentially significant logistical issues

A cost benefit analysis was undertaken and included consideration of environmental damage costs for NO_x and CO_2. The final selection of turbines was however primarily made on the basis of the aspects listed above, particularly with regard to emission limits set out in the World Bank, Dutch and Austrian standards. In undertaking the analysis consideration was also given to various pump driver configurations including the option of having the pumps driven by electric drives with a central turbine driven power facility. Many of the benefits (listed above) would not however be realized by this solution and therefore the direct coupling option was selected. Subsequent assessments have confirmed that the proposed solution is as efficient, or more efficient, than a system using central power.

The project must be undertaken in accordance with relevant international, Dutch and Austrian standards. As the Netherlands and Austria are members of the European Union, European standards and directives are also relevant. In regard to the EU standards, it was determined that the EU Large Combustion Plant Directive and amendments thereof are of relevance to the project. The directive is however only relevant to the main turbines, as the aggregated thermal input at each pump station exceeds the 50MW threshold. The directive presents a series of emission limits, and in the EU is implemented through the EU IPPC Directive (Integrated Pollution Prevention and Control) which makes provision for BAT (Best Available Techniques).

In summary, although the design NO_x emission limit of 165mg.Nm^{-3} exceeds the EU LCPD limit of 120mg.Nm^{-3} for thermal plant operating on liquid fuels, the use of such a system with the proposed programme of installation and future operation on natural gas, is considered "BAT" and therefore is in accordance with the intent of the EU directive.

Power generation

The power requirements at each pump station in Georgia will be served by three (3) 1MW power generators with two operating at any one time. Selection of the preferred generator type is being deferred for several months until the timing of SCP has been resolved. If gas will not be available for many years lean burn reciprocating diesel engine generators will be installed.

If SCP gas will be available soon after commencement of the BTC operation, simpler reciprocating diesel generators will be installed initially with gas generators replacing these when gas becomes available. These options were considered to be better environmental solutions than use of duel fuel turbines or duel fuel reciprocating engines.

Waste heat recovery

Waste heat recovery has traditionally been used on large (Power Station Type) installations. In the case of BTC running on topped crude distillate the responses from the turbine suppliers indicated that:

a) under design conditions there is insufficient spare capacity in the turbine to accommodate the back pressure induced in the exhaust stack by waste heat recovery systems. This in turn would impact on the overall availability of the pipeline system.

b) they have no experience of installing waste heat recovery systems on the selected turbine, ie the MARS 100, and as such could not guarantee their machines performance.

c) it was also thought that the quantities of make-up water would be prohibitive.

For these reasons waste heat recovery systems were not considered in detail for the project.

Air dispersion modelling

Air dispersion modelling, using discharges from the turbines, has been done for the pump stations as described in the draft ESIA, Section 10.3. Further air dispersion modelling will be undertaken as part of the design finalisation by the EPC contractors and will incorporate emissions from the site generators and the pump turbines. Should the modelled concentrations of any gas exceed air quality standards the design will be refined to ensure the air quality guidelines will be met.

Incinerators

Incinerators used during construction and operations will comply with European standards (Directive 89/369/EEC). The construction contractor will determine how many incinerators are required and where they will be situated.

For operations, there will be an incinerator at PSG1 and at the SCP metering facility on the Turkish border. These are currently being designed.

Other combustion emissions

As outlined in the ESIA, there will be small generators located at each block valve station. These will power the valves and any ancillary power needs associated with the operation of the block valve.

Emissions quantification and toxicity

The estimated volumes of emissions per year at design throughput are set out in Table 4.2 below. The table also provides a summary of the primary effects of exposure to the gases and particulates emitted.

Table 4.2 Quantification of emissions and toxicity

Annual Emissions (tones per year)					Effects
Emission	**Pump Drivers**	**Site Power**	**Block Valves**	**Crude Topping**	
NO_x	2,200	500	420	15	Prolonged exposure to NO_2 affects respiratory and cardiovascular systems, and enhances asthma and mortality
CO	10	150	120	5	High-level short-term exposure can reduce levels of haemoglobin in the blood, reducing oxygen content and ultimately resulting in death. Lower level exposure increases the likelihood of exercise related heart pain, may pose risk to foetus in pregnant women, and can cause fatigue and lack of concentration
CO_2	400,000	25,000	21,000	14,000	A gas considered a primary Green House Gas (GHG)
SO_2	520	30	25	1,800	Exposure to sulphur dioxide irritates the nose, throat and lungs, and exacerbates the symptoms of asthma
CH_4	1	1	1	0	A primary green house gas (GHG)
VOC	1	15	10	0	VOC in the presence of sunlight and NO_2 form secondary pollutants such as ozone, formaldehyde and peroxyacetyl nitrate (PAN)
PM_{10}	15	10	10	1	Epidemiological evidence suggests increasing mortality when exposure to PM_{10} concentrations of greater than 20µg/m^3

4.7 DECOMMISSIONING AND ABANDONMENT PLANS

4.7.1 Issue: Decommissioning of pipeline

Description of Issue A comment was made that abandonment options should be continually reviewed, as present suggestions such as water filling raise questions about resources and residuals.
Issue Drawn from Comments: 176, 603, 1083, 1375, 1800, 1823, 1857, 1966, 2018, 2655, 2683, 3147
Issue Relates to Following Sections of ESIA: Section 5.11

Response To Issue

With regard to the issue of water filling at abandonment, there is an obligation to leave the abandoned pipeline or facilities in an environmentally safe condition and to undertake abandonment activities in a manner and technique consistent with environmental, health and safety standards. Abandonment options will be reviewed and a plan submitted to the government for approval at the time of abandonment, currently planned for 60 years hence.

The HGA specifies how abandonment will be approached. Article 3.14 of Appendix 3 of the HGA requires project participants to provide to the Government -- for its approval -- a written abandonment plan describing the proposed actions to be taken by them associated with abandonment. This plan shall address the removal of all surface installations; the clearance of all waterways; the drainage and proper disposal of any remaining petroleum in the facilities; either the removal and salvage of underground and underwater pipelines or disconnection from supply of petroleum; the filling of all abandoned pipeline located underwater with water or inert material and the sealing and other such action in order to result in the facilities being left in an environmentally safe condition; the filling of all trenches, holes, and other surface depressions left by the removal of facilities and pipelines; the re-vegetation of the pipeline corridor consistent with the other prevailing conditions in the area. The aforementioned activities shall be done in a manner and technique consistent with environmental, health and safety standards and/or technical standards.

After completion of the abandonment obligations, the project participants shall cause an environmental assessment (“Preliminary Exit Study”) similar in scope to, and prepared to the same standards as, the baseline study. This study will also be subject to government approval. Once this study is approved, project participants shall be obligated to continue to monitor those areas where pipeline activities occurred in order to identify and remediate those adverse environmental impacts that may subsequently become evident.

4.8 PROJECT RESOURCES, WASTE AND EMISSIONS

4.9 WASTES

4.9.1 Waste management

Description of Issue
Reviewers have requested additional information regarding the following areas associated with wastes and waste management: • Methods and locations for collecting storing, treating, transport and disposal of solid and liquid wastes during construction • What is the process and criteria for selection of waste disposal sites • What are the quantities of dust produced • Clarification on how re-fuelling policies relate to waste storage-related leakage • Toxicity and composition of main effluent such as- oil, condensate, hydrotest water, drilling mud for river crossings, state if corrosion inhibitors will be used • Quantification of the amount of solid waste from trench excavation in rock and soils and other solid waste from construction. For surplus soil, provide a grading balance for each section of the pipeline (providing surplus and deficit), location where surplus will be laid down and borrow pits used • Methods for estimating quantities and composition of all residues and emissions identified. Impacts upon on material assets and non-renewable natural resources • Indicate which facilities will be shared between BTC and SCP for waste • Potential for resource recovery from wastes and residues should be explained in Waste Management Plan with reference to EU hierarchy • Details of the possible use of an impermeable liner for spoil disposal without provision for pumping of accumulated soakage • Quantify and characterise hazardous waste used or produced • Provide chemicals and hazardous materials management plan and Hazop - or at least a strategy with standards and targets. Construction drilling mud and oxygen scavenger (if any) should be included in table page 5-62 and 5-67 • Details of liquid fuel consumption of the PSGs, particularly PSG2- as the corresponding fuel is shuttled between PSG1 and PSG2 •
Issue Drawn from Comments: 873, 891, 902, 1030, 1522, 1523, 1702, 1703, 1704, 1705, 1706, 1750, 1801, 1826, 1829, 1866, 1970, 1971, 2027, 2028, 2029, 2057, 2066, 2067, 2217, 2218, 2265, 2266, 2269, 2271, 2273, 2687, 3077, 3148, 3153
Issue Relates to Following Sections of ESIA: Section 5.13

Response To Issue

Solid waste management

A considerable amount of work has been undertaken in assessment of practical methods for minimization, handling and disposal of any solid wastes arising during construction and operation.

The most important points are as follows:

- Waste management will be in accordance to EU standards
- Any arrangement with third parties will be audited and monitored

Solid waste is being categorised as inert, non-hazardous and hazardous with the management of each category set out below.

Inert wastes (excess spoil)

Initial estimates of the amount of excess spoil that may be generated during the installation of the pipeline, pump station and other facilities have been made. The volumes are very dependent on the construction methods employed, particularly in areas of hard rock, and the level of reuse achievable with online and transportable materials processing equipment, such as crushing and screening plant. For this reason BTC Co is working with the selected construction contractors to refine the volumes which, on the basis of preliminary estimates, ranged from 1,000,000 to 4,000,000 tonnes.

An initial survey has been made of potential sites for disposal of surplus soil and rock, and for extraction of construction materials, aggregates, etc. The sites identified from this assessment are included in the ESIA. The construction contractors will review these sites in parallel to the determination of waste volumes as part of the waste management plan development. Specific permits will be sought for each selected site based upon the scope and duration of the disposal operations and supporting environmental documentation will be provided as required by the regulators.

Other solid waste streams

Estimates of non-hazardous and hazardous waste volumes have been prepared for construction and operational phases of the project and are detailed in Section 5.13.5 of the draft ESIA. These volumes are being refined by the construction contractors and BTC Co for construction and operations respectively.

As part of an integrated waste management strategy potential landfill sites have been assessed by the Georgian Pipeline Company (operator of the WREP) with assistance from BTC Co and a plan for development of the preferred site has been prepared. This facility may not however be developed in time to receive wastes during the construction period. In this instance it will be necessary for the construction contractor to develop a temporary storage or disposal facility.

Waste management processes and procedures will be put in place for BTC. However, there are also clearly synergies in terms of waste management for BTC and SCP and these will be addressed prior to commencement of SCP construction.

Dust management

Given the significant variation in soil types and weather conditions it is not practical to estimate volumes of dust that will be generated during construction. The contractor will however be responsible for ensuring dust is not generated to such an extent it causes nuisance to nearby residents. Dust control measures that may be required to enable construction to continue in instances where significant volumes of dust may be generated may include:

- the spraying of parts of the FCI-ROW used as a “running track”
- imposition of a speed limit of 30km/h on unmade roads when conditions are such that large amounts of dust may be generated
- correct storage and handling of materials that may give rise to fugitive particles

This figure is provided using a US EPA AP42 emission factor for earth working (Section 13.2.3).

Fuel storage

Liquid (diesel) fuel will be stored in designated storage tanks . No fuel storage tank, refuelling or maintenance points will be located within 50m of any water course or dry river bed. Fuelling facilities will be constructed in accordance with UK best practice and will incorporate:

- storage tanks designed and tested to an appropriate recognized standard
- installation of storage tanks in a suitably sized and constructed bund that is impervious to water and fuel; and
- a hard standing area with drains to a suitably designed collection sump
- security fencing
- hazard signage
- oil spill clean up equipment will be stored close to fuel storage facilities at the main camps

Gas fuel (cooking and heating gas) will be stored in the manufacturers’ specifically designed bottles and tanks in accordance with the relevant safety standards.

Refuelling

Refuelling of vehicles is expected to take place at semi-permanent locations such as pipe dumps, railheads and construction camps, and at various other locations along the FCI-ROW. Refuelling on the FCI-ROW will occur for certain vehicles eg side booms and trenching excavators. However, no refuelling will be allowed within 50m of a water course or dry river bed. Any spillages from refuelling are typically very small however any spillage associated with refuelling at permanent facilities or in the field will be contained in a hard stand area or in a drip trays respectively. Operators will be required to use appropriate equipment and procedures to ensure the likelihood of spills during refuelling are minimized.

Toxicity of main effluents

Effluent (treated sewage) will be discharged from the construction camps and subsequently, during operations, from the main pump station facilities. Any sewage discharging to a watercourse will be treated to World Bank standards or better.

The need for any chemicals such as biocides and oxygen scavengers in undertaking hydrotesting has not been confirmed. Details of the proposed chemicals, if needed, their toxicity (including MSDS sheets) will be provided to the MOE for review and acceptance well in advance of there being shipped to Georgia.

Bentonite (a natural clay product) is typically used as the primary compound in directional drilling fluids.

Quantification of emissions, effluents, waste

Emission inventories have been prepared for both construction and operational phases of the BTC project, for a number of emissions normally considered 'air pollutants': CO_2, CO, HC (hydrocarbons), NOx, SO_X and particulate matter (PM), each calculated for the following sources:

Vehicle emissions:
Emissions inventories were prepared for both off-road and road vehicles, calculated using emission factors derived from USEPA AP-42 Volume II for heavy duty, low altitude working vehicles. Off-road vehicle emissions were calculated using emission factors from the USEPA NEVES (Non-road Engine and Vehicle Emission Study).

Vehicle emissions (for each of the aforementioned pollutants) were calculated for non-road / road vehicles using the types and numbers of vehicles factored up by the appropriate emission factor for that vehicle, its horsepower and the construction (or operational) period. A construction period of 420 days (12 hours per day) was assumed for the project.

Power generators:
Emissions from power generators were calculated using emission factors (for varying sizes of generators) from USEPA AP-42 section 3.3.

The relevant emission factors were factored against the number and size of generators to be used at the various stages of construction and operation of the pipeline.

0.2 % sulphur content was assumed for the fuel, and a 24-hour working day for the generators.

Waste incineration:
Emission factors for all of the above pollutants (plus NH_3, HCL, Pb, Hg and Cd) were derived from CORINAIR. These were factored up by the provided waste amounts (municipal, hazardous, and clinical waste) for the entire construction period.

Note that fugitive emissions from leakages or storage of liquids were not included in the above calculations. Furthermore, flaring was also omitted from the emissions inventory and therefore the total atmospheric releases for the project.

Solid and liquid wastes

Solid and liquid wastes including wastewaters for SCP, have been estimated based on the following:

- Identification of the principal waste streams associated with construction activities at each location, eg packaging, steel, timber, paper, consumables, etc
- Generation rates have been estimated from experience on other projects and from parameters such as the number of persons and equipment / vehicles likely to be employed or the amount of a type of waste generated per km. For the permanent facilities, the equipment specifications and knowledge of the likely maintenance regime have been used
- Amounts summed assuming no immediate re-use / recycle of any stream

Chemical and hazardous materials

The contractor is responsible for producing a number of plans that address this issue as outlined in Chapter 14 of the ESIA. The procurement plan will include procedures to be established in procurement, transport and storage of hazardous materials. The Pollution Prevention Plan (Oil Spill Response Plan) will set out the procedures to be followed should a spillage of fuel, oil or other chemical occur. The Waste Management Plan will address disposal of hazardous materials. Additionally, under safety requirements, hazardous materials will be controlled following the principles laid down in the "UK Health and Safety Executive publication L5 – Control of Substances Hazardous to Health Regulations 1999, Approved Code of Practice" (COSHH). Through COSHH, all chemicals and hazardous materia ls must be assessed to ensure that the right controls are in place to protect worker health and safety. Finally the contractor must carry out a risk assessment prior to work to ensure all health, safety and environmental risks are properly managed. Through both the Procurement and Supply Management Plan, Pollution Prevention Plan, Waste Management Plan, COSHH requirements and requirements for Risk Assessment the lifecycle of chemical and hazardous materials management is well addressed.

Fuel consumption at the pump stations

Liquid fuel consumption at the pumps stations (at end of Phase 1)

Equipment	Number operating	Consumption / unit (m^3/day)	Total consumption (m^3/day)
Pumps	4	66.5	266
Generators	2	12.2	24
		Total	290

During Phase 1 the CTD production figure of 290m^3/day is to be shared between the two pump stations, requiring the equivalent of 145m^3 to be transported from PSG1 to PSG2 each. At the end of Phase 1 this will become insufficient and either the existing use of CTD as fuel will be replaced by SCP gas or a further crude topping plant will be installed at PSG2, with the same specification and production.

4.10 QUANTITATIVE RISK ASSESSMENT (QRA)

4.10.1 Issue: QRA methodology

Description of Issue A comment was made that the draft EIA report should include further information on the QRA to depict the methodology used for developing the mitigation measures eg validity of assumptions made; validity of calculation method, for geotech hazards, river & stream crossings, oils spills, explosions.
Issue Drawn from Comments: 302, 304, 307, 344, 353, 367, 400, 537, 717, 718, 719, 798, 802, 806, 807, 839, 1012, 1013, 1015, 1020, 1048, 1049, 1291, 1341, 1342, 1345, 1348, 1351, 1364, 1411, 1413, 1556, 1603, 1604, 1642, 1832, 1833, 1834, 1835, 1836, 1837, 1839, 1840, 1841, 1842, 1854, 1881, 1882, 1945, 1947, 1948, 1949, 1955, 1963, 1982, 1989, 2145, 2186, 2188, 2189, 2234, 2240, 2245, 2246, 2248, 2249, 2263, 2282, 2305, 2310, 2312, 2318, 2326, 2328, 2329, 2332, 2334, 2336, 2338, 2339, 2341, 2342, 2359, 2370, 2384, 2431, 2342, 2471, 2472, 2651, 3037, 3041, 3042, 3043, 3047, 3067, 3089, 3091, 3092, 3093, 3104, 3116, 3154, 3188, 3204, 3209, 3214
Issue Relates to Following Sections of ESIA: Section 10.4

Response To Issue

Methodology mitigation measures

A comprehensive methodology to the approach is provided in Section 7 of the draft ESIA. The environmental and social baseline sections (8 and 9 respectively) provide descriptions of the methodology employed for the baseline studies. The Environmental Risk Assessment (Appendix E of the ESIA) provides a detailed description of the methodology employed to assess the environmental risk of an oil spill. Whenever specialist techniques have been used for specific studies (hydrological and hydrogeological modelling, forest assessments, faunal density assessments, etc) the relevant methods with references have been described in the text of the draft ESIA. The methodology used for the quantitative risk assessment is set out in the ESIA section 10.5. To complement the discussion a more detailed description of the assessment undertaken of the residual risk associated with geohazards is set out below.

Geohazards

Considerable work has been undertaken during the routing and design process to minimise the likelihood of pipeline damage due to geological processes. In particular, significant analysis has been undertaken to avoid unstable areas during the routing process and where these have been unavoidable, location specific designs have been developed. On completion of the design process the specialists have been asked to estimate the residual likelihood of pipeline failure at these locations. The approach and findings for the different geohazards are set out below.

Faults

Engineering teams supported by internationally recognised experts have undertaken field assessments and desktop studies of the tectonics and seismicity along the route. Of particular importance for pipeline design is the identification of locations where seismic activity would result in significant surface displacement at a frequency higher than the design criteria of 1 in 10,000 years. On this basis a number of faults were identified as requiring specific consideration as part of the pipeline design. The designs at each such fault crossing have subsequently been developed to ensure the pipeline has sufficient integrity to withstand a seismic event. Such designs include use of specific backfill material and trench cross-section and minimisation of any facilities that may "anchor" the pipeline in the vicinity of the fault. Removal of such anchors ensures that the forces resulting from displacement are transferred over a long section of the pipeline thereby reducing the stresses on the pipeline steel.

Each of these faults was then evaluated to determine the average interval (recurrence interval) between events of sufficient magnitude to potentially damage the pipeline. The inverse of this recurrence interval represents the annual spill frequency at each fault crossing.

Landslides

Routing of the pipeline through Georgia has been a significant challenge given the mountainous terrain and the associated high potential for landslides. In the few locations where it was not possible to avoid areas prone to landslides specific designs were developed to minimise the likelihood of pipeline damage. Upon completion of the pipeline routing and design the geotechnical specialists assessed the potential for pipeline rupture from first-time slides and from pre-existing slides along the pipeline corridor. This assessment was undertaken specifically for this ERA and for each segment along the pipeline. Table 4.3 below provides the terminology and associated failure frequencies used in undertaking the assessment.

Table 4.3 Failure frequency terminology and associated frequencies used in landslide and river washout analysis

Terminology	Assigned Spill Frequency (spills per km-yr)
None/Negligible	0.000001
Remote	0.00001
Occasional	0.001
Probable	0.01
Frequent	0.1
Certain	1.0

River crossings

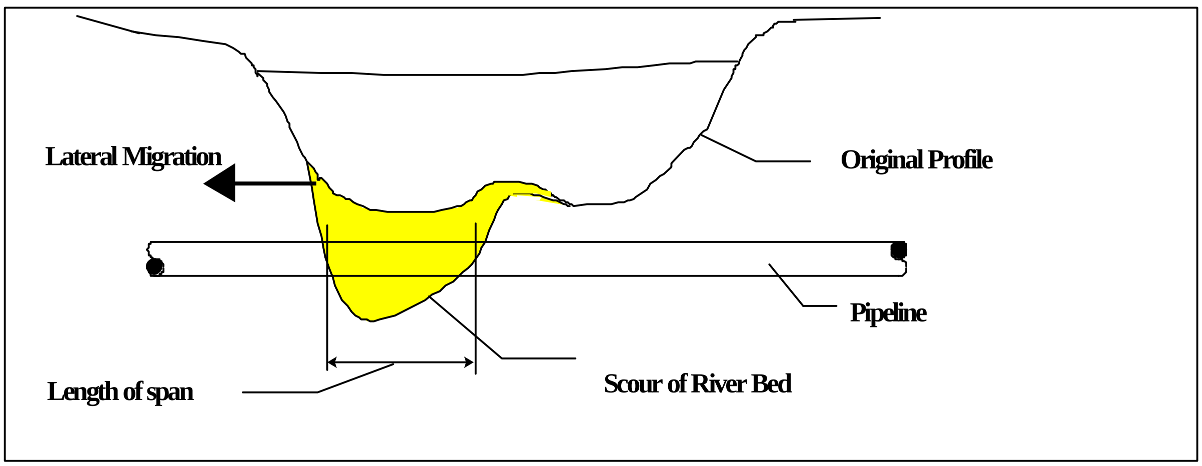
River crossings were identified as being locations for potential exposure and possible damage of the pipeline and were therefore considered in detail during the routing and subsequent design of the pipeline. HR Wallingford, a specialist consultancy was employed by BP to assist firstly in the route selection and subsequently in the crossing design. The engineering teams evaluated hydrological and geotechnical data in assessing the amount of lateral migration and scour that could occur at major river crossings. This assessment was used to determine set back distances and burial depths as part of the river crossing design. Figure 4.16 provides a pictorial representation of potential changes in the river morphology that could result in the pipeline being exposed.

In line with international practice a 1 in 100 year storm event was originally adopted as the design return period. This return period was applied in the statistical analysis used in determining flood flows and accompanying lateral migration and scour depths. At GIOC's request the design return period was changed to 1 in 200 years which ensured a more conservative design in terms of the burial depth and set back distances at major river crossings.

The ERA process for river crossings entailed the following:

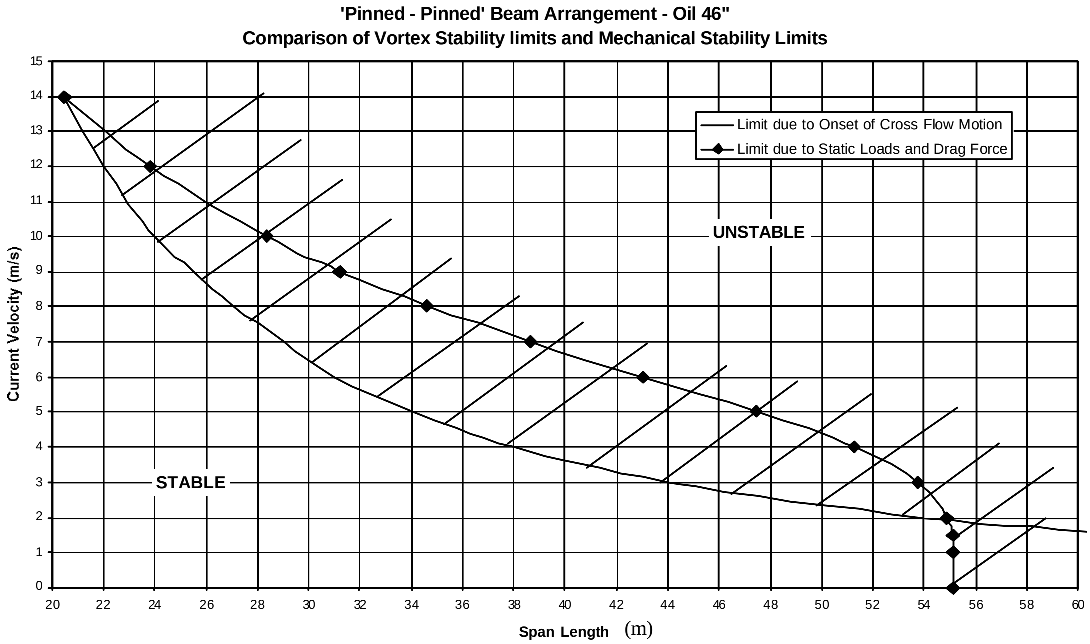
- Consideration of the river morphology and associated possibility for lateral migration of the river banks at the pipeline crossing
- Assessment of potential scour depths
- Assessment of the difference between the return period for the top of the pipeline being exposed and the entire pipeline being exposed
- Assessment of the structural integrity (strength) of the pipeline

Figure 4-16 Schematic of morphological process potentially affecting the pipeline at river crossings



To complement the studies undertaken by the hydrologists and geomorphologists additional analysis of the river widths and a structural analysis of the pipeline was undertaken. This structural analysis was undertaken to determine the unsupported span length necessary to cause structural damage to the pipeline. This assessment included consideration of failure due to static loading and from fatigue associated with oscillation of the pipeline. The results of this structural analysis are shown in Figure 4.17. This graph confirms that the BTC pipeline has significant inherent strength, which is primarily as a result of the large diameter and thick wall of the pipe.

Figure 4-17 Outcome of structural analysis

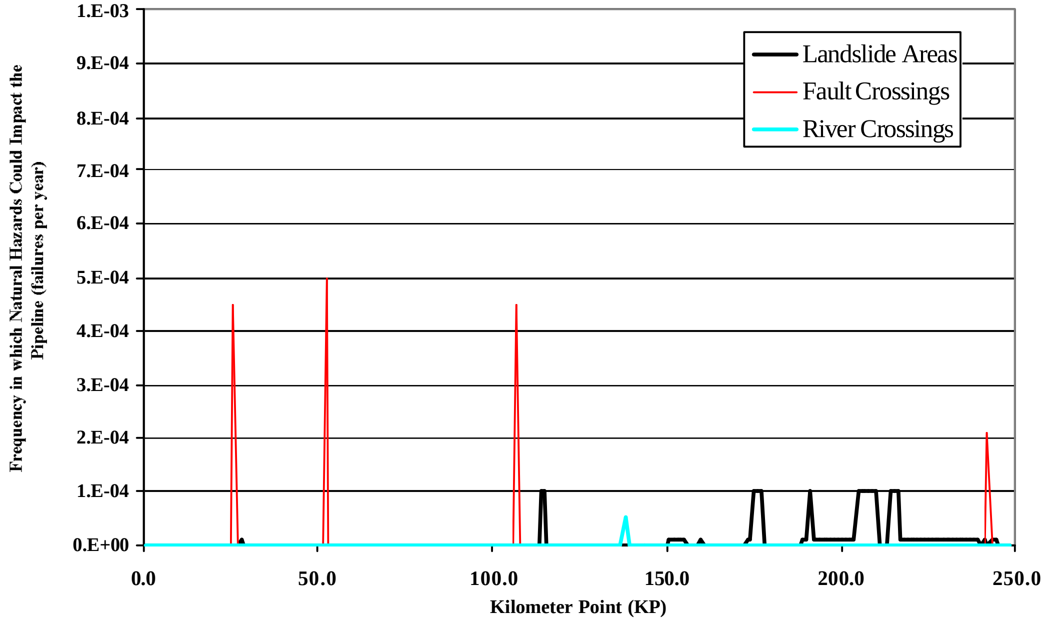


The information from the above assessments was used to determine the likelihood of pipeline rupture at each river crossing.

Summary of geohazard failure frequency assessment

Figure 4.18 shows the kilometre by kilometre frequency estimates which combine all geohazard frequency estimates (faults, river crossing and landslides).

Figure 4-18 Summary of failure frequency assessment at geohazard crossings



ENVIRONMENTAL ISSUES

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5 ENVIRONMENTAL ISSUES

5.1 INTRODUCTION AND METHODOLOGY

This section of the ESIA Addendum addresses the feedback received during the public disclosure and consultation period in relation to environmental issues.

The structure of this section reflects the environmental media or issues as described in the Environmental Baseline of the draft ESIA (Section 8) as follows:

5.2 Meteorology and Climate
5.3 Air Quality
5.4 Noise
5.5 Geology, Geomorphology and Geohazards
5.6 Soils
5.7 Contamination
5.8 Hydrology and Surface Water Quality
5.9 Landscape and Landuse
5.10 Archaeology and Cultural Heritage
5.11 Ecology
5.12 Protected Areas
5.13 Unplanned Events

Within each section the concerns and suggestions received from the project stakeholders are summarised and a response is given. The order of appearance of the issues is as far as possible related to the phase of the project and therefore the order is: pre-construction (baseline issues), construction and normal operation.

An additional section on unplanned or accidental events (Section 5.14) is also enclosed. This addresses the feedback received with regard to the potential for oil spills to occur, the consequences of such spills and the mitigation measures adopted to prevent the spills in the first place or to mitigate adverse consequences.

5.2 METEOROLOGY AND CLIMATE

5.2.1 Issue: Climate

Description of Issue

A comment was made that the draft EIA report actually neglects the significance of the climatic studies, which is a serious omission for such a large-scale project.

Several reviewers have stated that the State Hydro-meteorological Department, should be used as a source of information.

A request was made that all mitigation measures & residual impacts to be further developed, including: the risk of extreme climatic conditions and their impact upon the construction and operation phase, for example: hurricanes, hard precipitation, and thunderstorms; and the effect upon the local climate quality where the pipeline crosses the Borjomi/Bakuriani area.

The suitability of the weather stations is questioned together with the age of data. Only data from Tbilisi airport station has been included. There are reportedly 10 meteorological stations of a high category that possesses long observational statistics, but none have been used.

Mandatory climate parameters have not applied. Further information requested was on data for: snow and snow slides for last 40 years, "superficial" water for last 33 years, and also information on rainfall type and frequency.

Issue Drawn from Comments: 661, 803, 872, 1624, 1972, 1973, 1974, 1975, 1976, 1977, 1979, 1980, 1981, 1987, 2193, 2194, 2241, 2332, 2333, 2335, 2340, 2345, 2346, 2352, 2385, 2458, 3060, 3061, 3117, 3119, 3202, 3204, 3206

Issue Relates to Following Sections of ESIA: Section 8, Section 10

Response To Issue

Source of data

BP commissioned a report from the Georgian Academy of Sciences Institute of Hydrometeorology (GASIH) in May 2002 and this, together with additional data collected from international weather stations has been used to compile the climate section in the environmental baseline of the draft ESIA.

The GASIH is a renowned scientific body with an established history (since 1860) of climate study, data gathering and recording, within Georgia. They have also contributed significantly to the preparation of Georgia's Initial National Communication under the UNFCCC (1999).

The GASIH report describes the following climatic conditions along the pipeline corridor:

- Air temperature

- Solar radiation
- Air humidity, which is important for estimating pipe corrosion
- Atmospheric precipitation, including intensity
- Wind, including the distribution of high winds
- Snow cover, including estimates of avalanche occurrence
- Soil temperature
- Thunderstorm activity, including estimates of lightning discharges to the ground

Extensive climatic data is presented within the report's appendices. Five (5) weather stations were used (Gardabani, Tetritskaro, Tsalka, Bakuriani and Akhaltsikhe), which are in close proximity to the route and are therefore the most relevant. In addition, data from a station at Radionovka, located at an elevation commensurate with the maximum altitudes of the pipeline, was also used. Maps were produced using data from twenty eight (28) different weather stations.

The periods, range from 13 years duration to 46 and 64, dependent upon nature of the data and its availability. Unfortunately, since 1991, there are significant gaps in the collated information, which makes it less reliable and has been excluded accordingly.

The report goes on to describe the climatic features within six (6) specific sections of the pipeline corridor (including a detailed analysis of the Tsalka to Bakuriani section).

The report also assesses the anticipated climatic changes within the current century on the different areas of the pipeline corridor.

Impacts to climate

Whereas climatic information is essential for the planning of the works and for the design of the pipeline it is not expected that the project will have any significant effects on climatic conditions including microclimatic conditions, such as in the Bakuriani Tsikisjvari area.

Potential impacts associated with emissions of greenhouse gases from construction activities and operations of the two pump stations in Georgia have been evaluated in the draft ESIA (Section 13 Cumulative Impacts) and found to be negligible both in the overall project context and in relation the Georgian national emissions inventory.

5.3 AIR QUALITY

5.3.1 Issue: Air quality – baseline & air dispersion modelling

Description of Issue

It is suggested that with regard to Section 8.3.4 there may be no issue here as baseline air contaminants appear low. However, it is unclear how many sampling periods were undertaken during spring 2001/autumn-winter 2001 - that are statistically relevant. A number of 1 month instances spaced over a year are advised, but would have to consider the specifics of each location.

It is requested that iso-concentrations of emissions to air (varying by different types of contaminants) are plotted on topographic maps.

Concerns with air modelling methodology are expressed. For example, examination of the dispersion modelling report indicates that NO_2 levels were arrived at by assuming only 50% of emitted NO leads to NO_2 concentrations. This is on the basis that over certain distances much of the NO remains unconverted. It should be noted that actual conversion is very scenario and condition-specific and that modelling has inherent accuracies of a similar order. Consequently, international practice when modelling often avoids making this assumption in view of being conservative. It would appear that the EU, or "safe" NO_2 limit provided is likely to be infringed if the assumption is removed. It is also noted that this may not lead to significant effects (depending on receptor location), but this cannot be determined from the information presented (ie contours based on 50% assumption).

Issue Drawn from Comments: 321, 379, 905, 1608, 1617, 1679, 1696, 1697, 1698, 1699, 1717, 1719, 1721, 1738, 1740, 1761, 1815, 1829, 1871, 1939, 1978, 1985, 2026, 2229, 2253, 2255, 2259, 3181

Issue Relates to Following Sections of ESIA: Section 8, Section 10

Response To Issue

Baseline measurements

Baseline measurements were collected over a period of six weeks in autumn. Sampling was undertaken at the locations of pump stations, which are currently areas of little or no industrial activity, road use, or significant urban development. Results have indicated concentrations of study species being representative of a rural environment. It is not anticipated that extensive seasonal variation would occur in these measurement values, given the existing land use at these sites.

Emissions to air

Figure 5-1 to Figure 5-4 show the isopleths plotted on topographic maps. Section 5.3.2 also details the methodology used to calculate emissions to air from the AGIs.

Figure 5-1 Short term concentration of NOx at PS1

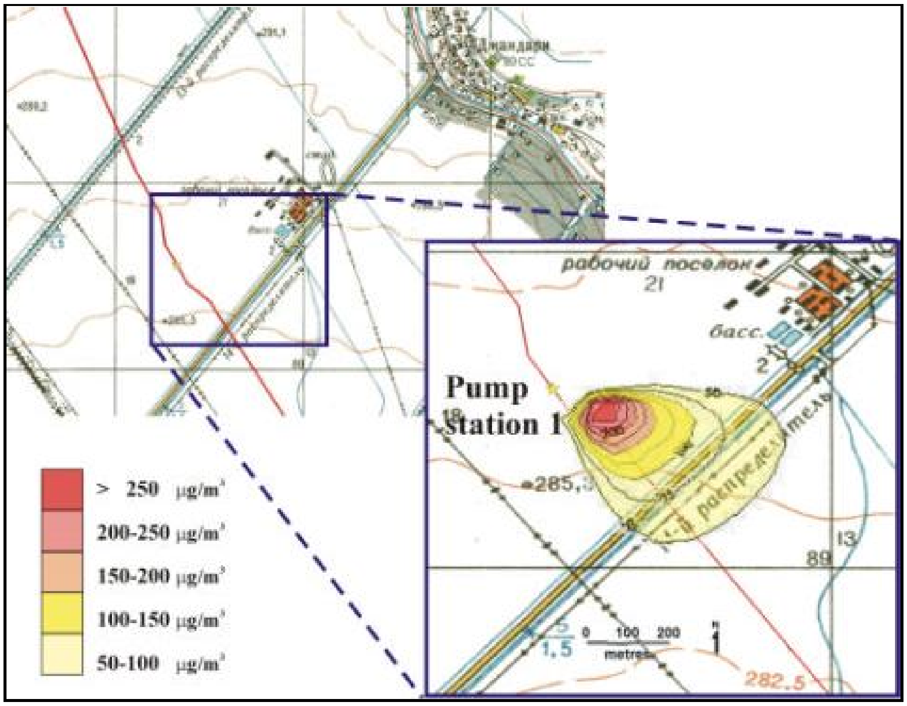


Figure 5-2 Long term concentration of NOx at PS1

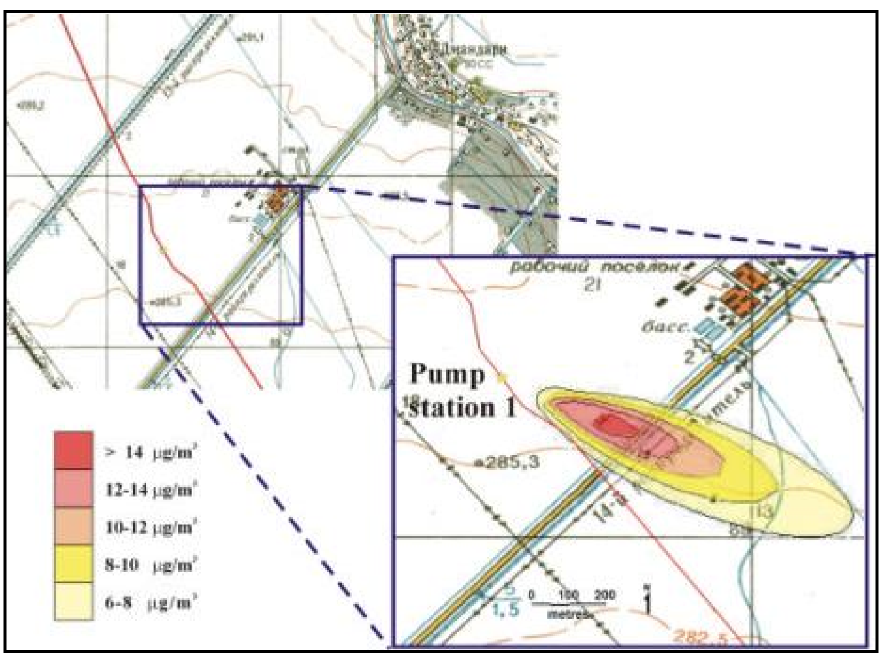


Figure 5-3 Short term concentration of NOx at PS2

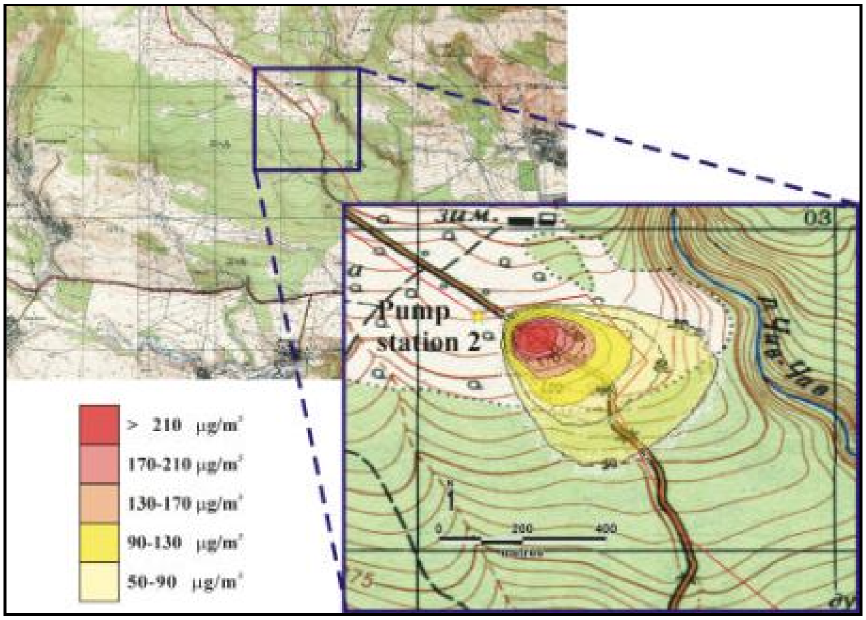
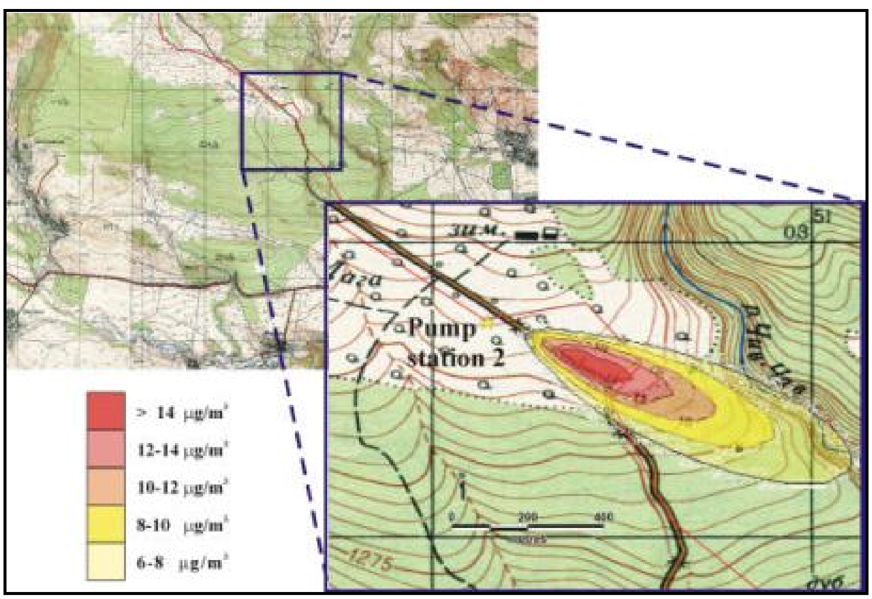


Figure 5-4 Long term concentration of NOx at PS2



Air modelling methodology

It is widely acknowledged that NO_x generated by thermal combustion plant is predominately in the form of NO, as opposed to NO_2, at a ratio not normally less than 90%. Maximum ground level concentrations of NO_2 have been applied in determining an appropriate stack height for mitigation of health impacts of releases, which are modelled to occur, under reasonable worst case meteorological conditions, within several hundred metres of the pump station sites. At a wind speed of $3ms^{-1}$, a time of flight of the plume to the location of maximum concentration is estimated to be approximately 1 minute. Given the troposphere lifetime of NO_2 in the sunlit atmosphere to be of the order of days, the degree of conversion of NO to NO_2 in 1 minute is considered to be insignificant. Therefore, a conversion factor of 0.5 or 50% is considered appropriate and conservative.

The degree of conversion over longer distances is not important in terms of health impacts, as the process of natural dispersion of emissions will greatly reduce the concentration of primary and 'secondary' NO_2 (formed through chemical transformation) rapidly down wind of the site.

5.3.2 Issue: Air quality – AGIs and operation

Description of Issue

It is requested that impact on air should include: calculation of emissions to air from the AGIs based on temperature, wind and other data elements of the nearest representative weather station to this section (not only of Tbilisi-Airport weather station). The methodology used here is based on stationary sources, which does not fully consider stratification of the atmosphere and the relief of location of the emission source. This methodology should be adjusted as relevant for mountainous regions in areas where receptors are in range of the emissions (ie inhabited areas).

For emissions sources (eg pump stations) the Environmental Standards for maximum allowable emissions should be indicated. Impact on climate should be assessed.

Requested that emissions related to transport movements during the construction period should be quantitatively assessed and operations eg air quality and dust impacts from daily three vehicles transport of diesel oil from first pumping station PSG1 to other stations for duration of operations until gas is supplied.

It is noted that the release of VOCs and odour from the CTD unit does not appear to have been significantly considered. Have the emissions from the flare been considered? Has the hazard associated with the CTD and flare been considered? Has the visual impact of the flare been considered? The nearest receptors to pump station air emissions should be identified.

It is noted that the flare from the CTD plant, hence its effect, has not yet been included in an air modelling study (due to be undertaken later). If flaring is of significant duration and frequency, the flare emissions should be considered alongside the stack emissions (should a further modelling study be undertaken, as is indicated). This combination of NOx emissions could be expected to lead to higher predicted maximums in relation to ground level NOx conditions.

ESIA contains only a statement referring to the emission of condensates produced due to the operation of SCP. More information is required.

Issue Drawn from Comments: 317, 661, 708, 1608, 1635, 1696, 1698, 1773, 1774, 1815, 2025, 2204

Issue Relates to Following Sections of ESIA: Section 10

Response To Issue

Modelling methodology

Dispersion modelling has been undertaken to establish conditions that lead to a reasonable-worst-case ground level concentration of emissions downwind of the site. As maximum ground level concentrations of emissions are predicted to arise within several hundred metres of the pump station sites, wind speed, wind direction and atmospheric stability are expected to be critical for modelling - factors which have been included in the modelling process. Although the pump stations are not located in mountainous areas, topography at PSG2 will influence wind movement across this site. However reliable and comprehensive historical data, including hourly measurements of wind speed, wind direction, and cloud cover (as a minimum), is not available for this site.

Therefore, Tbilisi airport meteorological data was identified as having suitable quality and data capture for modelling purposes, and is located in a region climatically similar to the pump stations. Should the prevailing wind direction be different at the pump station sites to that recorded at Tbilisi airport (due to topography), the distribution of emissions downwind of the site maybe different to that shown in the modelling assessment – however our conclusion is highly unlikely to change in that the impacts to human health will be of low significance given the stack heights selected for turbines and proximity of these sites to occupied dwellings, which are no less than 1km away from either pump station.

Environmental standards

The Environmental Standards for maximum allowable emission levels are presented in the draft ESIA Appendix E Annex II, Table 3.1.

Impact on climate

Although in general the international scientific community agrees that anthropogenic emissions are leading to a change in the global climate, emissions associated with construction and operation of the pipeline and associated facilities will not directly impact the climate of Georgia. It is not possible to establish, quantitatively, the impact of project emissions to the global climate, although a contribution to the potential for global warming is acknowledged (in relative terms this is very small) as discussed in Section 10.3 of the draft ESIA.

Emissions related to transport movements

Quantitative assessment of emissions is highly unlikely to establish exceedences of air quality standards, due to:

- The extensive geographical distribution of vehicles and their emissions
- The temporal distribution in road users
- The relatively small number of vehicles currently using roads near to the pipeline route and facilities

Operation of three trucks per day during pipeline operation will generate emissions, weighted over normal short and long term averaging times, which will lead to a negligible contribution of air toxics. For example, despite millions of vehicle trips taking place in London, UK, each day, exceedances of air quality standards are uncommon in most areas of this city.

CTD unit

The crude topping plant will be operated to ensure fugitive losses are minimized. Odours associated with such plant are often associated with loss of compounds containing sulphur. It is expected that the CTD and feed crude will be very low in sulphur, and hence an odour issue is not anticipated.

CTD flaring

Details of the crude topping plant are as follows: during design detailed consideration was given to the minimisation of venting at the crude topping plant. As a result, all off-gas will be used to fuel a fired heater (used to heat the crude oil as part of the crude topping plant process). Flaring will therefore only occur in non-routine/emergency situations. This is expected to occur less than twice per year. In this scenario, the total gas inventory for flaring is estimated to be 18 tonnes of hydrocarbon resulting in emissions of approximately 50 tonnes of CO_2 and 0.2 tonnes of NOx. The emergency flare has an auto-ignition system thus eliminating the need for pilots. Modelling of emissions from the flare, in conjunction with those from other stationary sources, will be undertaken as part of the detailed design.

SCP condensate

There will be minimal condensate production during the operation of SCP, which will be disposed of according the requirements of the HGA, and where practicable, will be bled into the BTC crude within the export pipeline.

5.3.3 Issue: Air quality – mitigation measures

Description of Issue

It is noted that mitigation measure 16 on air quality relates to monitoring, which is a technique for environmental impact identification and control. Thus, this cannot be considered as a negative impact mitigation measure. It represents compliance to EU standards on emissions from transport vehicles. It should be noted that more effective measures are transportation schedule arrangements along with programs for maintenance of mobile and stationary equipment to reduce harmful emissions.

The draft ESIA states that refuelling systems will prevent organic substance emissions. It is suggested that this statement is unrealistic and that alternative measures should be developed.

Request provision of information on measures to meet NOx emissions standards.

Issue Drawn from Comments: 322, 379, 1209, 1617, 1635, 2053, 2133, 2204

Issue Relates to Following Sections of ESIA: Section 10

Response To Issue

Monitoring

Although monitoring in itself is not a mitigation measure, it is integral to the implementation of controls and improvements in site environmental performance. It is also used to measure the effectiveness of mitigation measures and compliance to standards. Therefore upon this basis, monitoring and any consequent control to meet compliance requirements or to implement improvements in environmental performance, is considered a 'mitigation measure' to avoid non-compliance thus any potential for environmental impact.

Emissions will be minimized through regular vehicle maintenance. A Traffic Management Plan will also be implemented which will consider, but not be limited to:

- Transportation of pipe, equipment, plant to and from and on site
- Use of the working strip for access
- Traffic flow patterns
- Movement of personnel

The Traffic Management Plan will describe speed limits and enforcement, restrictions on traffic using the ROW, off road driving, and used of public networks. This Plan will consider the potential for traffic related impact to occupied dwellings, in terms of noise, dust and burden on existing infrastructure. Exhaust emissions from construction or operational vehicles and plant are not anticipated to lead to a noticeable worsening of air quality as described in Section 5.3.2.

Vapour recovery

All loading and unloading activities will utilize bottom loading techniques and vapour recovery units will be installed on loading gantries where practicable.

NOx standards

Optimisation of turbine performance will ensure design standards for such plant will be met. Design standards are in compliance with WB emission limits, however are not in compliance with respect to NOx, with EU standards as detailed in Section 4 of this Addendum.

5.3.4 Issue: Air quality – dust

Description of Issue

The ESIA notes that dust suppression will be applied where certain receptors are identified "within 300m of the ROW". It is requested that suppression measures be employed where a nuisance or adverse effect has otherwise been confirmed.

It is suggested that a 300m margin for dust control could be too conservative in many situations, leading to unnecessary water-use/suppression. For example, much of the route will have plant receptors within 300m of the ROW.

Issue Drawn from Comments: 1661, 1662, 1829, 3152, 3182, 3206

Issue Relates to Following Sections of ESIA: Section 1; Section 10

Response To Issue

Dust suppression

Suppression techniques will be adopted only when a nuisance factor is anticipated or notified. They will not for instance be adopted during rainy days.

Extent of dust control

The 300m belt is used for indicative purposes and will be altered depending upon wind conditions and soil characteristics at any one site of earth working. It is not anticipated that plants will be adversely affected by airborne dust given the short term and transient nature of earth working along the ROW.

5.4 NOISE

5.4.1 Issue: Noise – baseline & procedures

Description of Issue

It is unclear how the adjacent Gardabani power plant is sited relative to the Gardabani Pump Station site in relation to predominant wind directions. It is unclear from the wording in 8.4.3.2 whether the Gardabani Power station had a discernable influence at Site 2.

What is the procedure in the instance noise complaints are received?

In relation to the statement, "substitute for a different method if necessary", a clearer definition of "if necessary" would be beneficial.

Note: 15 minute measurement periods at significantly distant locations can be too brief to account for even day/night variations in noise in an undeveloped environment. Also, while the receptors are briefly described, the influences of local noise sources are not.

Issue Drawn from Comments: 320, 1360, 1621, 1680, 1681, 1817, 1826, 2269, 2274, 2277, 2612

Issue Relates to Following Sections of ESIA: Section 8

Response To Issue

Gardabani power plant

The Gardabani power plant is located approximately 5km from the proposed Pump Station PS1. The baseline survey indicated that the power plant had no discernible influence on the site of the pump station as would be expected over such a distance. The noise level will vary at the pump station depending on the pump load. The information reported in Section 8 of the draft ESIA describes the baseline conditions prior to any development. It is considered that the distance between the two sites is sufficient so that wind direction will not result in any cumulative noise load regardless of wind conditions.

Procedure for noise complaints

The grievance procedure for any community complaints regarding noise will be the same as for other community concerns (draft ESIA Section 11.6). It is believed that the majority of issues will be raised at the weekly meetings between Community Liaison Officers and communities and dealt with appropriately. The formal grievance procedure aims to provide additional safeguards. Details, including purpose and scope, responsibilities and process flow chart (including complaints log and monitoring) are presented in the draft ESIA, Appendix F, Annex I, section 8.

Definitions

The statement "substitute for a different method f necessary", this refers to noise control management, where if it is identified that there may be a noise nuisance or complaints received due to the vicinity of sensitive receptors, or the overall noise level of plant or processes; then substitution of the plant or process would be considered to minimize the likelihood of noise nuisance/complaint.

This means that noise control needs to be tailored to the specific environment. There is no benefit to investing in expensive noise control measures where there are no receptors (although the operators should always strive to reduce noise so far as is reasonably practicable in line with best practice). However, where there are sensitive receptors, a range of noise control engineering options would be considered including substitution. At PS-G1 the closest occupied residential dwelling is 1.6km from the site and the area is not believed to be faunally sensitive. It is considered highly unlikely that normal operations would represent a nuisance to receptors (draft ESIA Section 10.3.3).

Measurement periods

The measurement locations mainly comprise rural locations with either little or non-existent anthropogenic noise sources. A 15-minute measurement to establish background noise levels in these circumstances is acceptable. No notes were made for observations of any significant local noise sources, and beyond road traffic, there were no significant sources identified.

5.4.2 Issue: Noise – mitigation & monitoring

Description of Issue

Pump Station, Tetritskaro: the consideration of specific engineered noise attenuation measures to exercise Best Practicable Option (inadequate information on noise generation and fauna sensitivity at present to determine for sure) is suggested in view of the environmental setting. It is asked whether the buffer zone landscaping, aimed at reducing noise levels is likely to behave any more effectively than natural surrounding vegetation. It is suggested that the criteria for requiring engineered noise reduction and options for these measures are not considered.

Additional mitigation measures to planting of vegetation, to reduce noise levels are requested.

It is requested that consideration be given to the fact that hydraulic equipment and explosions cause noise, which can adversely affect fauna, which can leave the regions and move to neighbouring territories. This will affect the ecological balance of the region.

Suggest reassessment of impacts and residual impacts for the following areas and suggest appropriate mitigation measures and alternatives: noise and vibration residual impacts at camps and storage yards (10.2.4.2), borrow pits and waste disposal sites (10.2.4.3).

It appears proposed noise control at AGIs is limited to buffer zones. Are these adequate based on assessment?

It is suggested that it is unclear whether the noise monitoring provision is simply an audit or is weekly noise monitoring with level meter equipment, for different cases. Noise monitoring with level meters on a regular basis, with comparison made to guidelines, and remedial action being taken if necessary is expected.
Issue Drawn from Comments: 319, 322, 685, 708, 1157, 1183, 1354, 1360, 1558, 1621, 1680, 1691, 1695, 1817, 1819, 1856, 2052, 2063, 2209, 2279, 2283, 3182, 3192
Issue Relates to Following Sections of ESIA: Section 10, Section 14

Response To Issue

Tetritskaro pump station

The idea behind the buffer zone is simply that if the distance between source and receptor is increased, the noise level will be reduced. Noise control engineering methods such as screening or enclosure will be used to reduce noise in the first instance, and chosen commensurate to risk presented by the noise with respect to proximity of residents. The criteria for noise control engineering is a local issue for each site, as screening, for example needs to be tailored for the purpose (height, length, positioning, material used in screening, etc).

Additional mitigation measures

Noise mitigation measures in addition to the planting of vegetation are specified in Section 10.2.2 and Section 10.3.2 of the draft ESIA. These measures include limiting the working hours of noisy activities when near to identified receptors, selecting 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, and elimination of tonal, impulsive or low frequency noise through noise control engineering techniques such as damping or the fitting of mufflers

Hydraulic equipment

The effects of hydraulic noise depend on source, frequency, duration and location. The extent of use of hydraulic equipment has not yet been specified. In consideration of noise impact the mitigation measures detailed above will be employed.

Off ROW locations

Periodic noise monitoring will be undertaken in order to determine the effectiveness of mitigation measures and to reassess impacts and residual impacts at the camps and storage yards, borrow pits and waste disposal sites.

Buffer zones

Buffer zones are adequate where there are no receptors in the immediate vicinity, ie anywhere between 500m–1km (also dependant on prevailing wind direction and local topography such as natural barriers). Where receptors are identified in close proximity, and the noise level is likely to be significant, then noise control engineering techniques need to be considered applying Best Available Techniques.

Noise monitoring

The noise monitoring provision should depend on factors such as if there is a change in procedures or equipment used. Where there is a changing of procedures or equipment, monitoring will occur on a regular basis. A pumping station, will run (more or less) in a steady state continuous fashion and may only need quarterly noise monitoring audits. All complaints should be acted upon, but the idea is to undertake measurement where there may be a change, in addition to monthly or quarterly measurements to ensure that noise from procedures and equipment are not deteriorating. Seasonal variations will also be taken into account using this approach. Selection of monitoring locations should be consistent and measurements should be made in compliance with *BS 7445: Part 2: Description and measurement of environmental noise - guide to the acquisition of data pertinent to land use* and undertaken by a competent person using suitable, calibrated measurement equipment.

5.5 GEOLOGY, GEOMORPHOLOGY AND GEOHAZARDS

5.5.1 Issue: Geomorphology – recommend further works

Description of Issue

It is suggested that the draft ESIA ignores mud flows of the River Dviri (199+640 kp) and intensive flush flow cone (paleo and contemporary). It is pointed out that the contemporary canyon of the river is a result of an old flush flow cone which is constructed with clastic materials and therefore is unstable. If the geomorphological and geological features of the river basin are taken into consideration, it becomes obvious that the threat of mud flows can not be excluded.

It is suggested that the draft ESIA does not deal with celination of soil (Kumisi Lake Marneuli valleay), as well as suffusion processes, characteristic of North West slope of Iagluji range (KP 44.640 to 44.850). The width of burial of the pipeline should be considered at Mtkvari (KP 28.970) and Algeti (KP 53.245) crossings since the rivers tend to intensely scour the right bank.

It is stated that the geomorphologic research and study of dry ravines does not determine risk level for pipelines in case of the mudflow or flooding. It is known that mudflows have destroying power. Only detailed examination of these ravines can provide for the possibility of determining level of the side erosion of the riverbed or depth of pipeline laying. To determine the safe depth it is necessary to conduct detailed hydrological study and field research of ravines. Unfortunately, the evaluation does not say anything about such works in mentioned ravines. Probably, authors of the evaluation because of their low competence do not deem this issue important, but that may lead us to serious problems. We think impossible to pass (cross) dry and mudflow ravines without hydrological study.

Stated that the draft ESIA does not mention classical combined landslide, which has several angles of movement. Along with quarter rocks (terrain, delluvion), bed rocks (sandstones, Maicope clay layers containing gypsum) also move in this area with the angle on the mount slope reaching 70 degrees. Therefore, presently determining depth of immovable layer with single research sounds unconvincing and cannot be precise. It should be considered that during engineering works (trenching, road laying), and as a result of significant pressure on the terrain, the depth of presently immovable rock layer might be affected.

It is suggested that the chapter on "geologically hazardous processes" does not deal with movement of mud and pieces of rocks of Kodiana pass. Cracking processes are mentioned in regard to Jandari lake and Akhali Samgori territory as well as v. Lemshveniera. Cracking processes are rather intensive in certain sections of the route, particularly where intensity of quarter terigenical sediments is significant and angle of sloping exceeds 110-15 degrees.

Issue Drawn from Comments: 1543, 1544, 1547, 1548, 1564, 1648, 2368, 2376, 2443, 2447, 2448, 2463, 2470, 3020, 3024, 3026, 3028, 3031, 3105, 3111, 3112, 3155, 3166

Issue Relates to Following Sections of ESIA: Section 8

Response To Issue

Mud flows

The risk of mud flows and flush flow cone events has been considered as part of the study to assess the potential for causing debris flows at each of the river crossings along the route.

Where there is potential for a debris flows event, the magnitude of a the 200 year return period event is assessed in conjunction with the pipeline burial depth, set back and underlying geology. Where required, additional river bed stabilization will be provided in the vicinity of the pipeline crossing to ensure the integrity of the pipeline.

Soil properties and river crossings

Geohazard and erosion assessments have been undertaken along the pipeline route. Erosion control tools have been assigned on a KP by KP basis to prevent erosion, including piping, occurring over the pipeline. During operations regular monitoring will ensure that erosion control mechanisms are working correctly.

The pipeline river crossings have been designed to ensure that they are not exposed by the future erosion or movement of any of the watercourses crossed. The design of the Mtkvari (Kura East) river crossing incorporates a set back of approximately 100m from the river cliff on the right bank and approximately 25m beyond the existing railway tracks. The design of the Algeti river crossing is set back across the entire width of the floodplain.

Landslides and soils instability

Landslides have been classified in accordance with the varying types present along the pipeline route. This has included detailed geomorphological mapping to assist the pipeline routing and engineering design where there is a concentrated landslide complex. Detailed site investigations have been carried out at each problematic site, and in particular to avoid the landslides at Kodiana Pass and Minadze Plain. Mitigations involve avoiding the risk zones by burying the pipeline at appropriate minimum depths beneath the basal shear plane of the landslide.

There is a possibility that a landslide could be triggered by the trench or road excavation, especially in landslide-prone areas. This is likely to be a localized failure, which could lead to collapse of the trench and, if not arrested, progressive failure of the adjacent slope. The landslides in the high risk areas has been mapped and geotechnical recordings taken. Site specific construction method statements will be prepared addressing all construction methods, safety precautions and reinstatement requirements so that the works will be carried out safely and with minimum environmental and social impact. In addition, it is expected that both pipelines (BTC and SCP) will be laid at the same time in these areas so that any disturbance caused by construction would not impact the integrity of the BTC pipeline, as well as minimising visual intrusion and general habitat disturbance.

The system design engineers are aware of the potential for gullying and other soil erosion mechanisms. At Kodiana Pass the landslide prone areas have been identified and the pipeline route avoids these areas. In addition where risks are still significant erosion control tools have been developed and assigned for installation to prevent erosion. During operations regular monitoring will ensure erosion control mechanisms are working correctly.

Where there is potential for a debris flows event, the magnitude of the 200 year return period event is assessed in conjunction with the pipeline burial depth, set back and underlying geology. Where required, additional river bed stabilization will be provided in the vicinity of the pipeline crossing to ensure the integrity of the pipeline.

5.5.2 Issue: Geohazards – information requested

Description of Issue

Further information is requested including survey and geohazard maps, design sketches showing mitigation in hazardous areas, impact on landscape, specific erosion controls and reinstatement.

Further analysis of geohazards is requested (landslides, mudflows, avalanche and potential slope failures) to include risks and mitigation.

Justification as to why no landslides are believed to be present in the Kodiana region is requested.

Copies of the references in the WS Atkins report are requested.

Issue Drawn from Comments: 476, 482, 830, 831, 835, 846, 848, 1533, 1625, 1802, 2190, 2194, 2244, 2360, 2361, 2366, 2371, 2372, 2373, 2374, 2375, 2445, 2446, 2447, 2469, 2604, 2607, 3021, 3062, 3068, 3069, 3070, 3072, 3080, 3089, 3099, 3101, 3106, 3109, 3110, 3153, 3158, 3160, 3168, 3199

Issue Relates to Following Sections of ESIA: Section 8

Response To Issue

Further information

Surveys of geohazards, erosion sites and reinstatement requirements have been undertaken along the pipeline route. These have been incorporated into the overall pipeline design with specific requirements being detailed on a KP by KP basis along the pipeline route.

The pipeline route avoids areas of geohazards and excessive erosion where possible. Where the pipeline crosses hazard areas, mitigations, such as those listed below, have been included in the pipeline design to ensure the integrity of the pipeline will be maintained.

- Increased Pipeline Burial Depth and Set Back (Landslides and Rivers)
- Rip Rap (River Banks, Figure 5-5)
- Diversion Berms (Erosion Risk Slopes, Figure 5-6)
- Erosion Matting and silt fences (Erosion Risk Areas Figure 5-7)
- Site Specific Crossing Designs (Landslides and River Crossings)

Figure 5-5 Rip Rap at river banks

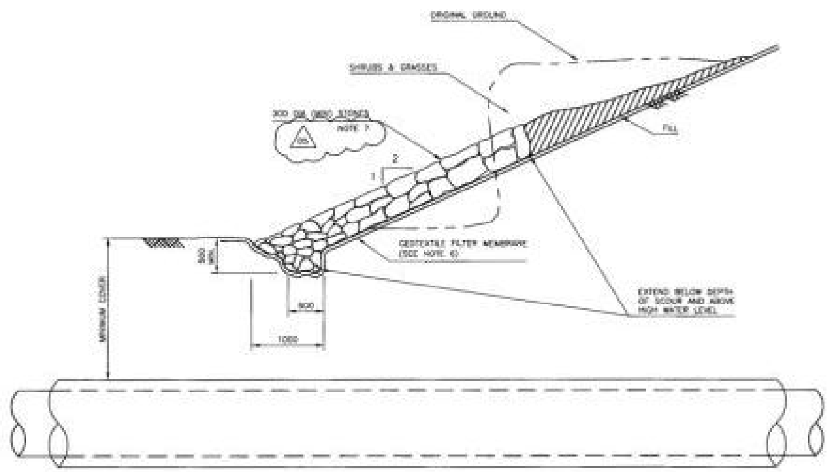


Figure 5-6 Diversion berm

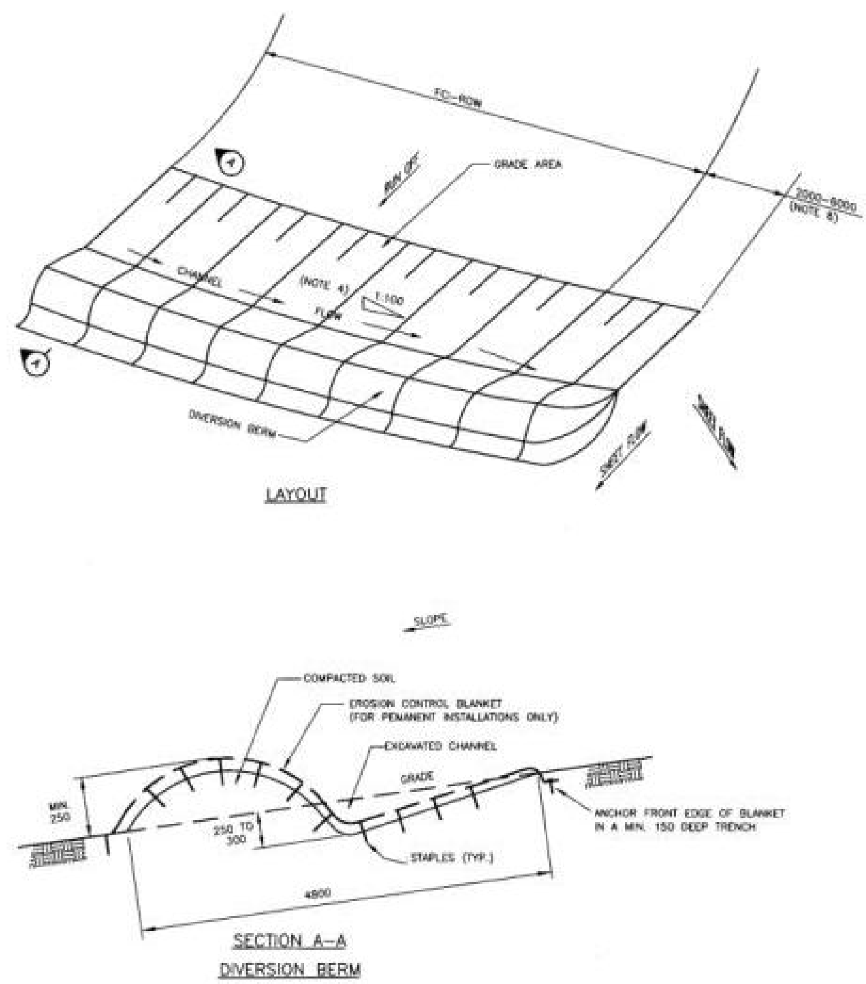
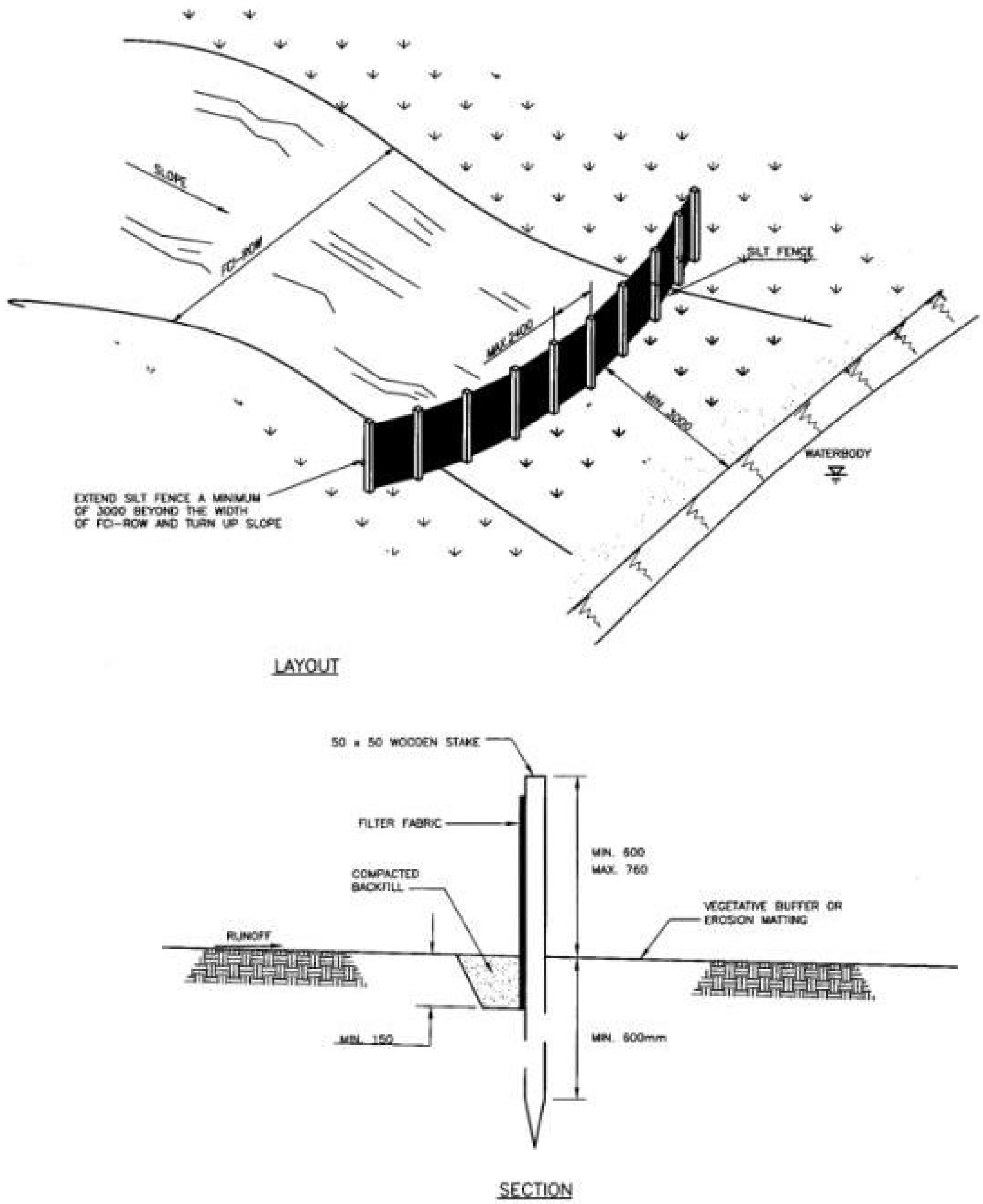


Figure 5-7 Silt fences and erosion matting



All active and potentially active landslides / slope failures within the pipeline corridor have been investigated. Where these have been deemed to pose risk to the pipeline they have been further investigated by means of specific geotechnical investigations and geomorphological mapping, such as at Kodiana Pass and Minadze Plain (Figure 5-8 and 5-9). Based on these investigations, a number of construction options have been proposed. The civil works design falls within the scope of work of the construction contractor who will obtain additional information as they feel necessary. All such works will be submitted to BP for review and approval prior to start of construction.

Figure 5-8 Landslide crossing, Kodiana Pass

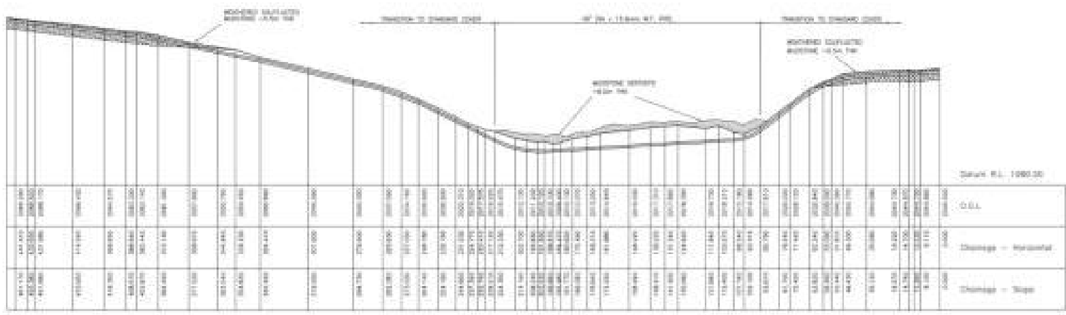
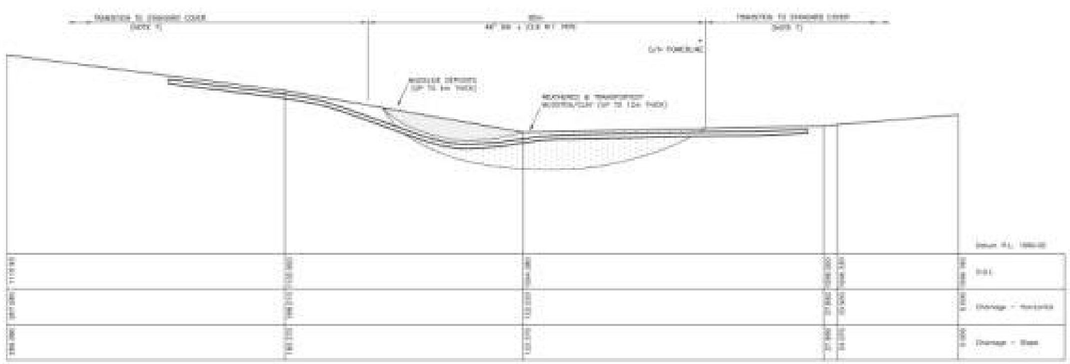


Figure 5-9 Landslide crossing, Minadze Plain



The risk of mud flows has been considered as part of the study to assess the potential for causing debris flows at each of the river crossings along the route. Where there is potential for a debris flows event, the magnitude of a the 200 year return period event is assessed in conjunction with the pipeline burial depth, set back and underlying geology. Where required additional river bed stabilization will be provided in the vicinity of the pipeline crossing to ensure the integrity of the pipeline.

Avalanches are not considered a hazard to the pipeline once the FCI-ROW is fully reinstated. During the construction of the pipeline the contractor will monitor meteorological data and where necessary de-mobilise from the mountain areas during the winter period. Erosion control mechanisms will be installed over the FCI-ROW to prevent erosion in excess of the project requirements due to adverse winter weather.

Landslides at Kodiana

Landslides are present at Kodiana Pass. The landslides have been subject to specific site investigation. Crossing designs at Kodiana Pass will include additional burial of the pipeline below the basal shear plane of the landslide. The civil works design falls within the scope of work of the construction contractor who will obtain additional information as they feel necessary. All such works will be submitted to BP for review and approval prior to the start of construction.

WS Atkins report

The WS Atkins report was referenced in the draft ESIA as a key study document on landslide investigations. The WS Atkins report has been provided to the Georgian authorities as part of the engineering and technical consultations. These consultations are ongoing.

5.5.3 Issue: Geohazards – concern expressed

Description of Issue

It is suggested that here is a lack of interaction between different factors (eg landslides, earthquakes and fault lines).

In areas of significant geohazards, it is stated that it is appropriate to assess the hazard in detail and develop a full technical solution at an early stage, eg in cut through landslides, investigate, design, construct and monitor stabilisation measures.

It is expected that the project will develop a landslide hazard mitigation strategy. Consideration of monitoring & warning systems so that action can be taken in the event of slope movement is requested.

Slope movement: it is asked whether the detailed studies undertaken identified any areas where the size of the open excavation to install pipe below the shear surface of existing slides, may result in unacceptable environmental impact.

It is noted that there has been no precipitation study with regard to mudslides.

Issue Drawn from Comments: 359, 512, 514, 834, 844, 845, 847, 987, 1504, 1555, 2146, 2294, 2362, 2364, 2374, 2375, 2445, 2446, 2469, 3021, 3062, 3072, 3080, 3090, 3110, 3158, 3160, 3168

Issue Relates to Following Sections of ESIA: Section 8

Response To Issue

Landslides deemed to pose a risk to the integrity of the pipelines have been treated the same regardless of the cause of initiation (be it seismic, erosion or water induced).

In areas where landslides are deemed to be hazardous to the pipelines, specific site investigations have been undertaken to determine the extent of the landslide in plan and profile (eg at Kodiana Pass complex and at Minadze Plain). The pipelines have been re-routed to avoid landslides landslides as much as possible and achieve full reinstatement where possible. Where it has not been possible to avoid landslide risk areas, the pipeline is installed beneath the basal shear plane of the landslide, thereby avoiding the landslide. This approach is preferable to trying to stabilize a pipeline within a landslides prone area.

Prior to installation, detailed method statements and construction drawings will be produced by the contractor. These will address all construction methods, safety precautions and reinstatement requirements. The design of all temporary works will be performed by the contractor's competent civil engineer.

In addition to the general Site Soil Investigation Surveys carried out along the route, specific surveys have been undertaken at Kodiana Pass and Minadze Plain, and have provided additional data for the design of temporary works. This work included:

- Installation of standpipes fitted with slip gauges to monitor water levels and slip movements
- Geodetic control points

The construction contractor will collect any additional data required to complete the design of temporary works.

Once installed, areas adjacent to the pipelines with potential for landslides will be monitored.

With respect to mudflows, catchments have been calculated using topographical mapping and regional hydrological modelling to calculate the 200 year return period event used in the debris flow analysis.

5.5.4 Issue: Inadequate description of groundwater resources / sources of data inadequate

Description of Issue

Within the corridor of interest the description of the main ground water deposits and the hydro-geological conditions of their formation is deemed incomplete and the sources of data insufficiently indicated. Incomplete consideration is given to surface discharges of a number of fresh and mineral waters. Request provision of maps showing a survey of existing abstraction wells along the corridor.

A commercial evaluation of the resources of the main groundwater deposits, along with audit and inventory works at a number of sites is recommended. Further hydro-geological work is requested due to the complexity of the issues considered. It is asked whether an overview of groundwater levels along the route is available, indicating areas where groundwater is closer to the surface.

It is suggested that a lack of studies have been undertaken which determine the nature of the hydraulic connection between the groundwater deposits and the surface waters, along with their hydro-chemical and sanitary-bacteriological environment.

Regarding the floodplains of River Khrami, Samtskhe-Javakheti plateau, and Borjomi, it is considered that further hydro-geological data is required.

Regarding Tsalka lava plateau, Bakuriani underlava flow, Borjomi mineral water and Mid-Eocene volcanogenic formations it is considered that consideration of surface discharges is incomplete.

Issue Drawn from Comments: 301, 303, 304, 305, 306, 307, 325, 326, 373, 544, 799, 1535, 1540, 1541, 1870, 2088, 2112, 2114, 2132, 2139, 2140, 2141, 2149, 2151, 2152, 2154, 2155, 2157, 2158, 2159, 2160, 2161, 2164, 2168, 3120, 3189

Issue Relates to Following Sections of ESIA: Section 1; Section 8

Response To Issue

The environmental baseline section of the draft ESIA (Section 8) clearly identifies the geological formations that occur along the route and their hydrogeological characteristics. Similarly, areas with a high incidence of springs and surface discharges are highlighted and the value of the water resource is indicated. Additional studies have been carried out in the Borjomi area to verify concerns expressed by interested stakeholders in relation to the perceived risk to the Borjomi water resources. The studies have drawn upon additional material than used in the draft ESIA and the factual report is enclosed as Appendix I.

The information is sufficiently detailed to enable an independent assessment of the potential impacts associated with the construction and operation of the proposed pipeline and compares positively with other ESIA studies carried out for similar projects.

The characterisation of the potential impacts associated with low probability spill events is also possible through the data included in the draft ESIA and the results of the assessment are included in Section 10.5.3 and Appendix E. The assessment has used very conservative parameters to estimate the potential contaminants' pathways in groundwater and therefore any additional data that may become available through additional detailed work would not add any significant value to the study.

Where necessary, further detailed assessments have been recommended as part of the work that will lead to the definition of the Emergency Response Plan and associated Oil Spill Response Plan. Such additional work will be focused on the Borjomi and Tsalka areas, where the most sensitive groundwater resources are located and at any other locations that would be deemed critical from an oil spill response stand point. The work will include a survey of water use by the communities located nearby the pipeline. The study programme includes a baseline survey of the sensitive aquifers along the pipeline route to verify water quality (chemical and bacteriological) prior to commencement of construction.

5.5.5 Issue: Comparison with other projects

Description of Issue: What were the Hydrogeological Problems in the Swiss Alps and Cameroon Pipelines?
Issue Drawn from Comments: 343
Issue Relates to Following Sections of ESIA: n/a

Response To Issue

At the time of undertaking the transalpine pipeline project limited EIA regulation was in place and therefore limited data is available with regard to groundwater sensitivity of the route and groundwater protection measures.

The Chad Cameroon pipeline EIA addresses hydrogeological issues from a general standpoint as groundwater resources in the pipeline territory are largely unexplored and no detailed characterization was deemed necessary for the purpose of the ESIA study.

5.5.6 Issue: Pressure regime of aquifers

Description of Issue

Hydrogeologists maintain different opinions on the structure and formation of the Borjomi recharge area. It is argued that issues of circulation pressure in aquifers need to be more fully addressed. Further detail requested on the mitigation measures for potential reputation impact on the Georgian Glass & Mineral Water Company.

Issue Drawn from Comments: 345, 375

Issue Relates to Following Sections of ESIA: Section 1, Section 8.5, Section 10.2, Appendix E Annex IV

Response To Issue

Based on an analysis of available literature, the local geology and geomorphology and an application of general hydrogeological concepts it can be stated that the pressure distribution in the Borjomi Tsikisjvari region is primarily related to topographically driven flows (recharge) from the Javakheti and Adjara Imereti mountains. Extra energy to the flow system is imparted by geothermal heat generated at depth due to magmatic activity. Groundwater travel times will be considerable (geological time). Local recharge is also topographically driven so that groundwater moves to the river courses, which act as groundwater sinks. These hydrogeological concepts are explained in the JW Lloyd report enclosed as Appendix I.

In the River Borjomola catchment, in the vicinity of Borjomi, where 'mineralised' groundwater is abstracted for bottling, the groundwater hydraulic heads in the flysch and Cretaceous strata are above river and ground level. Groundwater flows are upwards from depth, so that in the unlikely event of hydrocarbon contamination in the river waters from a pipeline spillage, the contaminant could not enter the 'mineralised' groundwater producing zones and therefore the commercial operation of the local mineral water companies will not be affected. These hydrogeological concepts are also explained in the JW Lloyd report (Appendix I).

BP is providing technical information to the Georgian Glass & Mineral Water Company (GGMW) in order to demonstrate that there is no technical risk to the mineral water aquifer.

5.5.7 Issue: Tsalka area groundwater

Description of Issue

Hydrogeologists have expressed concern with regard to the pipeline crossing the Tsalka territory groundwater aquifer. A series of clarification queries are put forward with regard to the information provided in the draft ESIA, the status of the underground aquifer, potential pollution risks, and the content of the Oil Spill Response Plan.

It is suggested that hydro-geological drilling works data held by Georgian hydro-geologists is reviewed, along with consideration of further oil spill mitigation measures and the possibility of discussing a re-route to the north of Tsalka.

Given the significance of the deposit and the filtration qualities of the main aquifers, lavas and their breccias, the potential high speeds of groundwater travel both in vertical and horizontal directions and small distances between the recharge, resource formation and discharge zones, it is suggested that in order to prevent potential contamination of the deposit, consideration should be given to re-routing to the north of the north contour of the lava formation from KP109 – KP173.

Issue Drawn from Comments: 270, 271, 310, 374, 463, 779, 796, 799, 838, 2198, 2441, 3000, 3164, 2198, 3164

Issue Relates to Following Sections of ESIA: Section 1, Section 8.5, Section 10.2, Appendix E Annex IV

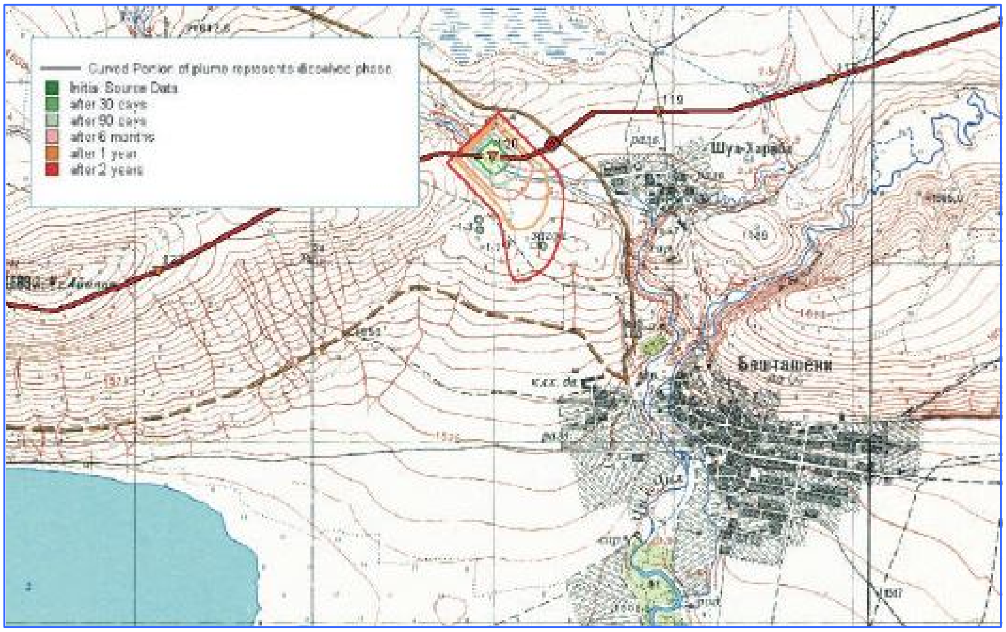
Response To Issue

The Tsalka region, and in particular the section of the pipeline where fractured lava is the most superficial geological structure, has been recognised as being an important groundwater resource where attention should be focused during the design and implementation of the oil spill response plan.

The environmental baseline section of the draft ESIA (Section 8), describes the hydrogeological conditions in the area in sufficient detail acknowledging the importance of the area. Section 10.5.3 and Appendix E includes the Tsalka area as one of the critical sites selected for detailed analysis of the consequences of a potential oil spill. Georgian scientists provided the data used for the analysis of potential groundwater contamination. Borehole data was also retrieved from the State archives.

Analysis of oil spill consequences shows that a large-scale oil spill would contaminate groundwater in the proximity of the spill and that the extent of contaminated groundwater can be minimised through prompt intervention including the installation of groundwater interception and treatment systems. The development of the Oil Spill Response Plan and the associated manual will focus on the measures required to achieve the above objectives. An extract from the draft ESIA showing the output of the groundwater contamination model is shown in Figure 5-10 below.

Figure 5-10 Groundwater contamination model near Beshtasheni



Potential re-routes to the north of the ridge along which the pipeline currently runs, have been deemed to have a significantly higher environmental impact due to the presence of ecologically important wetlands and because of the density of housing and rural dwellings. The routing report in Section 3 describes the process followed to determine the proposed pipeline route and the options that have been considered at local and regional level.

5.5.8 Issue: Hydrogeology at Tsikisjvari

Description of Issue

It is suggested that the Oil Spill Response Model should take into account alternative parameters including aquifer thickness (50m rather than 3-5m), permeability (approximately 500m/day rather than 100m/day) and, due to the extensive fissuring of lava, the infiltration of precipitation.

The definition of geometry of the aquifers at Tsikisjvari is questioned. With regard to a statement in the draft ESIA which states 'potential lava flows with high permeability to the north of the site' it is pointed out that this is the area where the recharge zone of the Borjomi-Bakuriani lava plateau is located. The precipitation that infiltrates at this site migrates towards Borjomi and generates the high-discharge Sadgeri Spring (Borjomi water supply) and Daba Spring (commercial development).

A request is made to further clarify the hydrogeological parameters at this location.

Issue Drawn from Comments: 274, 1902, 2165, 2166, 2401, 3122

Issue Relates to Following Sections of ESIA: Appendix E Annex IV

Response To Issue

There is no kaarst, or Quaternary lava along the ROW in the vicinity of the River Borjomola catchment. The ROW runs through volcano-clastics and lagoonal and lacustrine deposits of the upper Eocene. These latter deposits consist of clays, marls and sandstones so are considered to be of low permeability and not conducive to rapid transport of hydrocarbon contaminant. To examine the concern of direct spillage into the ground in the area, the volcano-clastic formation has been assumed to be the most conductive unit. A hydrocarbon contaminant transport model included in the draft ESIA (Appendix E, Annex IV) shows, that using a permeability of 100m/day, the 0.01mg/l concentration front will travel approximately 1km in 6 months and could eventually move into the local water course if no oil spill response is activated which is obviously unlikely. The 6 months travel time provides a more than adequate period during which interception of the contaminant plume can be put in place using remediation wells. As a safeguard, BP will install monitoring boreholes along the ROW prior to pipeline operations in both the lagoonal and lacustrine deposits, and in the volcano-clastic formation.

It is considered that the permeability of 100m/day is unrealistically high for the volcano-clastic formation. The rocks are stratified and disturbed and weathered. Shallow water table conditions and perennial spring discharges occur in dissected topography, which would not be the case if the formation had an extremely high permeability (such as 500m/d). With high permeability dominance the water table would be at depth and the springs, if they existed, would not be perennial. In view of the low density character of the potential contaminant and the local topographical flow drive, the contaminants' plume development will be of limited thickness, of the order of only a few metres. Hence, using 50m for the aquifer thickness in the model is irrelevant.

The modelling carried out is considered to give a result that is far worse than could exist in reality and therefore there is no need to carry out field determinations of ground parameters.

With regard to the possibility of contaminating the fresh water springs on the lava plateau it has been determined through a hydrogeological study carried out by Professor John W Lloyd that there is no possibility for any oil spilled from the pipeline to enter the groundwater system that feeds the springs. These concepts are explained in detail in the hydrogeological report included in Appendix I.

5.5.9 Issue: Oil spill modelling sites

Description of Issue

It is noted that the oil spill scenarios along the pipeline route have been selected correctly and that consideration has been given both to the spill options overland, into rivers, lakes and wetlands and the potential spill volumes. However, the oil spill simulation results have been based on 16 modelling locations. This is deemed as insufficient for a route of such significant length with a high diversity of geological and geomorphological conditions. There are a number of sites (eg Tsalka Dashbash Springs) which are of critical importance and which have not been included in the oil spill modelling.

Issue Drawn from Comments: 262, 269, 308, 328, 516, 837, 1565, 1601, 1742, 1743, 1880, 1891, 1900, 1924, 1928, 1930, 1986, 2142, 2169, 2170, 2171, 2172, 2173, 2174, 2175, 2176, 2178, 2450, 2461, 3121, 3172, 3183, 3197, 3205

Issue Relates to Following Sections of ESIA: Appendix E Annex IV

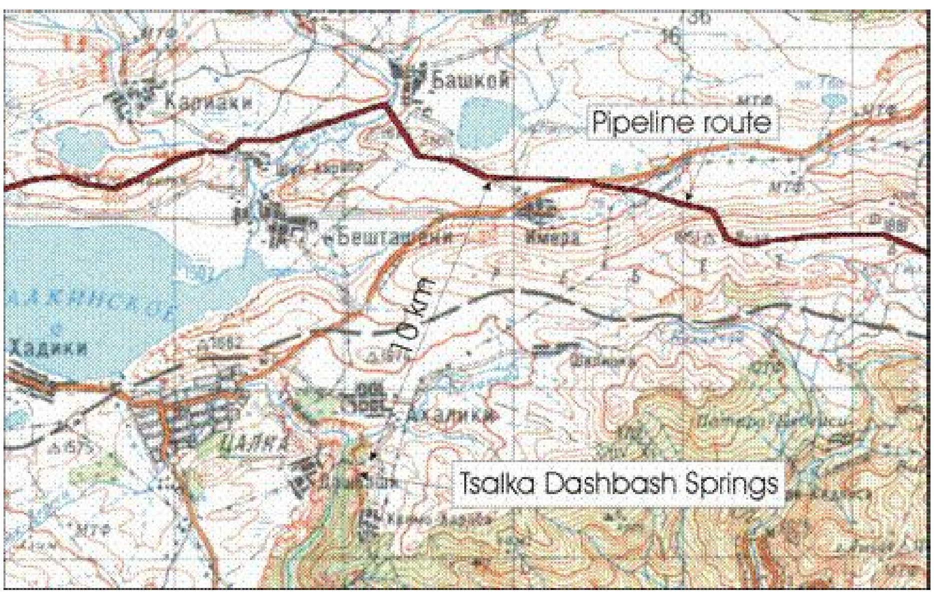
Response To Issue

The ESIA process has identified sensitive groundwater resources and selected the worst case conditions along the pipeline route to simulate the effects of a large scale oil spill. The initial screening was carried out by ranking each km section on the basis of its environmental sensitivity and special focus was given to groundwater and surface water resources. The most sensitive sites were selected to carry out the oil spill modelling study. Section 10.4 of the draft ESIA includes a description of the methodology used for the initial screening and for the oil spill modelling criteria. The consequence analysis carried out for surface and groundwater is not commonly done in the context of a pipeline ESIA and was undertaken in view of the high value of some natural resources along the pipeline route and to respond to concerns expressed by regulators and interested stakeholders.

The Tsalka Dashbash Springs are located approximately 10km to the south-west of the pipeline (Figure 5-11) and, based on the topography and the existing knowledge of groundwater flow in the area it can be determined that no oil spill, at any location, could result in the contamination of such springs.

The spill modelling location selected in the proximity of Beshtasheni was chosen because of the location of the proposed pipeline up-gradient of a public water supply borehole in an area where groundwater resources have a high value. The simulation therefore shows the worst possible instance of oil spill in the Tsalka region where the pipeline crosses volcanic terrains.

Figure 5-11 Location of Tsalka Dashbash Springs



5.5.10 Issue: Water resources and human use

Description of Issue

It is suggested that additional information should be available on the water supply headworks for villages, settlements, cities and other populated areas along the route. Additional data should include headworks capacities, location co-ordinates, current state, chemical and bacteriological content and potential impact on these waters in case of an accident along with associated mitigation measures. Reference should be made to alternative water sources in case of damage to main source.

Regarding potential primary and secondary impact of contaminated groundwater and water supplies which may no longer exist as a result of the project, it is suggested that the answers to these issues and concerns are incomplete.

It is argued that insufficient work has been done to study the condition of water supply piping, intake facilities and springs supplying communities within the corridor of interest and that further mitigation measures need to be implemented to mitigate potential water supply impacts. Audit and inventory works are requested at 25 water supply springs and 9 deposits and sites of mineral water and gas.

Water supply systems have not been investigated for settlements within 500m of pipeline. Request further investigation of water supply heads and sources. The risk of loss of underground water sources caused by blasting and trenching and associated risks should be identified. One potential receptor comprises exogenous fissures, the blockage of which due to blasting may cause the loss of underground water outlets.

Issue Drawn from Comments: 88, 177, 248, 263, 306, 309, 315, 325, 582, 761, 883, 1185, 1193, 1434, 1501, 1502, 1509, 1867, 1890, 1891, 1894, 1895, 1896, 1897, 1898, 1933, 2113, 2144, 2177, 2179, 2208, 2260, 2284, 2286, 2287, 2289, 2301, 2387, 2388, 2449, 2467, 2590, 2609, 2673, 2617, 2621, 2657, 3177, 3185, 3205

Issue Relates to Following Sections of ESIA: Section 1, Section 8.5, Section 10.2

Response To Issue

With respect to the River Bojomola catchment it is recommended in the JW Lloyd report (Appendix I) that groundwater abstraction installations drawing groundwaters from the alluvium should be surveyed. These are the only groundwater abstraction sites considered to be at risk from a potential pipeline spillage. The survey will form part of the BP future programme of work.

Studies done on the chemical and bacteriological content of waters in proximity to the pipeline route and potential impact to these waters are detailed in Section 5.8.1.

There is no predicted likely long term impact on any groundwater systems as a result of the project in either construction or operational phase. In the very unlikely event that an oil spill occurred and then contaminated groundwater, the contamination could be effectively cleaned up by standard remediation techniques. The modelling of contamination in groundwater is contained in the draft ESIA Appendix E, Annex IV. This modelling demonstrates that in all cases sufficient time is available to intervene if oil contaminates groundwater before any sensitive receptors are impacted.

Small spills of fuel or lubricant or accidental damage to canals or piping that may occur during construction of the pipeline will be made good by the construction company and compensation will be provided if a service is temporarily disrupted. Specific mitigation measures are in place to address these instances and include the development of accident response procedures to cover any such eventuality.

Concerns regarding the assessment of the baseline water supplies to communities are addressed in Section 6.4.1 of this Addendum. Further details of the mitigation measures in place to ensure there will be no impact on community water sources during construction are discussed in Addendum Section 6.8.3.

It is predicted that blasting, or other trenching techniques, will not have any adverse effects on the porosity or on the hydrogeological water regime. This is due to the fact that blasting will be controlled by sizing the charges so that energy dissipation will be concentrated within the trench and no adverse effect will occur at depth or at any distance from the ROW.

5.6 SOILS

5.6.1 Issue: Soils

Description of Issue

The following issues were raised:

The soil data presented in the draft ESIA is too general and incomplete. The competency of the "expert" used, is called into question; and why none of the established Georgian specialists institutes were either utilized or consulted. No methodology has been presented on how the information was collected, and what sources of information were used. For example how were the soils described and classified? The soil classification is not to WRB soil classification standards or any other recognizable International or Georgian standard.

There should be more information on soil thickness in sensitive areas with maps of soil cover produced. There is apparently a lot of information held by national institutes, which has not been used including recently collected data and up to date soils maps. More specifically, the saline soil conditions at Iaggluja Ridge (KP44.64 to KP 44.85) are not identified, nor are potential mitigation measures developed to counter the alkaline soil chemistry. The role of soil in relation to ecology should be assessed, with further studies undertaken by suitably qualified soil scientists.

Details on how the excavated soil is to be stored, and its integrity maintained, are not provided. More assurance is needed concerning the maintenance of quality of the topsoil. Having used the land for the purposes of pipeline construction, the topsoil in some areas of land may become rocky which complicates its use for cultivating the agricultural products. Training should be provided to local farmers on how to maintain and increase the fertility of the reinstated soils.

Impacts on topsoil are not described (construction process, oil spill and associated restoration works). BP should take obligations in EIA to carry out detailed studies and appraisal of soils in the construction corridor. It is necessary to conduct a detailed survey of a topsoil in a certain construction corridor, a laboratory analysis of samples, ascertaining of a soil type, a subtype and other taxonomic units, studying physio-chemical properties of a soil and estimating an erosion risk. A detailed map of a topsoil and erosion should be prepared. It is recommended that local experts are involved.

Mitigation measure 12 discusses soil storage and reinstatement, however the statement that there will be a residual affect conflicts with the standard documents, which state that restoration of soil without any residual impact is an obligatory requirement.

Issue Drawn from Comments: 1080, 1481, 1869, 2215, 2316, 2349, 2353, 2356, 2357, 2358, 2444, 2448, 2627, 2972, 2973, 2978, 3036, 3038, 3039, 3094, 3113, 3114, 3155, 3161, 3167

Issue Relates to Following Sections of ESIA: Section 8; Section 10

Response To Issue

Soil data and methodology

The sub-section on soils in the environmental baseline section (Section 8) of the draft ESIA is a summary of a literature review carried out by a Georgian scientist and the summary of an extensive soil erosion assessment carried out by Silsoe, a specialist soil sciences institute within the University of Cranfield, UK.

The information used for the summary soil classification is as follows (extracted from original literature review report compiled by Dr Dimitri Oniani):

1. Anjaparidze I. 1977. Meliorative Soil Science, Ganatleba, Tbilisi

2. Sabashvili M. 1965. Soils in Georgia, Metsniereba, Tbilisi

3. Talakhadze G. 1964 Main Soil Types in Georgia, Sabchota Sakartvelo, Tbilisi

The information used by Silsoe was the above literature review and a field survey of the route to evaluate areas of potential erosion risk. In addition, detailed slope measurements and field verification of soil types has been carried out by a Georgian specialist company (EGA, Environmental Geological Agency, an earth sciences, engineering and environmental specialist company).

In addition, a geotechnical investigation has been carried out along the entire route and the thickness of the topsoil has been recorded at over 200 locations throughout the route.

The purpose of a soil assessment in the draft ESIA is to identify soil types along the area of intervention and determine the following:

- Chemical characteristics that could affect the pipeline integrity (saline or aggressive soils, etc)
- Type of soil in relation to topographic gradient to assess erosion potential
- Fertility, structure and seed bank to assess the requirements for reinstatement after completion of the construction activities

The studies carried out by the specialists involved have enabled this assessment to an extent that is comparable to similar projects carried out in other parts of the world. Given that no inaccuracies have been actually detected in the overall soil classification or in the assessment of erosion risk it is questionable whether any more detailed studies would add any value to the assessment.

Soil restoration

BTC Co and SCP Co have committed through the draft ESIA documents to restore the topsoil to its pre-existing conditions throughout the ROW, both with regard to its thickness and its chemical composition and texture. The ROW clearance will involve the removal of the fertile topsoil layer, its stockpile and monitoring of the soils conditions throughout its storage and prior to the reinstatement of the soil. The reinstatement specifications also describe the measures to be taken to restore the soil properties and achieve the same fertility and texture that occurred prior to the pipeline construction.

The Construction Contractor will produce and agree an Environmental Management Plan (EMP) with BTC Co/SCP Co, including monitoring requirements for reinstatement and erosion control. Monitoring of the EMP will be conducted by specialists which will include Georgian experts.

It is the intention of the EMP that clear procedures are in place for the stripping and maintenance of the topsoil. All topsoil will be replaced, unless it is classified as contaminated. The only material that will be permanently removed after excavation will be either bedrock or subsoil which has been displaced by the pipe and any annulus material.

Some of the existing topsoil has a naturally occurring proportion of cobbles and boulders present within it. The utmost care will be taken to ensure that these proportions are maintained, or the proportion of cobbles and boulders reduced. This would also benefit the biorestoration programme.

There may be some scope for landholders to be involved in discussions with the reinstatement specialists to determine the most appropriate means to achieve pre-construction soil conditions. Post-reinstatement monitoring will be undertaken to check the effectiveness of the reinstatement in terms of soil productivity and erosion control.

Mitigation measure 12

Mitigation measure 12 does not state that there will a residual impact. It states that the potential impact may be a "loss of topsoil and deterioration of physical structure, loss of fertility and productivity". Mitigation measure 12 is designed to avoid the potential impact. These mitigation measures are likely to include topsoil storage piles of a maximum designated size, to enable the soil to remain oxygenated, seeding with plant species found in the area and erosion control measures. It should be noted that in Section 13.6 the conclusion is that there will be "no cumulative impact" on soil.

5.7 CONTAMINATION

5.7.1 Issue: Contamination

Description of Issue

With regard to contamination, the following points were made:

The contaminated land baseline study should include surface and subsurface geology; geomorphology; rock permeability and aquifers; effect of existing contamination on flora, fauna, landscapes and ecosystems; and qualitative assessment of any pollution, environmental damage and contamination.

A relatively small proportion of the route is represented by the quantity and locations of sampling in the contamination investigation. It may be unwise for the project company to assume that the unsampled expanses in between contamination sampling sites have uncontaminated soil conditions.

Is there adequate information on baseline soil conditions available for a later comparison of soil and groundwater concentrations (to demonstrate that the pump station has led to no contamination)?

It is stated that the oil company is not liable for already existing contamination. It is pointed out that the accuracy of the assessment is contingent upon the accuracy of the baseline information.

It would be beneficial for the project company to attempt to identify possible sources of the contamination encountered in the survey, firstly, to add weight to the assertion of pre-existing contamination; and secondly to indicate whether contamination is likely to be ongoing, or even worsening, as this could be a liability.

It is assumed that the temperature range for storage of samples returned to the UK applies to time in transit also. There is a lack of description of hazardous substances that accumulate in the environment and have long-term pollution impact. The possibility of radionuclide pollution in case of oil leakage is not discussed. The assessment requires verification of the background radiation levels in the environment and their possible change during the construction, exploitation or cessation.

The suite of soils and water analysis is commented upon as well as the lack of use of Georgian experts and laboratories.

Issue Drawn from Comments: 1605, 1682, 1683, 1685, 1816, 2044, 2219, 2223, 2224, 2251, 2333, 2945

Issue Relates to Following Sections of ESIA: 8.7

Response To Issue

An internationally recognized firm of environmental consultants prepared a baseline contamination assessment of the pipeline corridor and associated facilities (July 2002), as is required by the HGA. This report specifically addresses: surface and subsurface geology; geomorphology; rock permeability and aquifers; effect of existing contamination on flora, fauna, landscapes and ecosystems; and qualitative assessment of any pollution, environmental damage and contamination, where contamination has been identified along the pipeline corridor and associated facilities.

Whilst the sampling regime for contamination along the pipeline route has been very specific, it should be noted that a number of route walks utilizing specialist environmentalists have been undertaken (the initial route definition walks were conducted in 2000). In addition, a site investigation which utilized the services of a local Georgian company conducted extensive geotechnical investigations along the route from March to December 2001. These reconnaissance walkovers and geotechnical investigations enabled much of the route to be visually assessed and the most potentially contaminated locations to be identified for sampling as is consistent with standard international practice. Furthermore, walkover studies of re-routes were conducted in 2002. It is felt that these works have provided BP with a satisfactory degree of reassurance as to the current state of contaminated land on the route. It should be noted that information obtained during the investigations is accurate at the date of issue, however subsurface conditions and contaminant concentrations may vary spatially and with time. Minor pollution incidents may occur between the end of the survey work and commencement of the siteworks. It should be noted that BP and the Construction Contractor have a commitment to clean up any contamination, which may be a direct result of the construction works.

Articles in the academic press would indicate that there is currently a lot of research being conducted on naturally occurring radionuclides in oil, primarily on their use as indicators of oil spills. The research indicates that oil has minute traces of the radionuclides absorbed from the rock strata in which the oil is contained. It should be noted that the quantities identified require spectroscopy to identify them, and are present at levels that they are highly unlikely to increase the naturally occurring background radiation. They should not, therefore, detrimentally affect either the environment or grazing animals.

BP have requested information regarding potential radioactive sources within Georgia. The Ministry of Defense for Georgia has provided a list of known “radioactive emanations” from former Soviet Army bases. None of the recorded radioactive emanations are reportedly within approximately 2.4km of the pipeline corridor. At the time of the walkover surveys a radiation detector was used in suspected military areas - none of the readings at the time identified any anomalies.

All samples collected for analysis were stored in temperature controlled boxes during collection and transportation to the UK laboratory. It should be noted that during the period of the sampling, November 2001 to February 2002, the external temperature at these times was conducive to preserving the sample integrity. Full chain of custody procedures between the field sampling and transport to the UK laboratory were implemented. Holding times for the analyses requested required all samples to reach the laboratories within 14 days of the sampling date (this was the case with all samples collected).

The suite of soil analysis undertaken was a standard suite for baseline contamination assessments, and was considered to be indicative of potentially contaminative compounds most likely to be encountered along the investigation route The analysis per soil samples covers approximately 13 metals, over 60 volatile organic compounds (VOC) and hydrocarbon compounds in the range C_{10} to $C_{40.}$

A GIOC environmental expert accompanied the field team during the February 2002 walkover of the entire route. This expert was either consulted or present, throughout the process, from the initial review of aerial photographs and identification of suspect sites, to the actual site identification and assessment, including the collection of samples for subsequent analysis.

Information has been requested from GIOC. Under the HGA (clause 2.2 ii) they are required to provide "full access to all relevant and nonclassified information held at the central, regional, district and local levels of the State Authorities respecting:… (7) the environment." This would include information on contamination.

It should be noted that many of the areas of identified contamination were due to the dumping of waste and waste products. The removal of visibly contaminated waste identified during the investigations will potentially remove the source of the current contamination. BP is unable to prevent future contamination/pollution if the tipping of waste by the local population continues to be the biggest single potential source of contamination.

5.7.2 Issue: Contamination – anthrax

Description of Issue

The following comments were made with regard to anthrax:

The risk of anthrax during the construction phase has not been considered in detail.

It is recommended that a survey of veterinary-sanitary sanitation measures is conducted along the route in order to prevent the spread of danger from ectoparasites / zooanthroponose diseases.

A number of anthrax occurrences are reported including: 98 anthrax risk zones & particularly high risk zones at Kvemo Kartli; an outbreak in Vale in 1956 - associated burial sites, in the same area archaeologists dug up some remains two (2) years ago, other areas of concern are summer pastures, farms, cattle sheds, burial sites and dung stores.

There is concern expressed over the trenching and digging techniques to be employed and the preventative measures to be employed against encountering a burial site.

Also concern over what would be done should there be a suspect site encountered during the excavation works, what management plans would be put into place to prevent the spread of spore carried diseases and other diseases, and which organization/company would be responsible for health, safety and clean-up.

Private owners cannot afford veterinary/sanitation measures to prevent these diseases breaking out or spreading. It is recommended that cattle should not be allowed to come into contact with excavated soil.

Potential dangers of bio-terrorism are highlighted. The geopolitical location of Georgia & implementation of export measures of TRACECA and energobarers in Georgia do not exclude the danger of bioterrorism.
Issue Drawn from Comments: 66, 67, 444, 619, 812, 813, 814, 815, 1320, 1438, 1453, 1454, 1455, 1456, 1873, 2059, 2207, 2214, 2220, 2618, 2619, 2661
Issue Relates to Following Sections of ESIA: 8.7

Response To Issue

BP recognizes that Anthrax is a serious issue to many farmers and livestock owners along the right or way. Therefore for over a year, BP has been actively identifying any recorded or suspected anthrax burial sites.

BP has written to all the Municipal Authorities along the pipeline route for any details of anthrax burial sites within their administrative regions. BP also requested similar information from GIOC who are required, under the HGA, to assist BP with these issues.

The nature of the information received has been variable in its quality. The Municipalities have been very specific in identifying the locations of some sites. Other authorities have been able to provide a list, with dates of reported anthrax occurrences and the settlements affected, but not the specifics of the burial site locations. It is apparent from the public meetings that the information received to date is not complete and it is likely that further burial sites will be identified throughout the works.

During the actual excavation works BP will require the construction contractors to have in place an Environmental Management Plan (EMP). The EMP will have procedure(s) to ensure that any identified, or suspected, animal or biological waste burial site that occurs during the works will be dealt with in an appropriate manner. The EMP and its procedures need to be approved by BP before the commencement of works. The procedure will ensure that the appropriate authorities are contacted and any measures recommended by these authorities are acted upon appropriately.

The draft ESIA (Section 5.7) provides a description of the construction activities including surface grading and preparation, trenching and reinstatement. The draft ESIA states that the stripped topsoil and excavated subsoil and other arisings are to be stored separately from one another during the pipeline laying operations. Following completion of the pipe-lay, the reinstatement works will ensure that the subsoil and topsoil are reinstated in the original order. This should ensure that any livestock that should graze upon the reinstated land only encounters the original topsoil.

There is no reason that the pipeline project should increase the risk of bio-terrorism. In terms of more general security considerations, the pipeline route selection process specifically took account of security risk and the ability to protect the pipeline in the long term. The proposed route represents the best option considering all constraints including security.

The construction workers will be subject to health checks in order to ensure that communicable diseases are not spread amongst the workers and to communities. The construction camps will have medical facilities and medical staff.

5.8 HYDROLOGY AND SURFACE WATER QUALITY

5.8.1 Issue: Hydrology: chemical and physical parameters

Description of Issue

Specific rivers are mentioned and associated concerns expressed, including:

- The River Dviri – concern expressed over the mudflow nature and the unstable nature of the river
- The River Geti – further works on the headwaters and slope-wash needs are required
- The River Khrami – further works to assess stream parameters
- The River Algeti – further works to assess stream parameters
- The River Mtkvari – further works on stream flow dynamics
- Further work should be conducted on flow-rates and other parameters of river Marini channel and Aji river

Issue Drawn from Comments: 263, 903, 1435, 1450, 1560, 1684, 1769, 1890, 2113, 2140, 2150, 2242, 2243, 2252, 2285, 2390, 2393, 2394, 2397, 2448, 2449, 2457, 2470, 2658, 3033, 3034, 3050, 3059, 3063, 3144, 3157, 3170, 3171, 3203

Issue Relates to Following Sections of ESIA: Section 8, Section 10

Response To Issue

The hydrological regime of the permanent and ephemeral water courses has been studied extensively by Georgian Scientists and subsequently by HR Wallingford Ltd, an internationally renowned company that specializes in consultancy and research for the civil engineering hydraulics and water environment. The combined studies have resulted in the analysis of over 200 streams and rivers along the pipeline route. Based on preliminary field observations a number of hydrological surveys were also carried out by a Georgian specialist firm to determine the cross sectional profiles of the selected rivers as well as the hydraulic regime. Section 4.2.2. describes the approach to rivers and stream crossings.

5.8.2 Issue: Hydrology – further works recommended

Description of Issue

Additional works requested:

I. River's sensitivity is not determined by its size. Small rivers and gorges, particularly those subject to mud flows are equally hazardous. All water units shall be described and their sensitivity assessed
II. Run off, particularly maximum flows shall be thoroughly calculated. Methodology existing and probated among our scientists shall be applied

III. Regime of river beds shall be identified and sediment movements shall be studied and plotted on 1:25,000 maps
IV. Erosion processes (quantitative indices of vertical and lateral scouring)
V. Rivers with mud flow risk shall be given special attention
VI. All water units and river crossings shall be considered as high sensitivity zones and potentially hazardous sections
VII. Future monitoring working plan shall be designed in order to avoid undesired outcomes
VIII. More attention shall be paid to environmental impact mitigation measures. All calamities and natural events shall be taken into consideration and measures shall be planned against them
IX. An experienced expert shall take part in EIA report drafting and editing, so that errors and terminological imprecision of the translation could be avoided

Issue Drawn from Comments: 327, 334, 347, 374, 411, 475, 716, 799, 800, 801, 1090, 1092, 1408, 1529, 1530, 1656, 2300, 2319, 2379, 2380, 2385, 2389, 2415, 2416, 2459, 2610, 3003, 3019, 3023, 3025, 3027, 3030, 3051, 3082, 3083, 3095, 3096, 3107, 3111, 3144, 3155, 3158, 3166, 3170, 3171, 3191, 3194, 3196, 3198, 3200

Issue Relates to Following Sections of ESIA: Section 8; Section 10; Section 14

Response To Issue

All concerns associated with the river crossings design basis are addressed in Section 4.2.2.

In regard to translation, best efforts were made to translate the draft ESIA from English to Georgian and Russian in accordance with the technical language of the document. Georgian scientists were used to quality control the translation process. However, it is recognized that some aspects of the report once translated were difficult to understand. Hence, a significant effort will be made to try and ensure that the ESIA Addendum technical language is translated as well as is possible.

5.8.3 Issue: Wastewater

Description of Issue
A query was made on how sewage treatment standards will be enforced and what kind of treatment technologies are proposed. Description of the handling and treatment methods is requested. With regard to discharging abstracted water to ground, erosion concerns associated with discharging overland are emphasised. Specification requested as to whether BTC Co propose to review sanitary measures in Bakuriani, Tsalka, Tsikhisjvari and Mitarbi within the frames of environmental program. It is suggested that the implementation of a sewage treatment package, as indicated, would not fully mitigate "accidental spillage of waste".
Issue Drawn from Comments: 480, 752, 1436, 1524, 1657, 1659, 1664, 1828, 2203, 2659, 3145
Issue Relates to Following Sections of ESIA: 5.12

Response To Issue

Enforcement of sewage discharge standards

Package wastewater treatment plants will be established at the main construction camps and/or maintenance facilities. The construction contractor is required to select an appropriate waste water treatment system to achieve the relevant standards. However, it is envisaged that the systems will include solids removal and a biological treatment or a forced aeration stage. Examples of package treatment plants are rotating biological contactors (RBCs) or mini-aeration units.

Sewage treatment systems will be installed at the permanent manned facilities of BTC and SCP. For small facilities with permanent manning levels of less than 10 people, septic tank and soak away systems may be used. Alternatively if ground conditions are not suitable, package treatment systems will be used prior to discharge to a watercourse. Sewage treatment systems will meet World Bank standards, which include the following limits:

pH: 6-9
BOD < 50mg/l
TSS < 50mg/l

Short-term camps are likely to have simple facilities, such as chemical toilets. Such systems will be chosen in accordance with BTC Co policies on Health, Safety and the Environment, and collected wastes will be disposed of in accordance with the relevant standards.

Oily-water or other contaminated water arising away from the camps will be collected and tankered, to the contractor's or third party treatment or disposal facility. If any wastewater is transferred to a third party for treatment, then the project standards for discharges to the environment will be applied to the third party.

In both construction and operation, sewage sludges are to be incinerated or landfilled or used for agricultural purposes. If used for agricultural purposes the technical standards for sludge and soil required by the European Community Directive (1986/278/EEC) will be met.

Discharge to land

During construction, discharge to land from dewatering activities may be necessary to ensure safe working conditions below surface level (eg pipeline trench). Disposal will be undertaken in a way that minimizes erosion, and if necessary erosion control measures will be employed to avoid any adverse effects.

To meet the relevant standards, the construction contractor will establish an environmental monitoring programme. BTC Co staff will undertake audits to ensure the contractor is in compliance with the relevant procedures and standards.

An environmental monitoring plan will be developed and managed by BTC Co during the operational phase. This plan and the monitoring results will be available for review by the relevant authorities.

Water sanitation in sensitive areas

Detailed surveys of private and public water supplies in these areas will be carried out prior to commencement of construction to evaluate what sanitation measures, if any, are required to protect water intakes.

At each sewage treatment plant monitoring of the effluent will be carried out on a regular basis to ensure compliance with the discharge standards set by the project and agreed as part of the ESIA process. If sewage is to be discharged into public facilities, the impact on the facility and its discharge will be assessed in order to meet the project standards.

Accidental spillage of waste

The risk of accidental spillages of waste will be reduced through proper design of the sewage collection and treatment systems. If any spillage does occur the Emergency (Incident) Response will be implemented as stated in Section 10.3.2 of the draft ESIA. In the unlikely event of an accidental spillage of waste, chemicals or fuel within permanent above ground installations, the spilled liquid would be captured and contained by either specifically designed spillage control systems (bunds or closed-drainage systems) or the site drainage systems. The oily-water separation and sewage treatment systems will effectively treat minor spills of many products, and in such cases monitoring will be undertaken to ensure appropriate treatment or response is provided to manage the spillage within the facility. Response to an oil spill event will be managed in accordance with the IMP and oil spill response plan.

5.9 LANDSCAPE AND LANDUSE

5.9.1 Issue: Landscape and visual impacts

Description of Issue

It is suggested that more attention needs to be drawn to endemic and unique landscapes, that recreation and tourism value will be affected by the pipeline, and that landscape planting will be inadequate to compensate for this.

Suggested that further assessment should include:

- Impact on stability during process and degree of damage for unique and unstable landscapes and sensitive sections of the pipeline route eg Tskhratskaro-Tsikhisjvari and Kodiana landslide zone
- Impact on unique volcanic landscapes, particularly those in the Red Book of Georgia ("Footsteps of the Goliath" of Bedeni plateau) and candidates for inclusion (volcanoes Tavkvetili and Shavnabada)
- Description of direct, primary impact on the landscapes' quality for the following sites: km/mark 92-108: Bedeni plateau; km/mark 108-120: surroundings of Beshtasheni; km/mark 120-126: mountains in Tsalka surroundings; km/mark 126-129: Santa; km/mark 151-157: mountain Tavkvetili; km/mark 157-160: Narianis Veli; km/mark 175.5-180.6: Tskhratskaro pass; km/mark 180.6-183.3: Tsikhisjvari forests; km/mark 183.3-185.2: surroundings of Tsikhisjvari; km/mark 185.2-197: Kodiana

It is asked whether mitigation measures and the EMP will be applied to infrastructures used other than within the pipeline corridor (eg roads, railways).

Although consideration has been given to minimising lighting through use of specific equipment, it is suggested that it is unclear as to what the residual effects will be, visually. The need to avoid ridgeline lighting and glare is emphasised.

Issue Drawn from Comments: 297, 352, 513, 1483, 1536, 1554, 1609, 1669, 1765, 1766, 2043, 2267, 2344, 2348, 2350, 2437, 2456, 3084, 3087, 3097

Issue Relates to Following Sections of ESIA: Section 8, Section 10

Response To Issue

Endemic and unique landscapes

A full Landscape Assessment Study was undertaken by a Georgian Landscape Expert. The study characterised the landscape along the pipeline corridor and identified the main visual receptors within the pipeline Zone of Visual Influence. Endemic and unique landscapes are detailed within this report which is enclosed to the draft ESIA as Appendix E, Annex 1.

Landscape planting is one of a series of mitigation measures designed to reduce landscape impact. Additional mitigation measures include no clearance of soil, grass, shrubs or trees beyond a carefully defined boundary commensurate with construction requirements; reduction of the ROW width in forested and environmentally sensitive areas; use of colours sympathetic to the environment and avoidance of non-natural, visually active and metallic colours in the design and construction of AGIs; minimisation of the height and mass of buildings, for example by using pitched roofs where possible.

The development of landscape mitigation measures has taken place in tandem with the design of the pipeline and associated facilities thus allowing mitigation measures to be incorporated into engineering design.

Further assessment

In sensitive areas and in unstable areas, specialist engineering design and mitigation measures will be employed. These are detailed in Addendum Section 5.5.1 and 5.5.3.

Off ROW activities

A full suite of mitigation measures will be employed in Off ROW areas. These are detailed in Section 10.2.4 of the draft ESIA. The EMP as developed by the contractor will also apply to Off ROW areas to include roads, railways, pipe storage yards, worker camps, borrow pits and waste disposal sites.

Lighting

Section 7 of the draft ESIA details the methodology used to assess and rank the significance of residual environmental impacts. Lighting impacts are associated with landscape impacts and are mitigated for through the use of vertical diffusion lighting.

5.10 ARCHAEOLOGY AND CULTURAL HERITAGE

5.10.1 Archaeology - concerns expressed

Description of Issue

Confusion is expressed with regard to the extent and number of known archaeological sites in proximity to the proposed pipeline route. It is noted that procedures and mitigation measures are proposed for some of these sites by the project company. It is recommended that the project company commits clearly to ceasing works on discovery of artefacts/archaeological finds until an acceptable method of continuance is agreed with an archaeological expert.

It is noted that on page 10-17 there are identified "potential sites of archaeological interest" immediately on the pipeline route. It is suggested that if there is reasonable evidence supporting such a classification it is unwise to rely on the earthmoving equipment to safely uncover the full extent of the find and that some form of further study should be arranged. If the area has been classified with very limited evidence then the proposed approach may be best practicable option.

Question is asked as to why the 100m corridor has not gone around the cluster of burial mounds at KP169-170? The alternative of going around this area is not detailed.

Issue Drawn from Comments: 181, 589, 629, 650, 655, 783, 1102, 1105, 1117, 1473, 1474, 1476, 1667, 1692, 2475, 2476, 2477, 2479, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2491, 2496, 2720, 2721, 2722, 2723, 2725, 2726, 2727, 2728, 2729, 2737, 2738, 2739, 2740, 2741, 2742, 2743, 2744, 2745, 2750, 2756, 2761, 2773, 3086

Issue Relates to Following Sections of ESIA: 8.10

Response To Issue

Known archaeological sites

The number and extent of known archaeological sites is detailed in Section 8.10 of the draft ESIA. Specifically, BP has committed to a "late finds plan" which is outlined in the ESIA (Cultural Heritage Management Plan, Appendix E Annex III) and will be developed as part of the construction contractor's work protocols.

Potential sites of archaeological interest

The point is well taken and is addressed in the Cultural Heritage Management Plan of the ESIA. As indicated in the Plan, Phase II preconstruction investigations are planned for a number of known sites, in order to assess the extent and significance of sites so that recommendations for Phase III can be made.

Tsalka Reservoir to Tabatskuri

The area from Tsalka Reservoir to Tabatskuri From KP 120 to KP 170 is rich in archaeological remains of the Bronze Age such as those referenced in the comments. The route in this area has been carefully selected to avoid as many sites of significance as possible. Based on current knowledge, the present pipeline route in the area would have the most limited archaeological impact.

Preconstruction Phase II investigations are planned for the heritage resources at 169-170, as it is not certain that the features are significant. Based on the results of those investigations, mitigation measures may be undertaken at the site such as data recovery excavations or additional re-routes.

5.10.2 Archaeology - information requested

Description of Issue It is asked as to whether it is possible to hold a dedicated meeting on issues of cultural heritage within a 10km corridor. It is asked if it is possible to finance and implement urban architecture preservation projects that are partially encountered along the pipeline route, in particular civil architecture of the late 19th and early 20th Century.
***Issue Drawn from Comments**:* 101, 179, 180, 391, 569, 585, 595, 648, 986, 2476, 2477, 2479, 2480, 2481, 2482, 2491, 2496, 2547, 2717, 2718, 2719, 2720, 2724, 2727, 2728, 2739, 2740, 2753, 2756, 2764, 2765, 2774, 3086
Issue Relates to Following Sections of ESIA: 8.10

Response To Issue

The 10km corridor was a study corridor as per the HGA route definition process, and does not imply that the project will have associated impacts on cultural heritage within the entire corridor. Where potential impacts are predicted, these are described in Section 10 of the ESIA. The Cultural Heritage Management Plan in the ESIA describes the process for dealing with known and unexpected cultural heritage finds. Part of this process includes close liaison with all interested parties.

The pipeline does not pass though urban areas. Since heritage works sponsored by pipeline projects are aimed at mitigating possible direct impacts of the pipeline itself on heritage resources, such activities would be outside of the scope of BP heritage work in this case.

5.10.3 Cultural Heritage Management Plan

Description of Issue

A number of clarifications are requested:

Description of the extent to which the rehabilitation process covers the monuments of cultural heritage.

Provision of better scale maps showing archaeological features affected within ROW and at AGI locations and temporary construction camps and pipe laydown yard and locations.

Description of the procedure for additional finds during excavation works.

Confirmation of the number of archaeological monuments identified.

Issue Drawn from Comments: 454, 538, 547, 549, 595, 736, 1602, 1660, 2473, 274, 2478, 2488, 2489, 2490, 2492, 2493, 2494, 2495, 2497, 2498, 2499, 2716, 2718, 2730, 2731, 2732, 2733, 2734, 2735, 2736, 2746, 2747, 2748, 2749, 2751, 2752, 2757, 2758, 2759, 2760, 2761, 2762, 2763, 2769, 2770, 2771, 2772, 2774

Issue Relates to Following Sections of ESIA: Appendix E Annex III

Response To Issue

Substantial planning and studies are underway to assure the pipeline construction does not cause damage to monuments (above ground historic structures). If any risk to monuments is identified, mitigation measures would be implemented. Therefore, rehabilitation is not a part of the monuments program. Any monuments subject to accidental impacts would of course be rehabilitated. Monument studies undertaken by the project will, in the future, provide baseline information that could assist greatly with monuments rehabilitation sponsored by the Georgian government or other agencies.

More detailed monument and archaeological site maps will be produced by forthcoming Phase II and III study programme.

The procedure for additional finds during excavation works is specified in the Cultural Heritage Management Plan in Appendix E Annex III of the draft ESIA.

The number of archaeological monuments identified is based on the Phase I literature search which does identify 219 monuments. The number will become more precise following the upcoming Phase II monuments fieldwork.

5.10.4 Pirghebuli Monastery Complex

Description of Issue

It is requested that consideration be given to the possible effects on the Pirghebuli Monastery Complex of slope failure, unplanned events, explosions, and increased tourism (due to the pipeline construction). It is recommended that architectural, geological, archaeological and fresco works be undertaken on the complex.

As a mitigation measure, it is suggested that BP should undertake activities to protect, reinforce and restore any damage to the Pirghebuli Monastery Complex and other monuments.

Issue Drawn from Comments: 703, 705, 707, 708, 709, 711, 713, 714, 715, 1468, 1469, 1470, 1471, 1472, 1998, 2234, 2235, 2236, 2237, 2238, 2239

Issue Relates to Following Sections of ESIA: 8.10

Response To Issue

The Pirghebuli Monastery Complex (Monument #50) lies 3km to the south of the proposed pipeline ROW. There are no access roads or other related facilities proposed near to the monastery. The on going monuments survey concentrates on a 2km belt either side of the pipeline ROW as that is the agreed maximum distance at which impacts on monuments could occur. As such, no special studies are planned for this 13^{th} century monument complex, which is understood to be of national importance. It is not anticipated that the project would bring additional tourists to this monument given its limited access and distance from the ROW. As identified in the draft ESIA, evaluation and protection studies are planned for numerous other monuments that lie closer to the pipeline than does Pirghebuli.

5.11 ECOLOGY

5.11.1 Issue: Flora & fauna – mitigation

Description of Issue

It is suggested that mitigation measure 1 should be further developed. More information on the techniques used for transplanting, the approach and methodology of restoration works and proposed conservation projects is requested. Proper adequate measures are regulated by Georgian standards SNR 3.01.01-85 and SNR III-10-75.

It is suggested that mitigation measure 1 substantiates the necessity of measures for retention of rare and endangered species. In Table 10-3 the methods of temporary conservation of rare species, endangered to become extinct, and the species themselves are not indicated. If the mitigation measures towards all the protected species are not fulfilled, it will cause their disappearance. This will be subject to Georgian criminal code, paragraphs 287 – infringing rule of environment protection during work execution and paragraph 302 – destroying a settlement of wild plants or animals, being in danger, included in "Red List" of Georgia.

Mitigation measure 3 is described as generic and that specific methodologies should be stated for the Reinstatement Plan.

Due to the high sensitivity of the environment at Bedeni Ridge and at the Tskhratskaro-Kodiana mountain area, it is requested that consideration be given to re-routes to avoid these areas. The route traversing the Tskratskaro-Tsikisjvari region is objected to. If the route does not change further mitigation measures are requested.

Request mitigation measures are further developed and specified for:

KP 53.2-53.8 Algeti river crossing: mitigation measures to be proposed for forest fragments and Georgian red book species of Hipoppae rhamnoides
KP 92-108 Bedeni plateau, for orchid Dactylorhiza urvillean and mitigation of biodiversity of wetland habitat by avoiding changes of hydro regime
KP 108-120 Beshtasheni area; consider wetlands at Bareti lake and village Imera
KP 120-129 mountains in Tsalka to address wetland habitats with high conservation values at lake Santa and Kariaki village areas
KP 151-157 Mt Taukvetili to address sensitive wetlands
KP 157-160 Narialis plain to readdress wetlands and pollution risk
KP 160-165 Lake Tabatskuri and Ktsia-Tabatskuri protected area
KP 165-175.5 Ktsia areas: wetlands and part of Ktsia-Tabatskuri protected area.
KP 175.5-197 Tskhratskaro range, Tsikhisjvari forests to Kodiana. Mitigation measures of negative impact on flora and fauna partially described

Issue Drawn from Comments: 142, 279, 284, 296, 501, 559, 566, 586, 691, 781, 857, 1104, 1116, 1513, 1576, 1577, 1589, 1626, 1628, 1630, 1638, 1644, 1850, 1960, 1968, 2012, 2017, 2019, 2042, 2050, 2051, 2061, 2064, 2071, 2073, 2075, 2076, 2077, 2078, 2079, 2080, 2082, 2083, 2084, 2085, 2086, 2090, 2091, 2092, 2093, 2094, 2095, 2102, 2103, 2104, 2105, 2106, 2126, 2202, 2438, 2442, 3163

Issue Relates to Following Sections of ESIA: Section 10

Response To Issue

Mitigation measure 1 – transplanting techniques

Transplantation is recommended only for herbaceous species of conservation value and rare shrub Oriental thorn. Transplantation is part of a series of measures comprising *ex-situ* conservation of directly affected plant individuals, seed/bulb collection to create sufficient planting material, reintroduction in the wild following the completion of construction and reinstatement activities and subsequent monitoring of adaptation and restoration success.

The herbaceous species recommended for transplantation are as follows: Marsh Orchid *Dactylorhiza urvillana*, Squill *Scilla rosenii*, Snowdrop *Galanthus caucasicus*, Gentian *Gentiana angulosa* and Globe-Daisy *Globularia trichosantha*. For each plant specific recommendations were developed including seed/bulb collection, storage conditions, seeding and maintenance at an *ex-situ* facility (either Bakuriani Alpine Botanical Garden or Department of Live Flora, Georgian Academy of Sciences dependent on plant characteristics), re-introduction into natural habitat and subsequent maintenance period and monitoring activities.

Pasqueflower *Pulsatilla georgica*, local endemic of the Georgian flora, was originally recommended for translocation. As a result of the vigorous route selection process, the proposed route was relocated to the east; however, it still crosses the meadow - habitat of the pasqueflower. Therefore, it is recommended to conduct seed collection so that planting resource is available by the time when construction is completed.

It is also recommended to conserve *ex-situ* a solitary individual of the Oriental Thorn (*Crataegus orientalis*) growing in the construction corridor impact zone until it is feasible to achieve re-introduction into the natural habitat. Like herbaceous species, the recommendation includes detailed instructions on each activity involved.

Detailed information on transplantation, conservation and reintroduction of rare, endangered and Red Data Book species occurring along the currently preferred pipeline route is given in the Biorestoration strategy supplied to the Construction Contractor. The specifications outline in detail guidance on restoration techniques recommended for various plant communities and species found within the construction corridor. The restoration techniques are based on Phase I and II floristic survey findings and a combination of methodologies used successfully in Georgia and other countries.

A summary of activities related to translocation is given in Table 5-1 below. In addition, Chapter 4 of the biorestoration strategy provides guidance to the contractor, including a summary of the entire route in terms of biorestoration activities, topsoil requirements, species to be planted, planting rates and specifications and aftercare requirements so that original habitat restoration is achieved.

Table 5.1 Translocation activities

Species	Habitat[1]	Seed / Bulb Collection/ Translocation Period	Seed / Bulb Collection & Storage	Seedlings/Translocation	Reintroduction
Pasqueflower *Pulsatilla georgica*, GE[2]	Post-forest meadows, Tetri Tskaro, KP89+150-KP89+360	Seed collection: August-September	Seeds to be dried in a dry room. Stratification is necessary for seed germination, hence, several-month storage is required under humid conditions. Seeding should be conducted in October	Prior to seeding in boxes, the topsoil should be prepared comprised of forest topsoil, meadow soil and fine sand. The soil surface should be mulched to retain the soil moisture. In April mulch is removed and boxes are stored in a shade. Seeds germinate in May. Recommended *ex-situ* facility: Bakuriani Alpine Botanical Garden	Re-introduction is recommended in late September-early October when seedlings normally reach 10cm in height. Pits (20cmX20cmX20cm) should be prepared and the soil should be tilled prior to transplantation. Transplanted seedlings are watered once planting is completed so that each plant receives 2-3 l water. Reintroduced plants require aftercare only in the first year: watering, tillage and mulching the soil around plants with dry leaves. A three-year monitoring programme should be implemented to observe the vitality and fertility, which indicate vegetative and generative development respectively

[1] KPs may vary due to local changes of the pipeline alignment. The contractor will verify the location of each habitat prior to undertaking the bio-restoration programme.
[2] GE - Endemic of Georgia

Species	Habitat[1]	Seed / Bulb Collection/ Translocation Period	Seed / Bulb Collection & Storage	Seedlings/Translocation	Reintroduction
Marsh Orchid *Dactylorhiza urvillana*	Eastern part of Bedeni plateau, KP94+460-KP94+960	Translocation: September-October		Plants must be dug out with rootballs in order to retain the mycorhiza which is vital for Marsh Orchid. Balls are cut with a spade at the depth of 20cm. The collected material is wrapped in plastic bags for transportation. The rows (length - 5-6m, width – 60-80cm, depth - 20cm) should be prepared in advance. The soil is to be tilled at 20cm depth. Distance between the plants is 20cm, ie 25 plants are accommodated per 1m^2. Immediately after planting plants are watered and the soil is mulched with dry leaves or straw. Mulch is removed in March. Soil is tilled and weeded once a month in spring - summer; watering - as required. Recommended *ex-situ* facility: Bakuriani Alpine Botanical Garden	Reintroduction is recommended in August-September. Pits (20cmX20cmX20cm) should be prepared. Each plant is placed with its rootball in a pit and watered. Reintroduced plants require aftercare only in the first year: tillage and weeding the soil around the plants once a month in spring - summer; and watering twice a month in May-August

Species	Habitat[1]	Seed / Bulb Collection/ Translocation Period	Seed / Bulb Collection & Storage	Seedlings/Translocation	Reintroduction
Squill *Scilla rosenii*, CE[3]	Alpine meadows and forests, Tskratskaro pass, KP174+750 - KP175+260, and Kodiana pass, KP188+970 - KP192+000	Translocation: July		Bulbs should be dug out without rootballs and dried for 2-3 weeks prior to planting. Bulbs should be placed in beds trenched in advance (length - 5m, width - 60cm, depth - 20cm). The soil is tilled at 20cm depth. Distance between the planted bulbs should be no less than 10cm so that 100 bulbs are accommodated per $1m^2$. Immediately after planting the plants are watered and the soil is mulched with dry leaves or straw. Mulch is removed in March. In spring soil is tilled and weeded once a month and watered 1-2 times a week. Recommended *ex-situ* facility: Bakuriani Alpine Botanical Garden	Re-introduction is recommended in July. Pits (20cmX20cmX20cm) should be prepared. At least two bulbs are placed in each pit and watered. In case of droughts all planted bulbs should be watered twice a month in summer. The soil is tilled around the planted bulbs once a month during the same period. A monitoring programme is recommended for the three successive springs following completion of reinstatement activities to assess degree of natural restoration

[3] CE - Endemic of the Caucasus

Species	Habitat[1]	Seed / Bulb Collection/ Translocation Period	Seed / Bulb Collection & Storage	Seedlings/Translocation	Reintroduction
Snowdrop *Galanthus caucasicus*, GE, CE, proposed for inclusion into the new edition of the GRDB[4]	Forest, Kodiana pass, KP188+970 - KP192+000	Translocation: first two weeks of July	Combined with seed collection in July-August for reseeding the RoW when ground intrusive works are completed	Bulbs are divided into 5-6 smaller bulbs. All bulbs are placed in rows prepared in advance (length - 5m, width - 60cm, depth - 10cm). The soil is tilled to 20cm depth. Distance between the planted bulbs should be no less than 10cm so that 100 bulbs are accommodated per $1m^2$. Immediately after the planting the plants are watered and the soil is mulched with dry leaves or straw. Mulch is removed in March-April. In spring soil is tilled and weeded once a month and watered 1-2 times a week. Recommended *ex-situ* facility: Bakuriani Alpine Botanical Garden	Reintroduction is recommended in July. Pits (diameter-20cm., depth - 10cm) should be prepared in advance. At least two bulbs are placed in each pit and watered. In case of droughts all planted bulbs should be watered once a week in summer. The soil is tilled around the planted bulbs once a month during the same period. A three-year monitoring programme should be implemented to observe the vitality and fertility, which indicate vegetative and generative development respectively

[4] GRDB - Georgian Red Data Book

Species	Habitat[1]	Seed / Bulb Collection/ Translocation Period	Seed / Bulb Collection & Storage	Seedlings/Translocation	Reintroduction
Gentian *Gentiana angulosa*, CE	Alpine meadows, Kodiana pass, KP188+970-KP192+000	Translocation: September - October	Combined with seed collection in July for reseeding the RoW when ground intrusive works are completed	Plants must be dug out with rootballs cut with a spade at the depth of 15cm. The collected material is wrapped in plastic bags for transplantation. Rows (length - 5-6m, width –60-80cm, depth - 20cm) should be prepared in advance. The soil is tilled at 20cm depth. Distance between the plants is 20cm, so that 25 plants are accommodated per 1m^2. Immediately after the planting the plants are watered and the soil is mulched with dry leaves or straw. Mulch removed in March. Soil is tilled and weeded once a month and watered 1-2 times a week in spring- summer. Recommended *ex-situ* facility: Bakuriani Alpine Botanical Garden	Re-introduction is recommended in August-September. Pits (diameter - 20cm, depth - 20cm) should be prepared in advance. Each plant is placed with its rootball in a pit and watered. Next year the soil around the plants is tilled and weeded once a month and watered at least 2 times a month in spring and summer. A three-year monitoring programme should be implemented to observe the vitality and fertility, which indicate vegetative and generative development respectively

Species	Habitat[1]	Seed / Bulb Collection/ Translocation Period	Seed / Bulb Collection & Storage	Seedlings/Translocation	Reintroduction
Globe-daisy *Globularia trichosantha*, GRDB	Open meadow, Potskhovi I crossing, KP238+960 - KP239+030	Translocation: April-May	Combined with seed collection in July for reseeding the RoW when ground intrusive works are completed	Plants must be dug out with rootballs cut by a spade at the depth of 15cm. The collected material is wrapped in plastic bags for transportation. Rows (length - 5cm., width – 80cm., depth - 22cm) should be prepared in advance. Distance between the plants is 10cm, so that 100 plants are accommodated per 1m^2. Immediately after the planting the plants are watered and the soil is mulched with dry leaves or straw. Soil is to be tilled and weeded twice a month and watered as required (1-2 times a week) in summer). Recommended *ex-situ* facility: Department of Live Flora, Georgian Academy of Sciences	Reintroduction is recommended in late October. Pits (diameter - 20cm, depth - 20cm) should be prepared in advance. Next year the soil around the plants is tilled and weeded once a month and watered at least twice a month in spring and summer. A three-year monitoring programme should be implemented to observe the vitality and fertility, which indicate vegetative and generative development respectively

Species	Habitat[1]	Seed / Bulb Collection/ Translocation Period	Seed / Bulb Collection & Storage	Seedlings/Translocation	Reintroduction
Oriental Thorn *Crataegus orientalis*	Secondary shrubland, Potskhovi II crossing, KP243+000 - KP243+010	Translocation: First decade of November	Combined with seed collection in late September-early October. Young seedlings to be transplanted on the western bank	Before translocation the crown should be reduced to minimise the transpiration stress. The shrub should be planted in a pit (50cmX50cmX70cm) and watered immediately after the planting. The shrub should be watered once a week and the soil is to be tilled once a month in spring-summer. Recommended *ex-situ* facility: Department of Live Flora, Georgian Academy of Sciences	Reintroduction is recommended in late November. One year aftercare programme should include as a minimum: watering 3 times in summer and soil tillage once a month from June through September. A three-year monitoring programme should be implemented to observe the vitality and fertility, which indicate vegetative and generative development respectively

The full titles of the standards referenced in the comment are:

a) Construction Standards and Rules (SNIP) 3.01.01-85: Organisation of Construction Activities, applicable to construction of new and refurbishment and expansion of existing facilities in all sectors of the national economy
b) Construction Standards and Rules (SNIP) III-10-75: Area Development, applicable to development of areas for residential buildings, public amenities and industrial facilities.

These standards provide general environmental requirements, which are not specifically designed to address environmental issues related to linear developments (pipeline construction). Needless to say that conservation measures are entirely beyond the standard scope. However, it should be noted that all environmental requirements specified by the referenced standards are addressed in the draft ESIA, namely land restoration, minimization of loss of natural resources, prevention / treatment of harmful emissions to soil, water bodies and air, clearance of construction sites, prevention of water diversion leading to land instability, dust suppression, waste management, topsoil and soil handling, etc.

Mitigation measure 1 – retention of rare and endangered species

One of the techniques recommended for conservation of herbaceous species of conservation value is described in the response given above. The biorestoration strategy also provide detailed guidance on restoration of various habitats identified in the course of Phase I and II floristic surveys such as:

a. Steppes and shibliak
b. Various types of forests (both tree-layer and understorey) and plantations
c. High-mountain habitats including subalpine meadows, high-mountain meadows and rhododendron scrub.

Table 5-2 below summarises activities related to restoration of the above communities.

Table 5.2 Community restoration activities

Species	Habitat	Propagation
Buckthorn *Rhamnus* sp.	Shibliak, KP54-KP70	It is recommended to use nurseries for propagation from cuttings. Taking cuttings is recommended in July - August. Shoots are cut off to produce either nodal, basal or heel cuttings, usually between 5-10cm long. They are relatively tough and tolerant, however, each collected batch is placed into a polythene bag to prevent from drying and wilting. At a nursery collected cuttings can be placed in a shaded sun-frame or propagator, under polythene in a low tunnel, or under mist. Cuttings can be set up in a propagator or in a low, closed polythene tunnel (like a large cloche) and thoroughly watered-in. If they are then heavily shaded so that there is only diffuse sunlight, they will remain moist for three or four weeks before they need to be looked at again. In hot sunny weather overhead sprays of water may be required several times a day. If a mist unit is not available, this must be done by hand. Once roots have been formed and young shoots start to grow, they should be drenched with a strong liquid feed, weaned under slightly less protected conditions and moved into a sheltered place, in airy greenhouse or cold frame, where they can continue to develop until the time comes to pot them up. As a simple rule of thumb, all cuttings which are not well and truly ready to be potted up by 1st September are better left as they are till they start to grow again in spring. Almost all cuttings are likely to be more at risk when overwintered individually in pots, than when left undisturbed in the containers in which they were rooted even though they may appear to be uncomfortably overcrowded
Smoke-tree *Cotinus cogyggria*		Similar to dog-rose described below
Spiraea *Spiraea hypericifolia*		Similar to Buckthorn described above

Species	Habitat	Propagation
Georgian oak *Quercus iberica*	Forest fragments dominated by Georgian oak KP72+840-KP72+950, KP78+460-KP78+580, KP82+170-KP82+370, KP82+430-KP82+580, KP83+400-KP83+560, KP83+650-KP83+680, KP83+910-KP84+420	It is recommended to grow whips from seeds at nurseries as oak seedlings are highly sensitive towards any kind of damage. Acorns are collected in the first two weeks of October in the mature forest stand. Seeding should be followed immediately to avoid any damage to acorns. Acorns are to be sown in 5-6-8cm deep pits, located at a distance of 1m. Five acorns are placed into each pit, covered with 25-30g topsoil obtained from mature oakwood, graded and watered immediately. The plantation area is covered with straw mulch to prevent loss of soil moisture. Hand weeding and tillage is required 5-6 times while watering - at least 4 times during the growing period (June-October). It is recommended to cut roots at the depth of 15cm by cultivator when the seedlings reach age of 1 year as seedlings usually develop long taproots. Should it be impossible to sow seeds immediately after the collection, it is recommended to store each 100kg of oak seed in a pit (length - 2-3m, width - 2m and depth - 1.5m) dug in a dry place. Seeds are to be mixed with sand at a ratio of one to two for storage in pits. A bunch of 10-15 fallen wooden branches is inserted in the centre of a pit down to the bottom to ensure adequate aeration. A 0.5m long and 0.5m deep trench is dug around the pit to prevent rodent access and drain water. Seedlings are ready to be replanted in the wild when they reach 10cm in height. Recommended planting rate is 2,000-3,000 seedlings per ha. The planting areas should be fenced to prevent cattle ingress. A maintenance programme comprising weeding, tillage and watering should be implemented in the first 5 years after the replanting

Species	Habitat	Propagation
Dog-rose *Rosa canina*	Forest understorey	Propagation from both fruits and cuttings is recommended at nurseries. False fruits of dog-rose are collected in August when its colour starts to change from green to pale orange. Prior to sowing soil should be fertilized. Seeds should be sown in 1m long trenches at a depth of 20-30cm, at 15cm intervals along and 50cm intervals across the trenches. The seeding rate is approximately 9g/m^2 (90kg/ha). After backfilling the trenches, seeds should be covered with tree branches to provide protection from birds. Use should be made of fallen branches available in the adjacent forest or branches from the trees cut to clear the RoW. Seeding is to be followed by one-time watering. Hand weeding is required at least twice a year (spring and late summer). First seedlings will appear in next spring and they are ready to be transplanted in the wild. If it is not possible to sow seeds immediately, they could be stored for 2 years. The preferred methodology for dog-rose propagation is that from semi-mature cuttings at nurseries. 9-12cm long cuttings, with a heel, of strong, non-flowering lateral shoots should be taken in August-September. All leaves should be stripped except two or three at the top of each cutting and buds in the leaf axils should be removed. A V-shaped trench (depth - 15-20cm) should be dug out in a sheltered, partially shaded place. The bottom 2.5cm should be filled with sharp horticultural sand and the cuttings are inserted in the sand 8-10cm apart. The soil over the cuttings should be firmed and the foliage is to be watered. If the weather is dry, the trench is watered thoroughly. In spring and summer soil should be tilled once a month and watered at least once in two weeks. The cuttings will be ready to plant out in the wild the following autumn
Hawthorn *Crataegus curvisepala, C. kyrtostylla, C.monogyna*	Forest understorey	It is recommended to propagate hawthorn at nurseries. Hawthorn fruits are collected in September-October. Collected fruits should be sown immediately at the rate of 10g per linear meter or 30g/m^2 (300kg/ha). Hawthorn is a low maintenance shrub and grows well on dry and impoverished soils. Prior to planting the area should be tilled to the depth of 25cm. All other procedures are the same as discussed above. If it is not possible to sow collected seeds immediately, they could be stored for one year.

Species	Habitat	Propagation
Pasqueflower *Pulsatilla georgica*	Post-forest meadows KP89+150-KP89+360	Recommendations pertaining to pasqueflower are given in response No. 1 above (transplantation of the herbaceous species of conservation value). The RoW should be sown with seed mixture consisting of 40% meadow fescue *Festuca pratensis*, 30% clover *Trifolium pratense* and 30% smooth meadow-grass *Poa pratensis*. The seeding area should be tilled to 25cm. Prior to seeding, the soil must be slightly moistened. Hand spreading is used, when one-half of the mixture is spread perpendicular to the second half. Recommended seed application rate is 15g per square metre. The surface must be rolled or lightly harrowed to assist seed burial. Seeding should be undertaken from May to late September and followed by one-time watering. As the above mixture is of low maintenance, application of fertilizers and cutting is not required. The above plants are not available at Georgian nurseries, however, they are widespread in Europe and might be obtained from commercial seed breeders in EU countries
High-mountain oak *Quercus macranthera* GRDB	High-mountain oak forests[5] KP85+000-KP89+150, KP92+190-KP94+360, KP200+070- KP200+180, KP202+380-KP202+660	Procedures for restoration of tree-layer and the understorey are similar to ones described for the Georgian oak forest fragments
Beech *Fagus orientalis*	Beech forests KP90+310-KP92+190, KP186+200-KP188+320	It is recommended to grow beech seedlings at nurseries / conservation centres and replant 1-year old seedlings in the wild. Beech seeds are ripe by the end of October. Seeds are to be collected during the first two weeks of November the latest. Optimum period for the sowing of beech seeds is the last two decades of November and the first week of December. Prior to sowing, 1kg of seeds should be mixed with 100g of red lead to protect the seeds from birds and rodents. Seeds are sown in 1m long and 5cm wide trenches in shaded places at the depth of 5cm, at 30cm intervals along and 50cm intervals across the trenches. The sowing rate is 1,200kg/ha. Watering should be undertaken immediately after the seeding. Watering, hand weeding and tillage is required 5-6 times during the growing period. In a year seedlings are ready (normally 10cm high with 3mm root collar) to be planted in the wild. This should be done in late November

[5] rare habitat

Species	Habitat	Propagation
Goat willow *Salix caprea*	Forest understorey	It is recommended to propagate goat willow at nurseries. Goat willow seeds are extremely fragile, loosing the germination ability in 2-3 days after collection. Therefore, it is not practicable to grow the above plants from seeds. Young shoots of goat willow with more or less glossy surface should be used for revegetation purposes in early spring (March). Hand weeding is required on a planting site. Straight, branchless and approximately 0.5cm thick shoots are to be cut with knife to avoid damaging bark. 30-35cm long shoots should be planted in slits supported by a stake of the same size. About 22-25cm of the shoot should be planted in the ground. All planted shoots should be watered immediately after the planting. At least five-time watering is required in late spring - summer. Goat willow is highly sensitive towards weeds and at least two weeding procedures per year are necessary (spring, late summer). Usually, 10,000 shoots are planted per hectare. As the goat willow shoots does not require fertile soils, there is no need to apply fertilizers. By the next spring rooted shoots are ready to be planted out in the wild

Species	Habitat	Propagation
Hazelnut *Corylus avellana*	Forest understorey	Hazelnut could be grown at nurseries from seeds collected in August –September. Prior to sowing hazelnut seeds, soil should be tilled at a depth of at least 25cm. Hazelnut seeds are sown at a depth of 7cm in late fall. The seeding rate is $40g/m^2$ or 400kg/ha. Watering should be conducted immediately after planting. Aftercare programme should include tillage of planted area at least 5-6 times during the plant vegetative period (May-September). It is not necessary to apply fertilizers as the hazelnut is known to grow well on poor soils. If it is not possible to sow collected seeds immediately, they could be stored for 5-6 months. Hazelnut seedlings are ready to be transplanted in the wild in 1-2 years when they reach 15cm in height
Birch *Betula litwinowii*	Birch forests[6] KP188+800-KP188+950	Birch seeds are ripe by the end of September. It is recommended to grow beech seedlings at nurseries / conservation centres and replant 2-year old seedlings in the wild. Seeds should be sown in 2-3 days after collection in nutrient-rich soils with the admixture of sand. The sowing rate is 90kg/ha. Seeds are sown in 1m long and 10cm wide trenches at the depth of 4-5cm. Intervals between trenches are 20-25cm along and 40-50cm across. The seeds should be sown manually and covered with 0.3cm sand layer. Planting are should be watered immediately after the seeding. It is recommended to cover the site with mulch (sedges, mosses, straw, etc) to retain soil moisture. Watering, hand weeding and tillage is required 6-7 times during the growing period. During the same period the areas between rows should always be covered with mulch. Planting site should be watered at least twice a month in June-October. In two years seedlings are ready to be replanted in the wild. To achieve a dense birch stand, it is recommended to plant 2,500-3,000 seedlings per hectare

6 Rare crook-stem birch forest habitats

Species	Habitat	Propagation
Rhododendron *Rhododendron caucasicum* CE	Understorey	One of the options is to propagate *Rhododendron* plants from seeds at Bakuriani Botanical Garden. Seeds are collected in August-September. Seeding period is late September-October. Seeds should be sown in small pits at the depth of 8-10cm at a rate of 30g/m^2. Seeds should be sown in the greenhouse to stimulate germination in relatively short period. Seedlings are ready to be transplanted in 3 years when the root system is strong and developed enough to ensure the successful adaptation of the plants to harsh alpine environment. Preferred option for the restoration of *Rhododendron* is to collect 5-10cm long branch cuttings in late May-June for further *ex-situ* cultivation at Bakuriani Alpine Botanical Garden. About 3-5cm of the branches should be planted in the 6-8cm thick nutrient-rich substrate (peat mixed with sand at a ratio of three to one). Approximately 100 branches may be planted on 1 square metre. For successful growth of *Rhododendron* cuttings at least three waterings per week are required during the active vegetative (growing) period (June-October). The optimum period for reintroduction of the above plants in the wild is end of October-first decade of November. For better performance, use could be made of biodegradable pots. Each cutting should be planted in each pot at a depth of 3-5cm. Watering frequency is the same as discussed above. Reintroduction of plants in wild should be undertaken without removing pots
Rhododendron scrub *Rhododendron caucasicum* CE	KP152+090-KP152+330, KP152+710-KP152+830, KP175+480-KP175+690	See above
Spruce *Picea orientalis*	Mixed coniferous forests[7] KP194+460-KP194+820, KP198+330-KP198+540, KP199+630-KP199+660	Spruce seeds are ripe in October and could be collected from late October to December. After collection cones should be dried at the temperature of at least 18°C. In 4 -5 days cone scales usually open and seeds could be easily isolated. The sowing rate is 60kg/ha. Seeds should be sown manually in 1m long and 10cm wide trenches at the depth of 1-2cm. Intervals between trenches are 20-25cm along and 40-50cm across. The planting site should be watered immediately after seeding. It is recommended to cover the site with mulch (sedges, mosses, straw, etc) to retain soil moisture. Manual weeding and tillage is required 6-7 times, while watering should be conducted at least 4 times during the growing period (June-October). In 3-4 years seedlings are ready to be replanted in the wild. To achieve a dense forest stand, it is recommended to plant 3,000-4,000 seedlings per hectare

[7] Primary coniferous forests with high regeneration rate and high coverage of tree layer

Species	Habitat	Propagation
Fir *Abies nordmanniana*		It is recommended to grow fir seedlings at nurseries / conservation centres and replant 2-year old seedlings in the wild. Fir seeds are ripe in September-October and could be collected in late October. After collection cones should be dried at the temperature of at least 18^0C. In 4-5 days cone scales usually open and seeds could be easily isolated. The sowing rate is 1000kg/ha. Seeds should be sown manually in 1m long and 10cm wide trenches at the depth of 2-2.5cm. Intervals between trenches are 20-25cm along and 40-50cm across. The sown seeds should be covered with mulch (wood chips). The planting site should be watered immediately after the seeding. Manual weeding and tillage is required 5-6 times while watering should be conducted at least 4 times during the growing period (June-October). In 2 years seedlings are ready to be replanted in the wild. To achieve a dense forest stand, it is recommended to plant 3,000-4,000 seedlings per hectare
Dog-rose	Understorey	Refer to the descriptions given above
Hazelnut		
Black poplar *Populus nigra*	Riparian Forests[8] KP221+580-KP221+800, KP239+600-KP239-730	Black Poplar seeds are ripe by the end of June, and should be collected by the first decade of July at the latest. As seeds are inserted in catkins, they should be collected and dried for 3-5 days at the temperature of $18\text{-}20^0$C. When catkins are dry seeds are easily separated from the surrounding tissues and are ready for sowing. It is not recommended to store seeds for more than 2 months. Seeds are sown in moist alluvial soils of riversides, 1m long and 5cm wide trenches at the depth of 0.1-0.2 cm, at 20cm intervals along and 50cm intervals across the trenches. Weeding should be undertaken prior to the sowing. The sowing rate is 24kg/ha. After sowing the soil should be slightly trampled and watered. The planting site should be covered with mulch (wood chips). Thinning of seedlings is necessary so that about 40 seedlings are left per linear meter. If sowing poplar seeds is not feasible immediately on the RoW, a compensation site should be selected close to the crossing where the sowing programme could be undertaken with further replanting of seedlings on the RoW. Black poplar can be propagated from 2 or even 3m long cuttings, prepared by removing entire branches from parent trees, trimming off side shoots and inserting them firmly into open ground, where they are intended to grow. Black poplar stands are very easily produced this way, and grow rapidly into trees, provided the ground within a radius of 1m around each is kept free of weeds for at least two years after they are set out. The same methodology could be used when propagating the species of willow.
Willow *Salix* spp		Propagation methodologies for willow species are similar to those of goat willow.

[8] Habitat type, which has become almost extinct on a country level

Species	Habitat	Propagation
Tamarisk *Tamarix ramosissima*	Understorey	Tamarisk could be propagated both from seeds and cuttings. The propagation should be undertaken at nurseries to achieve high survivability and well-developed root system. Tamarisk seeds should be collected in September. Tamarisk seeds are light and tiny. Prior to the seeding, a careful weeding should be undertaken on the planting site. For better performance, seeds should be mixed with sand and scattered over the ground surface followed by slight trampling. The sowing rate is 1g per linear meter or 30g/m^2 (30kg/ha). Immediately after the seeding one-time watering should be undertaken repeated six times in the plant vegetative period (April-October). Tamarisk seeds are to be sown in fertile alluvial soils. Hand weeding should be undertaken twice a year (spring, late summer). Tamarisk seeds could be stored for maximum 10 months. Tamarisk can be successfully grown from cuttings. Cuttings should be taken in late October. These cuttings are prepared from shoots which are fully mature with very firm wood. Long lengths of shoot can be cut from the plant, provided all the growth was made during the preceding summer, and these can be sliced into sections each with about four buds, measuring 10-20cm in length. The cuttings are stuck into cutting compost (mixture of grits and peat) in boxes or large pots in a cold frame, or into a V-shaped slit in the ground filled with cutting compost. It is not necessary to bury them deeply, nor for cuttings to project far out of the ground. Ideally the uppermost buds should be just above ground level, with the bud below only a short distance beneath the surface. Cuttings set up in pots or boxes can be potted up individually once their roots are well-developed, usually during the following spring, and grown on under cover in a greenhouse, or in a sheltered place outside. These should grow into well-established plants by autumn, large enough to plant into their permanent positions in the wild

Species	Habitat	Propagation
Sea buckthorn *Hipopphaë rhamnoides* GRDB		It is recommended to propagate sea buckthorn at nurseries. The optimum period for collection of sea bukthorn seeds is September-October. Prior to seeding, hand weeding should be undertaken in the planting site. It is recommended to sow seeds immediately in 1.2m long and 3-4cm deep trenches. The spacing between trenches should be 40cm along and 50cm across. To achieve higher survivability of seeds, it is recommended to mix seeds with sand before sowing and cover the trenches with at least 2cm thick layer of fertile soil. Immediately after the seeding one-time watering should be undertaken repeated six times in the plant vegetative period (April-October). The sowing rate is 3.5g seeds per linear metre or $9g/m^2$ (90kg/ha). Sea buckthorn is very sensitive towards weeds and therefore, at least 4 hand weeding procedures should be undertaken from March to October. Seeds are to be sown in fertile alluvial soils. In 2 years seedlings are ready to be planted out in the wild
Sheep's fescue *Festuca ovina* Bent *Agrostis planifolia* Vetch *Anthyllis caucasica* Meadow clover *Trifolium campestre*	Subalpine meadows, Bedeni Plateau KP94+360-KP102+510	As seeds of the local herbaceous plants are not available in commercial quantities neither in Georgia nor at European seed houses, it is recommended to make use of seeds from haystack. At hay making time (late August-September) locals should be paid to "borrow" their hay and thresh it using a portable machine. After the extraction of seeds hay will be returned to owner. Seeds should be winnowed to get rid of waste and placed in bags. Seeds should be dried using a bag dryer. The seeding area should be tilled to 25cm. Prior to seeding, the soil should be slightly moistened. Hand-spreading shall be used, one-half of the mixture shall be spread perpendicular to the second half. The application rate is 15g of seed mixture per square metre. The surface should be rolled or lightly harrowed to assist seed burial. Seeding should be undertaken in late May-June and followed by installation of biodegradable erosion mat. Prior to the installation, the surface should be free of material, which would prevent uniform contact of the covering with the soil surface. Installation shall begin by laying the covering from the top and unroll down the grade, allowing it to lay naturally on the soil surface following all the local undulations. The mat should be laid loosely. Adjacent erosion mats should be overlapped 100mm minimum. In the down-slope direction, end of the upslope roll must be placed on top the next roll down-slope with a 500mm overlap. The upslope ends should be buried in an anchor slot no less than 6 inches (15cm) deep with earth tamped over the blanket. The material will be stapled at no more than 12 inches (30cm) increments across the top end. Staples should be long enough to achieve a firm hold. After the geojute installation the seeded area should be watered

Species	Habitat	Propagation
Sheep's fescue *Festuca ovina* Bent *Agrostis planifolia* Vetch *Anthyllis caucasica* White clover *Trifolium repens* Mountain Everlasting *Antennaria caucasica* Bird's-foot-trefoil *Lotus caucasicus* Sibbaldia *Sibbaldia parviflora*	High-mountain meadows Javakheti Upland, northern-western slope of Tskratskaro Ridge, Kodiana Pass KP140+320-KP174+840, KP174+840-KP180+180, KP188+320-KP192+030	It is recommended to combine several techniques to restore the meadow habitats under the severe ecological conditions of subalpine and alpine zones: turfing, broadcast seeding & erosion mat installation and wattles (fascines)

Mitigation measure 3

Specific methodologies for transplanting, conservation and reintroduction of rare, endangered and Red Data Book species occurring along the currently preferred pipeline route are summarized in the table above and are further detailed in the Biorestoration Strategy supplied to the Construction Contractor.

Sensitive areas

Specific methodologies and techniques for restoration of vegetation cover and individual species' populations of high conservation value occurring on Bedeni Plateau and Tskratskaro-Kodiana area are summarized above and are further detailed in the Biorestoration Strategy supplied to the Construction Contractor.

Further development of mitigation measures

KP53.2-53.8: The floodplain forest developed on the river Algeti banks is heavily impacted by grazing and logging leading to degradation of riparian forest ecosystem and floristic impoverishment of plant communities. Although Sea Buckthorn (*Hipopphaë rhamnoides*) is included into the Red Data Book of Georgia, this plant is one of the most common and widespread shrubs in the country. Despite the above-mentioned, detailed methodologies for restoration of riparian forest habitat and Sea Buckthorn populations are summarized above and are further detailed in the Biorestoration Strategy supplied to the Construction Contractor.

KP92-108: recommended conservation techniques for *Dactylorhiza urvillana* populations are described in Table 5-1. It is not anticipated that a small wetland fragment on Bedeni Plateau will be affected by the pipeline construction and operation as the distance from the pipeline centreline to the edge of wetland is approximately 480m.

Figure 5-12: Location of Bedeni wetland in relation to pipeline ROW

KP108-120, 120-129: The distance between the pipeline centreline and the edge of lake Bareti (Bashkoi) is approximately 271m. The lake and pipeline are topographically isolated by a small hill and it is not anticipated that the pipeline construction could in any way affect sensitive wetland ecosystems. The same applies to Imera wetlands; the wetland fragment in the environs of village Imera is approximately 214m NW from the nearest pipeline centreline point.

Figure 5-13: Location of Lake Bareti (Bashkoi) in relation to pipeline ROW

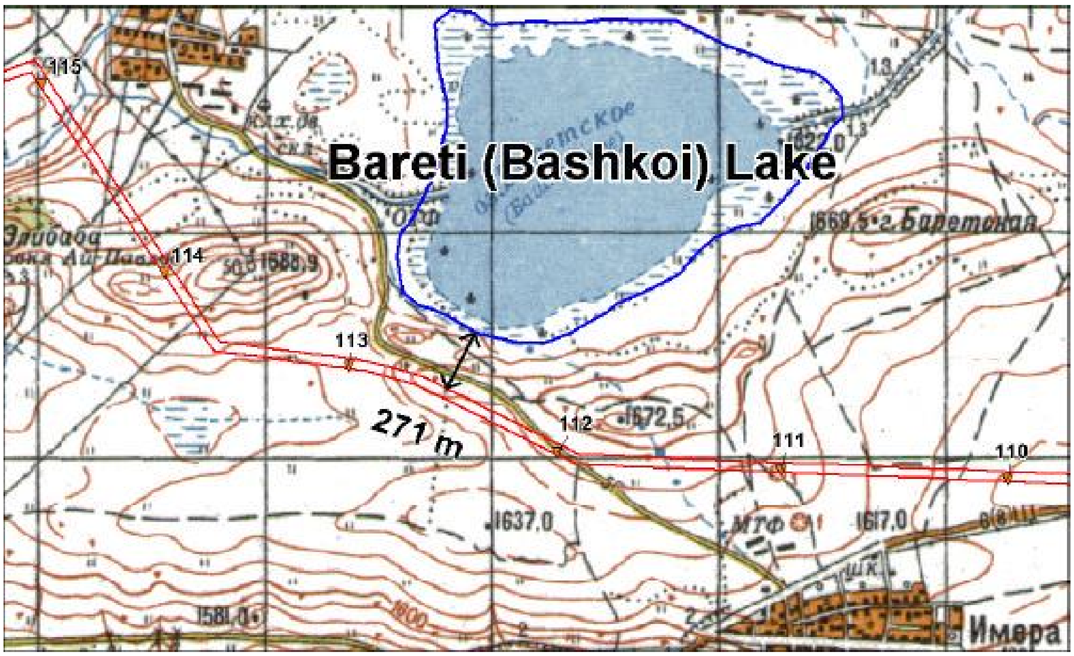
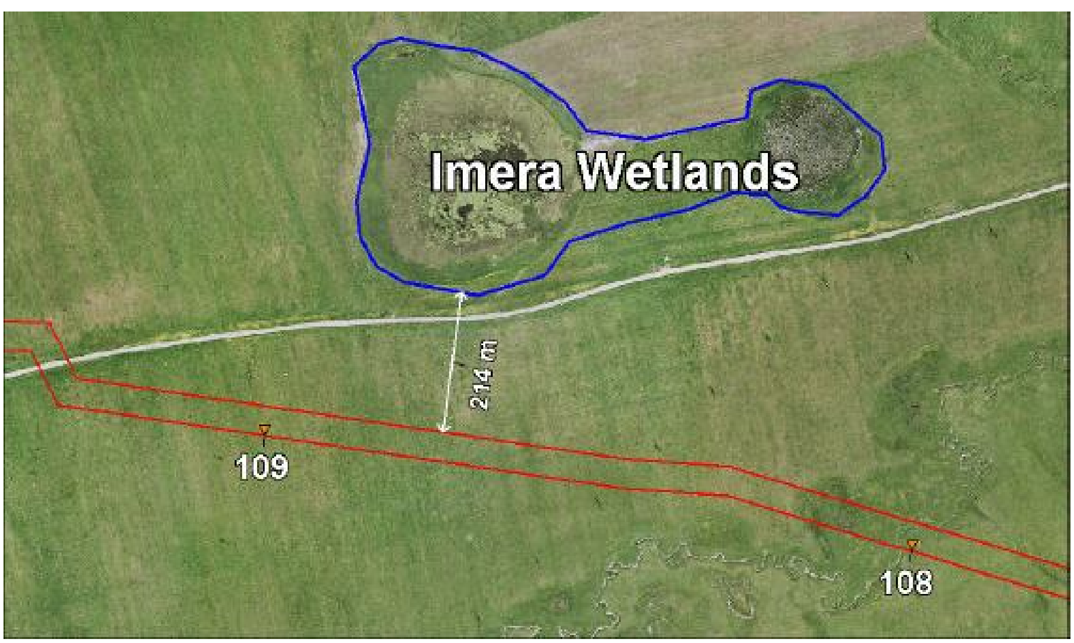


Figure 5-14: Imera wetlands



KP 151-157, KP 157-160, KP 160-165, KP 165-175.5: A detailed floristic assessment of wetlands has been undertaken in July-August 2002. Full information is given in Appendix II. Phase II Botanical Reports, Ktsia-Tabatskuri Wetlands, 2002.

In total, eleven wetlands were surveyed in detail. Only three are actually crossed by the proposed route as shown below.

Site #	Community Type	Distance from the p/l Centreline (m)	Conservation Value
1	Sedge Dominated Wetland with Tufted Hair-grass and Mat-grass	0	High
2	Sedge Dominated Wetland with Mat-grass	0	High
3	Sedge Dominated Wetland with Mat-grass	0	High
4	Tufted Sedge Dominated Wetland	380	High
5	Sedge Dominated Wetland	520	High
6	Sedge Dominated Wetland with Common Duckweed	420	High
7	Sedge-Common Reed-Shining Pondweed Dominated Wetland	1260	High
8	Water Crowfoot Dominated Wetland	240	High
9	Sedge Dominated Wetland	910	High
10	Sedge Dominated Wetland	780	High
11	Sedge Dominated Wetland	130	Medium to High

Detailed inventories of 11 wetland sites were compiled. All higher plants and bryophytes (mosses and liverworts) were recorded and quantitative data on the community structure were collected. Almost all of the wetland communities are quite poor in higher plant species; the higher number of associated species (15) was observed on only one site crossed by the proposed route (Site 1). The most complex wetland structure was found on the western banks of lake Tabatskuri (Site 7), where various eco-niches are occupied by different communities dominated by Sedge, Common Reed and Shining Pondweed with a very limited number of associated vascular plant species. On sites 1, 5, 9 and 10 an extremely rare species of the Georgian flora- *Carex wiluica* - was found, which occurs on Javakheti upland and is of limited ecological adaptability. It is associated exclusively with alpine wetlands. The majority of the sites could be characterized as fens or peat-producing wetlands, which are influenced by soil nutrients flowing through the system. The vegetation is dominated by sedges and grasses.

The currently preferred pipeline route crosses three sites (1, 2, 3), which could cause their fragmentation and could lead to complete degradation. Site 8 and 11 are in the vicinity of the edge of the proposed RoW and may be impacted by the pipeline construction and operation as the above activities may cause changes in the groundwater table and surface drainage. It is anticipated that project works will not have any impact on the other studied wetland fragments as they are not located within the pipeline RoW or in the immediate vicinity.

All sites except Site 11 have been evaluated as being of high conservation value as the wetlands are rare plant communities in the high-mountains of Georgia having patchy distribution (Kimeridze[9], 1963), are under permanent anthropogenic influence and have very low restoration

[9] Kimeridze, K. 1963. Materials to the Study of *Carex inflata* Formations in the High-Mountainous Regions of the Caucasus. Buklletin of the Academy of Sciences of the Georgian SSR, XXXI, 2:396-406

potential. Site 11 is considered as of medium to high conservation value as in some parts it is used as hay meadow by the local population.

The restoration of wetlands seems a worldwide problem as wetland habitats are seriously threatened (Global Biodiversity[10], 1992). In many parts of the world wetland restoration projects have been undertaken with little success (Zedler[11], 1996) although much research effort is being directed at wetland reinstatement projects.

It is almost impossible to create a functionally equivalent ecosystem, which will replace the lost/damaged habitat as the functioning of the ecosystem is dependent on peculiar geomorphology and consequent hydrological regime, restoration of which seems to be impossible. As the surveyed wetland patches occupy limited area, the possibility to relocate the pipeline route so that crossing through and near the sites 1,2,3,8,11 are avoided will be evaluated in more detail. This option will be further investigated and considered given local constraints during the pre-clearance survey.

To ensure that all other wetland patches are not affected by the pipeline construction and operation, it is necessary to establish permanent plots (30mx30m) in each investigated site except sites 7, 9 and 10. A detailed floristic and phytosociological inventory of each plot will be undertaken prior to pipeline construction. During the operational phase each permanent plot should be monitored on annual basis.

KP 175.5-197: Specific methodologies and techniques for restoration of vegetation cover and individual species' populations of high conservation value occurring in this area are summarized in Table 5-1 and 5-2 above.

5.11.2 Issue: Flora & fauna – data questioned

Description of Issue

The following issues were raised with regard to flora and fauna:

KP 0-11. Water chestnut is (GRDB) not mentioned.

KP 92-108. Orchid species are not adequately described. Re-routing as a mitigation measure should be considered.

KP 108-120. Flora, vegetation and mitigation measures are not properly described.

KP 120-126. Presence of wetland habitats at Santa Lake and Kariaki are over-looked.

KP 126-129. Wetland habitats in the Santa village area include significant ecological features which are overlooked.

[10] Global Biodiversity. 1992. A report Compiled by World Conservation Monitoring Centre.

[11] Zedler, J.B. 1996. Ecological Function and Sustainability in Created Wetlands. In: Restoring Diversity, Island Press. pp. 331-342.

KP 151-172. The botanical description is superficially described. Impact evaluation & mitigation measures are incomplete. It is not clear why wetlands of important botanical value will not be directly affected by the pipeline construction operations. The environment of Tabatskuri Lake is not botanically described. Ktsia River upper reaches are not properly botanically characterized and evaluated.

Section 8.11.2.1.2. The content of the text on rare mushrooms is questioned.

Section 8.11.2.1.3. Flora and vegetation in this section are not properly characterized. An inventory of rare and endemic plant species and communities requiring protection is recommended.

The ESIA should be supplemented by additional data in a number of areas (Bedeni, wetland habitats and Narialis Veli-Ktsia). It is asked which period of the year studies were carried out. Bedeni Giants Causeway is a monument of nature and has not been mentioned in the baseline.

It is suggested that protected species, communities and their habitats should be listed and that the significance of impacts for these species (risk of extinction) and communities (loss of diversity) should be described. Mitigation and compensating measures should be further described.

Issue Drawn from Comments: 278, 283, 284, 285, 286, 287, 288, 289, 290, 292, 293, 294, 295, 298, 299, 342, 778, 1061, 1537, 1578, 1580, 1582, 1597, 1851, 1864, 1968, 2421, 2424, 2425, 2426, 2428, 2430, 2433, 2434, 2435, 2452, 2454, 2455, 2456, 3162

Issue Relates to Following Sections of ESIA: Section 8

Response To Issue

KP0-11

At present only historical data is available on the occurrence of Water Caltrop (Water Chestnut) in Jandari lake. It is unlikely that Water Caltrop populations inhabit coastal waters near the banks of Jandari lake, as the above areas are under the heavy anthropogenic impact and aquatic habitat is much disturbed. Also, the distance between lake Jandari and pipeline centreline is approximately 2.6km, and it is not anticipated that projected works will have impact on sensitive aquatic ecosystem and consequently, vulnerable populations of Water Caltrop, if any indeed occur.

KP92-108

Marsh Orchid (*Dactylorhiza urvilleana*) is a common species of Georgian flora that is widespread in most districts of the country. The above species is not included into the Georgian Red Data Book or IUCN Red List (1997). Despite the above-mentioned, recommended conservation measures for Marsh Orchid populations occurring on Bedeni Plateau are summarised in Section 5.11.1 of this Addendum and are further detailed in the Biorestoration Strategy provided to the Construction Contractor.

KP108-120

Flora and vegetation of the areas north of Tsalka reservoir are generally poorly studied and almost no data is available in the published literature sources. During the Phase I Survey the above areas were visited by the field team and all sensitive receptors were found to be outside the pipeline impact zone. Also refer to Section 5.11.1.

KP120-126

The wetland habitat located south of village Santa was visited in summer 2000 during the Phase I Survey of the proposed pipeline route. The floristic composition of the above wetland fragment is summarised in Datasheet No.447 "BP Phase I Baseline Report, Summer and Autumn Surveys 2000" and is given below.

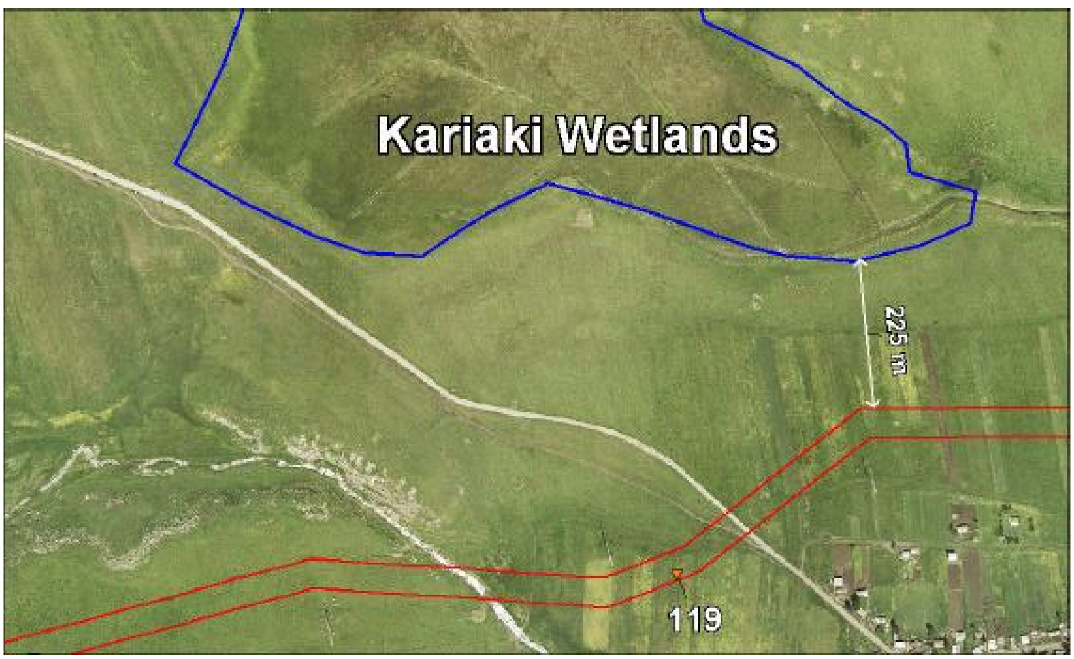
Site No:	23	***Datasheet No:***	447
Date:	24.07.2000	***Time:***	17:30pm
Film No:	D-6	***Photo No:***	2
Easting:	8418591	***Northing:***	4612421
Location:	South of village Santa		
Habitat:	Reedmace Bed		
Dominant Species Recorded:	*Typha latifolia*		
Description of Habitat:	Almost pure stands of reedmace. Very few associates were recorded (*Epilobium* sp., *Scirpus* sp.). Coverage is almost 100%. Species richness is approximately 15 species.		
Conservation Value:	Low - common vegetation type throughout the country		

The above fragment was classified as a site of low conservation value due to poor floristic composition and dominance of widespread reedmace.

Figure 5-15: Santa wetland

The wetlands in the vicinity of village Kariaki are outside of the impact zone of the pipeline project and were not studied as their disturbance is not anticipated.

Figure 5-16: Location of Kariaki wetlands in relation to the pipeline ROW



KP126-129

Refer to responses above; also see Section 5.11.1.

KP151-172

Also refer to responses above and Section 5.11.1.

Two Phase II Floristic surveys have been undertaken in Ktsia-Tabatskuri zone (KP147-175) including the surroundings of Mt. Tavkvetili, shores of lake Tabatskuri and Ktsia river upper reaches. The first survey was conducted in September 2001 and survey findings including two data sheets with detailed phytosociological descriptions were summarized in a report submitted to BP. Another survey was undertaken in July-August 2002; survey findings are given in a report that includes 11 data sheets with qualitative and quantitative botanical data. Both reports contain data on the potential impact on sensitive wetland habitats and mitigation measures to avoid/minimise disturbance and are attached as Appendix 2 of this Addendum.

Section 8.11.2.1.2

The use of the attribute “rare” in the context of mushrooms is erroneous as the literature sources indicate occurrence of these mushrooms only in a few locations within the referred phytogeographic unit.

Section 8.11.2.1.3

The baseline information on the flora and vegetation of Javakheti upland is given based on a review of existing literature. In general, these areas are poorly studied botanically and only a limited number of publications contain information on their floristic composition. Additional comprehensive data was gathered during the Phase I Survey and are enclosed in Appendix II of this Addendum. The referenced datasheets are given below) and detailed botanical assessments (refer to Appendix II).

Site No:	29	***Datasheet No:***	458
Date:	25.07.2000	***Time:***	11:00am
Film No:	D-6	***Photo No:***	20
Easting:	8406145	***Northing:***	4614136
Location:	Environs of village Kizil-Kilisa		
Habitat:	Pine Plantation		
Dominant Species Recorded:	*Pinus sosnovskyi*		
Description of Habitat:	Artificially planted dense pine forest. Age is 27-28 years according to locals. Average height of trees reaches 3-5m, distance between trees-1-2m. Ground vegetation consists mostly of grasses		
Conservation Value:	Medium – rare woodland in Tsalka area, although possible to restore adequately due to availability of pine at nurseries and ability to grow under extreme conditions		

Site No:	30	***Datasheet No:***	460
Date:	25.07.2000	***Time:***	11:40am
Film No:	D-6	***Photo No:***	23
Easting:	8404650	***Northing:***	4614750
Location:	Environs of village Kizil-Kilisa		
Habitat:	Grass-Forb Meadow		
Dominant Species Recorded:	*Festuca ovina, Trifolium ambiguum*		
Description of Habitat:	Grass-forb meadow used as a pasture. Common associates of dominant species are *Achillea* sp., *Scabiosa caucasica*, *Cirsium* sp., etc. Coverage is approximately 90%. Species richness is approximately 70 species		
Conservation Value:	Low - common vegetation type in SE Georgia		

Site No:	31	***Datasheet No:***	3
Date:	01.09.2000	***Time:***	12:30pm
Film No:	D7	***Photo No:***	6
Easting:	8395520	***Northing:***	4617145
Location:	SW of village Khando		
Habitat:	Grass-Forb Meadow		
Dominant Species Recorded:	Polidominant		
Description of Habitat:	Coverage is almost 100%. Species richness is approximately 200 species of higher plants. Species recorded are *Bromopsis variegata*, *Agrostis planifolia*, *Deschampsia caespitosa*, *Centaurium pulchellum*, *Alchemilla retinervis*, *Betonica macrantha*, *Prunella vulgaris*, etc.		
Conservation Value:	Low – common type of vegetation throughout the mountains of Georgia		

Site No:	32	***Datasheet No:***	479
Date:	26.07.2000	***Time:***	13:15pm
Film No:	M-1	***Photo No:***	7
Easting:	8394199	***Northing:***	4617638
Location:	E of Narianis Veli		
Habitat:	*Rhododendron caucasicum* Scrub		
Dominant Species Recorded:	*Rhododendron caucasicum*		
Description of Habitat:	Coverage is approximately 95-100%. Species richness is approximately 160-180 species of higher plants. Species recorded are *Rh. caucasicum*, *Rubus* sp. *Vaccinium myrtillus*, *Juniperus communis*, *Alchemilla* sp., *Allium* sp., *Betonica macrantha*, *Calamagrostis arundinacea*, etc.		
Conservation Value:	Medium - important but common high-mountain habitat with high biodiversity and slope stabilizing function		

Site No:	33	***Datasheet No:***	470
Date:	26.07.2000	***Time:***	12:05pm
Film No:	M-1	***Photo No:***	6
Easting:	8390823	***Northing:***	4618372
Location:	Narianis Veli		
Habitat:	Wetland		
Dominant Species Recorded:	*Carex* sp.		
Description of Habitat:	Coverage is almost 100%. Species richness is approximately 160 species of higher plants. Species recorded are *Alchemilla* sp., *Calamagrostis arundinacea*, *Campanula* spp., *Carex* spp., *Galium* sp., *Juncus* sp., *Polygonum bistortus*, *P. carneum*, *Rumex* sp., etc		
Conservation Value:	High - wetland habitats at higher elevations are quite rare and may support a number of endemic, rare or endangered species		

Site No:	34	***Datasheet No:***	468
Date:	26.07.2000	***Time:***	11:00am
Film No:	M-1	***Photo No:***	5
Easting:	8388759	***Northing:***	4618189
Location:	Narianis Veli		
Habitat:	Wetland		
Dominant Species Recorded:	*Carex* sp.		
Description of Habitat:	Coverage is almost 100%. Species richness is approximately 150-170 species of higher plants. Species recorded are *Achillea millefolium*, *Alchemilla* spp., *Alopecurus* sp., *Bromopsis variegata*, *Calamagrostis arundinacea*, *Campanula* spp., *Carex* spp., etc.		
Conservation Value:	High - wetland habitats at higher elevations are quite rare and may support a number of endemic, rare or endangered species		

Site No:	35	***Datasheet No:***	467
Date:	26.07.2000	***Time:***	10:40am
Film No:	M-1	***Photo No:***	2-4
Easting:	8388220	***Northing:***	4618064
Location:	Narianis Veli		
Habitat:	Subalpine Meadow		
Dominant Species Recorded:	Polidominant grass-forbs		
Description of Habitat:	Coverage is almost 100%. Species richness is approximately 180-200 species of higher plants. Species recorded are *Campanula* spp., *Centaurea fischeri, Galium* sp., *Phleum pratense*, *Polygonum bistorta*, *Rumex* spp., *Sanguisorba officinalis*, *Scabiosa caucasica*, etc.		
Conservation Value:	Medium - almost primary meadow with no signs of disturbance and high biodiversity		

Site No:	36	***Datasheet No:***	465
Date:	26.07.2000	***Time:***	10:00am
Film No:	M-1	***Photo No:***	1
Easting:	8386179	***Northing:***	4617749
Location:	NE of lake Tabatskuri		
Habitat:	Subalpine Meadow		
Dominant Species Recorded:	Polidominant grass-forbs		
Description of Habitat:	Obvious signs of intensive grazing. Coverage almost 100%. Species richness is approximately 80-100 species of higher plants. Species recorded are *Poa alpina*, *Nardus stricta*, *Alchemilla* sp., *Trifolium* sp., *Cirsium* sp., *Hypericum* sp., etc.		
Conservation Value:	Low - common grazed meadow containing no Red Data book or endemic species		

Site No:	37	***Datasheet No:***	481
Date:	26.07.2000	***Time:***	15:50pm
Film No:	M-1	***Photo No:***	10,11
Easting:	8385124	***Northing:***	4617553
Location:	E to Narianis Veli		
Habitat:	Subalpine Meadow		
Dominant Species Recorded:	Polidominant grass-forbs		
Description of Habitat:	Coverage is almost 100%. Species richness is approximately 100 species. Species recorded are *Achillea* sp., *Bromus variegata*, *Campanula* sp., *Carex* sp., *Centaurea fischeri*, *Equisetum* sp., *Galium* sp., *Geranium* sp., *Hypericum* sp., *Pedicularis* sp., etc.		
Conservation Value:	Medium - important high-mountain habitat but impoverished species composition		

Site No:	38	***Datasheet No:***	532
Date:	31.07.2000	***Time:***	11:00am
Film No:	M-2	***Photo No:***	29,30
Easting:	8377016	***Northing:***	4617604
Location:	Tskhratskharo Pass		
Habitat:	Subalpine Meadow		
Dominant Species Recorded:	Polidominant		
Description of Habitat:	Used as a hay meadow and pasture. High content of weeds. Species recorded are *Alchemilla* sp., *Bromopsis variegata*, *Calamagrostis arundinacea*, *Carex* sp., *Cirsium* sp., *Nardus stricta*, *Polygonum bistorta*, *Scabiosa caucasica*, *Veratrum lobelianum*, etc.		
Conservation Value:	Low - degraded meadow with high abundance of weeds		

Additional data

Wetland habitats in the Ktsia-Tabatskuri area were studied in May 2001 and July-August 2002. Bedeni Giants Causeway is included into the Red Data Book of Georgia as a monument of inorganic nature and not as a site of floral interest. See also responses above and Section 5.11.1.

Protected species and communities

Protected species, sensitive habitats and proposed mitigation and compensation measures are described in detail in "Biorestoration Strategys", Rev.05. The summary is outlined in Response No. 6, KP 151-157, KP 157-160, KP 160-165, KP 165-175.5, Issue Ref. No. 64.

5.11.3 Issue: Ecology at Mt Taukvetili

Description of Issue

It is suggested that Rhododendron and Black Grouse interests appear to be addressed only by generic measures. Although habitat restoration after works is proposed, further effort to identify the likely response of grouse to habitat loss is recommended eg. how does loss compare to net habitat available locally; are the grouse likely to be forced into an area with increased risk from natural or works sources. This information could be used to determine whether there is something that can be done to offset the impact/avoid further impact.

Caucasian black grouse habitat (Caucasus rhododendron): Ruining the black grouse habitat is against the law, as the law protected bird causes infringement of the law and is subjected to criminal code of Georgia, paragraph 287 – infringing the rule of environment protection during job execution. Paragraph 302 – destruction of settlements of wild plants or animals being in danger, included in "Red List" of Georgia. In case of receiving permission of settlement destruction evading the law, the terms of hewing out Caucasus rhododendron must be determined. This should take place in late autumn, before the carpet of snow appears. At the same time measures against erosion must be taken.

Further mitigation measures to minimize the impact and loss of Caucasian black grouse habitat (rhodedendron scrub) on Mt Taukvetili are requested.

Request re-evaluation of suitability of "forcing" the local population of Caucasian Black grouse to seek an alternative habitat (Ref page 10-59) (KP 151-157 Mt. Taukvetili) in terms of potential irreversible loss of a micropopulation of a listed Georgian Red Book species and consideration of alternatives eg. re-route ROW on the south slopes of Mt. Taukvetili.

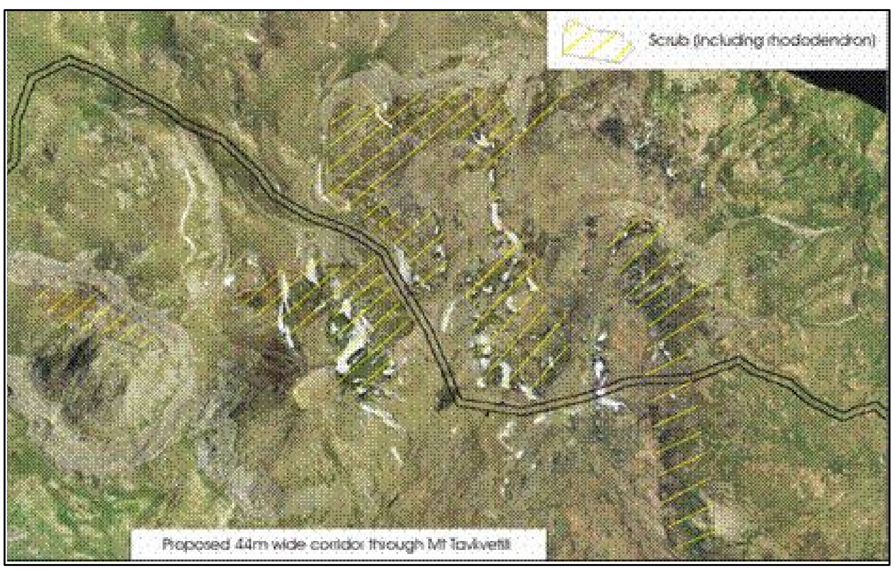
Issue Drawn from Comments: 522, 622, 1577, 1694, 2422, 3162
Issue Relates to Following Sections of ESIA: Section 8, Section 10

Response To Issue

The aerial photograph below shows the proposed pipeline route across Mt Tavkvetili and the extent of rhododendron scrub on the same mountain. As can be seen, the construction corridor encroaches patches of scrub at two locations and the habitat removal will affect less than 1% of the overall area of the local rhododendron habitat.

It should also be noted that rhododendron scrub and Caucasian black grouse are abundant in the area, rhododendron being dominant in these volcanic terrains where few other shrubs would adapt to the high drainage and the consequent semi sterile conditions of the soils.

Figure 5-17 Extent of Rhododendron habitat



Advice has been sought from Georgian scientists as to the effect on the black grouse population. The significance of the effect is reduced through the application of a number of mitigation measures. The analysis of the effects on the black grouse population is based on the following rationale:

- As discussed above, field studies and analysis of aerial photographs indicates that the relative proportion of black grouse habitat that is affected is low. The total area of rhododendron scrub that would be affected in this area is 2.3 hectares (ha) made up of two areas – one of 1.9ha and the other of 0.40ha
- Alternative, undisturbed habitat is available for use by black grouse
- Rhododendron would be reinstated across the Right of Way (ROW)
- Mitigation has been developed that addresses the breeding period of the species. Nesting individuals would be avoided by construction activity either:
  - through the prior removal of nesting habitat. The rhododendron would either be removed in the spring prior to breeding or in the previous autumn; or
  - through a ban on construction activity during the breeding season if habitat is not removed prior to breeding and it is possible that individuals would be nesting on the ROW
- Alternative route options have been considered in an attempt to avoid the main black grouse habitat of rhododendron scrub. It was not possible to define a route that was acceptable in terms of all the routing constraints, including constructability and ecology. The current alignment attempts to minimise the area of rhododendron scrub affected as much as possible
- Construction and operation would not result in the loss of the population

The actions would not be in contradiction of the law due to the area affected and the mitigation measures put in place.

5.11.4 Issue: Forestry – information provided & concerns expressed

Description of Issue

It is suggested that foresters were not used during the baseline assessments. Further discussion with foresters and ecologists of potential issues and problems is requested, particularly at Tsikhisjvari where an alpine zone influences a sub-alpine zone and as a result the forest area is reduced. Request made to further discuss limiting the amount of timber felled in this area.

Attention is drawn to the multiple values of the forest. It is requested that when valuing the forest itself, trees are not the only subjects to be taken into account, but that an assessment of the social and ecological value of the forest is made.

Concern expressed over the possible effect on the recreation and tourist value of the forests, particularly at Borjomi, Tskhratskaro and Sakire.

Request for the process for forest inventory prior to construction to be clarified. The report does not indicate how many hectares & cubic metres of forest are to be felled within the ROW. A forest inventory within the ROW is requested. Queries also made on who is responsible for cutting the trees and for what purpose the cut timber will be used.

Issue Drawn from Comments: 135, 183, 339, 341, 350, 351, 354, 366, 367, 369, 371, 372, 560, 565, 588, 804, 806, 856, 1075, 1559, 1561, 1649, 2214, 2453, 2455, 3175
Issue Relates to Following Sections of ESIA: Section 8; Section 10

Response To Issue

Baseline assessments

Consultations have been undertaken with foresters, including the State Department of Forestry, and ecologists during the baseline and impact assessment stages. In order to address concerns raised during consultation specific field surveys were undertaken involving the use of botanists and ecologists to evaluate the floral and faunal value of the forest areas. A detailed forest assessment was carried out by a forest health specialist in conjunction with personnel from the State Department of Forestry in September 2002. The report of the assessment is enclosed in Appendix IV of this Addendum.

Mitigation – forest area

In order to reduce the amount of forest/tree loss a number of mitigation measures have been put in place, including:

- Fine-scale routing to avoid forest areas, and where this was not possible to select cleared or partly cleared areas (also detailed in Section 5.11.5)
- Reduction of the width of the Right of Way (ROW)
- Pre-clearance surveys to identify rare tree species (listed in the Georgian Red Data Book) within the ROW that will be marked and retained during construction

Evaluation

In considering the importance of the forest a variety of relevant factors were taken into account:

- Flora – specific field surveys were undertaken at the optimum time of year (see draft ESIA section 8.11)
- Fauna – specific field surveys were undertaken at an appropriate time of year (see draft ESIA section 8.11)
- Forest resources eg medicinal plants; herbs; berries; mushrooms – evaluated as part of the floral surveys (See draft ESIA section); social survey of communities along the proposed route addressed the use of forest products by local people (see draft ESIA Section 9.4.5)
- Landscape – the contribution of the forests to the landscape was described as part of the landscape assessment (see draft ESIA Section 8. and Appendix E)
- Social value – concerns that there is insufficient assessment of the social value of the forest are addressed in Addendum section 6.7.4.

Mitigation – Tourism potential

It is recognized that the intention is to promote tourism within the Borjomi, Tskhratskaro and Sakire areas. Any potential impacts on tourism would be as a result of the visual impact and number of mitigation measures have been designed to reduce the visual impacts and the potential effects on tourism:

- Reinstatement of an 8m strip directly above the pipeline with shrubs and shallow rooted trees
- Reinstatement of the remainder of the ROW with mixed forest species
- Creation of irregular edges along the ROW to soften visual effects
- Use of changes in direction along the ROW to reduce the distance over which the ROW can be viewed

It must be however noted that beneficial impacts are also predicted for the development of the tourist resorts of the area as the local population and the local business will benefit economically from the activities associated with the construction phase.

Forest inventory

An inventory is to be undertaken to assess the number of trees and timber value to be logged on the ROW. This is being undertaken by the State Department of Forestry. An independent assessment has been undertaken by a forestry specialist contracted by BP.

The forest loss amounts to approximately 90ha – approximately 20ha at Tetritskaro and approximately 35 hectares at Tskhratskharo-Sakire with the remainder area consisting of isolated patches. A small section of riparian forest would be crossed at the Algeti River crossing (KP 53.2 – KP 53.8) and at the Mtkvari and Potskovi river crossings in the western part of the pipeline route.

Tree clearance

Trees would be felled as part of the ROW clearance operation by (or on behalf of) the construction contractor. The valuable timber would either be sold or provided to a third party. This would minimize disturbance to the forest area and ensure that the timber was available for use. Smaller branches would be provided to local communities for firewood (see draft ESIA Section 10.8).

5.11.5 Issue: Forestry – reinstatement

Description of Issue

Objections are made to routing through the Tsikisjvari to Sakire area. Request that to avoid forests a re-route should be considered in the Tsikisjvari-Aspindza-Ighumali direction.

Legislation & Logging: it is maintained that it is illegal to clear-cut on slopes. Support is given to measures which will encourage natural regeneration rather than artificial planting. Quantification of residual impacts remaining is requested, ie area of forest loss in km^2.

The report does not incorporate the full forest reinstatement scheme. Forest reinstatement after construction does not specify the source of replanted trees, particularly characteristic local species where such nurseries do not exist in Georgia. Reinstatement of the ROW through endemic habitat retention is questioned given the complex process involved. Further reinstatement details are requested. In addition further detail requested on cumulative effect of reinstatement between BTC and SCP. A description of proposed mitigation measures to protect forestry is requested and it is pointed out that according to Georgian legislation on forestry any excavation on the sub alpine area is forbidden, because many plants located there are in the Red Data Book species. The re-planting ratio of 1:1.5 is regarded as inadequate. Preference is placed on replacing the biomass or replacing a greater area. Recommendation: exercise and involve local community in the planting of trees and the reinstatement of the region. This is a significant psychological factor that will foster people to build rather than to ruin. Concern expressed that new access routes will promote illegal logging.
Issue Drawn from Comments: 183, 279, 280, 281, 282, 291, 346, 347, 350, 351, 355, 368, 369, 370, 518, 593, 805, 860, 958, 990, 1237, 1514, 1561, 1620, 1629, 1645, 1675, 2041, 2212, 2307, 2453
Issue Relates to Following Sections of ESIA: Section 8; Section 10

Response To Issue

Routing

Extensive routing studies have been undertaken in an attempt to minimize the forest area affected by the pipeline route. This includes consideration of a variety of route options around the Tsikhisjvari to Sakire area. The main elements considered during the route refinement process can be summarised as follows:

- Terrain and Geohazards
- Construction and Trenching Conditions
- Access and Logistics
- Environmental and Social Impact
- Security and Regional Politics

The present alignment represents the optimum route to minimise environmental and social impact, optimise the pipeline design, relieve construction difficulties and ensure the long term integrity of the pipeline system. Section 3 of this Addendum also provides information on the routing options considered.

Legislation & logging

Article 98 of the Forest Code of Georgia prohibits exploitation of forest in the sub-alpine strip, due to consideration of limiting erosion processes in these areas. In accordance with the Host Government Agreement (HGA) the project is permitted access to areas required for completion of the project. A suite of erosion control measures will be put into effect on project areas. In addition, the forest vegetation will also be reinstated over the majority of the ROW.

Area of forest affected

The draft ESIA report states that forest loss amounts to 55ha – approximately 20ha in the Tetritskaro area and approximately 35 ha in the Tskhratskharo-Sakire area. The detailed forest assessment has however resulted in an overall estimation of approximately 90ha of forest, due to the application of FAO guidelines. The difference between the initial and latter estimate is due to the inclusion in the inventory of small patches of open forests and riparian forests at the Algeti River crossing (KP 53.2 – KP 53.8) and the Mtkvari and Potskovi crossings in the western part of the route.

The 8m strip of ROW directly above the pipeline will be re-planted with shrubs and shallow rooted trees. The remainder of the ROW and any other areas of forest affected by the project activities would be reinstated with tall forest tree species. In addition, further areas of forest would be created either through enhancement of degraded forest areas or by creation of new forest areas in clearings. A greater area of forest vegetation will be replaced by means of reinstating the ROW plus the creation/rehabilitation of additional forest areas.

Reinstatement

In order to minimize the effects on forest habitats it is the intention to reinstate the forest habitat using indigenous species. Whilst taking account the requirement to maintain the integrity of the pipeline, the principle is to reinstate the key canopy species and shrub layer and allow natural reinstatement from the seed bank and plant material retained in the topsoil.

A Reinstatement Specification has been developed from which the construction contractor will develop specific Reinstatement Method Statements for forest areas. A summary of the Reinstatement Specification is provided in Appendix A of the draft ESIA. Additional recommendations with regard to forest restoration have been provided in the forestry assessment report enclosed in Appendix IV of this Addendum.

As part of the development of the Reinstatement Specification a biorestoration study has also been undertaken by Georgian experts. This provides specific advice to the construction contractor on the species to be used for reinstatement in forest areas; the sources of plant material; propagation requirements and planting requirements. The contractor Reinstatement Method Statements will be reviewed by BP, particularly in view of the advice provided. Information has been obtained on the existing nurseries in Georgia and the stock that they hold. It is expected that the construction contractor will also develop stock of appropriate species.

Cumulative effects of BTC and SCP

The construction contractor shall reinstate the full width of the BTC (1st pipeline) ROW, and all other project areas as the base case. However, should the SCP (2nd pipeline) installation follow directly from the BTC pipeline, full reinstatement shall only be carried out on sections that will not be disturbed by SCP construction activities. Interim reinstatement shall be installed over the remaining portion of the ROW. The interim measures are required for erosion control to cover the period between installation of the BTC pipeline and installation of the SCP. The intention is to avoid permanent measures that might be disrupted by the installation of the second pipeline. Final reinstatement of joint land will be carried out with the SCP option. If the SCP option is not required, reinstatement shall be completed as part of the BTC Project. In any section of the ROW where erosion control is installed, if there is a planned duration of more than 12 months, between the completion of back-filling of the BTC pipeline and the start of construction of SCP, then full reinstatement shall be performed over the whole of the disturbed area as part of the BTC construction.

Re-planting ratio

Further to undertaking a detailed forest assessment it is proposed to adopt two different strategies for replanting forests. In the areas where predominant conifer forests occur it is proposed to replant spruce and pine with an initial density of 2000 trees per hectare. It is proposed to plant as many hectares of plantation as cleared during the ROW preparation. In areas with predominant hardwood forests it is proposed to plant established sapling and whips with a density that would reflect the habitat conditions prior to clearance of the ROW. As previously stated in the draft ESIA the planting ratio will be of 1:1.5. This is based on an old soviet standard (1:1.3) and it allows for a 50% mortality rate.

Community involvement

It is recognised that in order to be sustainable, any forest rehabilitation project should be undertaken with the support of the local community. Linkages are being sought as part of the development of the Community Investment Programme in an effort to promote sustainable forest use. Concerns regarding the degree of community involvement in reinstatement are addressed in Section 6 of this Addendum.

Environmentally sustainable energy have been identified as one of six key sectors for investment under the Community Investment Programme (CIP). Whilst the CIP is neither designed to mitigate residual and cumulative impacts, nor is it a form of compensation, it is recognised that links should be sought between these CIP projects and the forest rehabilitation mitigation measures.

Illegal logging

The issue of the promotion of illegal logging has been seriously considered by the project. The primary mitigation for this effect is that there are existing access roads in the forest areas through which the route would pass. Logging activities that were presumed to be illegal were observed near the proposed pipeline ROW, throughout the Thratskharo-Sakire area, since the environmental surveys associated with the BTC project started.

Additional measures are proposed to prevent access along the ROW both during construction and operation. These include:

- Security patrols along the ROW both during construction and operation
- Physical barriers at specific locations along the ROW to restrict illegal access
- Possible use of community liaison team to encourage people to raise awareness of importance of forest and to report incidents of illegal logging to authorities
- Reinstatement of new access roads in ecologically sensitive areas
- Reinstatement and landscaping of ROW post construction to prevent access into forest areas

5.11.6 Issue: Forestry – assessment of impacts

Description of Issue Forest areas with high conservation values have not been sufficiently described to allow assessment. This is insufficient to assess the adequacy of the Reinstatement Plan. Quantitative description of forest ecosystems within project area, with classification of protected forests and distribution in the project impact area, should be presented on 1:25,000 scale maps.
Issue Drawn from Comments: 351, 354, 370, 372, 1598, 1950, 2032, 2033, 2034, 2037, 2038, 2039, 2040, 2048, 2049, 2054, 2055, 2211, 2295, 2613, 3175
Issue Relates to Following Sections of ESIA: Section 8, Section 10

Response To Issue

The Phase I baseline survey undertaken along all route sections identified key habitats of potential nature conservation importance that warranted more detailed study as part of the Phase II surveys. The key objective of the Phase II surveys was to identify and collect quantitative data on plant communities and fauna sufficient to characterize the nature of the habitat, the importance as a wildlife habitat and identify species of high conservation value. Each area was sampled following good international practice.

One of the basic principles of the Reinstatement Plan is to allow natural regeneration of plants from those retained in the stripped and replaced topsoil. This is to be supplemented by the planting of significant tree and shrub species from the community. Species plans will also be in place for the treatment of rare species.

Accurate locations for the extent of community types and locations of notable species were obtained through the use of Global Positioning System (GPS) co-ordinates. Each Phase II report used a 1:50,000 map showing a study area and a set of 1:25,000 maps showing surveyed habitats. For each habitat type described, coordinates were taken for the start and end point along the relevant ROW sections. Field teams had 1:25,000 maps with waypoints on the route indicated every 50m. The resulting data can be displayed on any scale of topographic map.

An additional forest survey has been carried out in early September 2002 to better define the timber inventory along the proposed ROW, to identify forest fire hazards, existing forest diseases and to assess the potential for the overall forest health to deteriorate as a result of the proposed construction activities. A draft report is enclosed as Appendix IV.

5.11.7 Issue: Flora & fauna – further works

Description of Issue

A number of further works recommendations and comments were made as below:

Flora resources in the 50m construction corridors should be classified to assist with the Reinstatement Plan.

Temporary, short-term impact on ecosystems, particularly flora and fauna during construction to be further described for following sites:

KP29.4-53.2: Kumisi plain
KP53.2-53.8: Crossing of the river Algeti
KP92-108: Bedeni plateau
KP126-129: Santa
KP157-160: Nariani field
KP185.2-197: Kodiana

Does the text regarding fragmentation studies mean that a study has been committed to or will be undertaken if required. What will determine this requirement?

What is the schedule for preparation of the recommended inventory of rare and endemic plant species (Javakheti)?

Has the bear survey been executed and if so, what is the extent, duration and result (note time pressures and seasonal implications on such a survey)?

Issue Drawn from Comments: 1596, 1599, 1611, 1652, 1676, 1685, 1686, 2423, 2430, 2433, 2434, 2435, 3109, 3163, 3174, 3176, 3186, 3193

Issue Relates to Following Sections of ESIA: Section 8, Section 10, Section 14

Response To Issue

Construction corridor

All sensitive botanical habitats and protected species occurring within and in the immediate vicinity of the pipeline route were identified and described in detail (Refer to Appendix II. Phase II Botanical Reports). Also, refer to responses in Addendum Section 5.11.1. Detailed information of the botanical composition of the ROW and reinstatement of key species has been provided to the Construction Contractor in a Biorestoration Specification.

Short term impact on ecosystems

Kumisi plain and the environs of Santa village are not considered to be sites of floral interest. The vegetation in the above areas has high reinstatement potential and no additional measures are required to mitigate short-term impacts. The restoration methodology of riparian forest at the River Algeti crossing and the conservation strategy of endangered/protected species occurring on Bedeni Plateau and Kodiana Pass are summarised in Addendum Section 5.11.1. In addition, more detailed information on the reinstatement of the area is described in the Biorestoration Strategy supplied to the Construction Contractor. It is not anticipated that Narianis Veli wetlands will be affected by the pipeline project, although it is recommended to undertake some vegetation monitoring in Narianis Veli to evaluate any changes in flora (see Addendum Section 5.11.1 and Appendix II Phase II Botanical Reports).

Fragmentation studies

The baseline studies that were completed addressed ecological impacts including habitat fragmentation and isolation. The studies contributed to the route selection which has been designed to reduce the effects of habitat fragmentation and isolation, for example through the use of clearings in forest areas as far as possible rather than intact, dense forest blocks. In addition a set of mitigation measures have been developed to further minimize the effects of habitat fragmentation. These are detailed in draft ESIA Section 10.2.2 and include reduction of the Right of Way (ROW) at sensitive sites; reinstatement of vegetation across the ROW; maintenance of faunal access across the ROW during construction and reinstatement of new access roads in ecologically sensitive areas. Post-construction reinstatement monitoring will be undertaken to ensure that reinstatement is progressing satisfactorily.

Species inventory

The inventory of rare and endemic plant species occurring in the impact zone of the proposed project has been compiled and incorporates findings from survey conducted in 2001-2002 (Appendix II). In identified sensitive areas pre-clearance surveys will be undertaken at the most appropriate time of year. These areas are detailed in ESIA Section 10.2.3.

Bear survey

Literature reviews and faunal field surveys were carried out by NACRES during April - May 2001 (Appendix III). On the basis of the findings of the surveys target areas for monitoring were selected. These were forested areas in the Tetritskaro and Tsikhisjvari areas. The requirement for the survey will depend upon the construction programme agreed with the construction contractor. If no construction activities are proposed at key locations during sensitive periods for bear activity no survey will be required. If surveys are deemed to be necessary the aim will be determine the nature and extent of bear activity at the locality.

5.11.8 Issue: Flora & fauna – reinstatement

Description of Issue

It is asked who will be responsible for determining the degree of effort in identifying valuable floral resources and transplanting/avoiding these resources at the site-specific level?

It is suggested that long term (project lifetime) impact on landscape and ecosystems, particularly flora and fauna reinstatement is further addressed at:

KP29.4-53.2: Kumisi plain
KP120-126: Mountains in Tsalka & surroundings
KP126-129: Santa
KP172-175.5: River heads of the River Ktsia
KP222.5-238: Akhaltsikhe

KP238-238.5: Northern crossing of the River Potskhovi
KP243.8-247.79: Elevation near Turkey frontier

The impact of bush fires should be quantified within the vicinity of the ROW. This analysis should be included in the mitigation measures to include teams equipped and trained for prevention, early warning and suppression of bush-fires.

Issue Drawn from Comments: 691, 1076, 1558, 1612, 1689
Issue Relates to Following Sections of ESIA: Section 10, Section 14

Response To Issue

Flora and fauna reinstatement

The baseline assessments have already identified the locations of key species and habitats. Some work has already been done in the identification of suitable methods for rare species management. For the next stages of the work BP will commission Georgian experts to undertake pre-clearance surveys at the most appropriate time of year. Based on the results of the surveys and advice from Georgian experts a programme for transplantation of individuals will be developed.

Detailed description and potential impacts on sensitive plant communities and plant species of conservation value are addressed in Phase II Botanical reports (Appendix II). Recommended measures for reinstatement of the vegetation cover are summarised in Section 5.11.1. Detailed biorestoration advice has been provided to the Construction Contractor for use in the development of the detailed reinstatement method statements.

KP29.4-53.2 Kumisi Plain - refer to Section 5.11.7.

KP120-126 Mountains in Tsalka and surroundings - refer to Section 5.11.1 and 5.11.2

KP126-129 Santa - refer to Section 5.11.1 and 5.11.2

KP172-175.5 River Ktsia heads - refer to Section 5.11.1 and 5.11.2

KP222.5-238 Akhaltsikhe - refer to Section 5.11.1

KP238-238.5 Northern Crossing of River Potskhovi - refer to Section 5.11.1

KP243.8-247.79 Elevation near Turkey Frontier - refer to Section 5.11.1

In addition, measures were developed to mitigate potential impacts on the landscapes in the vicinity of the proposed route corridor and above-ground installations, which are summarized in Appendix E, Annex I of the draft ESIA report.

Forest assessment

A forest assessment was carried out in early September 2002 and included a forest inventory, assessment of current forest health and assessment of potential hazards such as forest and bush fires. The report is enclosed as Appendix IV.

5.11.9 Issue: Fish & fisheries

Description of Issue We note there is little information presented on fish spawning sensitivities and note the need to avoid undertaking river disturbances during spawning seasons. Where are the fish breeding farms exactly - are they potential receptors in event of spill, or to construction siltation? Mitigation measure 8: it is known that the spawning of the most of fish types and fry growth happens during May - August months. Building must take place in autumn and winter. Water is low in autumn and winter. Only the lowland springs dry up in summer.
Issue Drawn from Comments: 692, 1235, 1571, 1573, 1606, 1622, 1655, 1687, 2062, 2070, 3146
Issue Relates to Following Sections of ESIA: Section 8, Section 10

Response To Issue

Fish spawning sensitivities

Given the nature of the pipeline construction activities it is not always possible to accurately predict the timing of particular operations such as the crossing of rivers. Major river crossings will be studied in detail in the pre-construction phase to establish the most suitable time for construction. This would generally coincide with the lowest flow of the river to avoid engineering works required to divert or manage large quantities of water. It is however possible that, due to scheduling constraints or other requirements associated with the spread of activities, crossings construction take place at times when rivers and/or during fish spawning seasons. In these cases, the construction contractors will be expected to maintain the river flow at all times and to implement sediment control techniques to ensure that water quality in the river does not degrade.

Impact on fish farms

The fish farms present in the proximity of the proposed pipeline route are described in the environmental baseline section of the draft ESIA. The locations of the fish farms are as follows:

- Jandari Lake
- Kumisi Lake Fish Breeding Farm
- Tsalka (Khrami) Reservoir
- Beshtasheni (ponds)
- Tabatskuri Fish Breeding Farm

It is not expected that construction siltation would have any adverse effects on the fish farms in the light of the proposed mitigation measures and distance of the water bodies from the construction corridor.

A large scale oil spill could affect all lakes and reservoirs mentioned above.

Mitigation measure 8

Since it is not feasible to restrict construction activities to the autumn and winter (particularly in view of the limited weather window in some areas) mitigation measures have been designed to permit construction at other times of year. In addition, flows are reduced in the summer period facilitating construction across river beds as discussed above.

5.11.10 Issue: Secondary & residual impacts – flora & fauna

Description of Issue

It is suggested that secondary impacts on flora and fauna should be further examined to include:

- information about secondary impact on forests, flora and fauna due to the construction of associated infrastructure, eg approach roads, work camps
- possible indirect impact on high moisture territories, related to changes of drainage conditions caused by the pipeline
- impact on the forests by fires (natural and those caused by an emergency)
- secondary impact and long term impact following reinstatement on flora and habitats to be described for: KP29.4-53.2 Kumisi Plain; KP92-108 Bedeni Plateau; KP108-120 Beshtasheni; KP126-129 Santa; KP151-157 Mt Tavtkvili; KP160-165 Tabatskuri Lake; KP165-175.5 River heads of the Ktsia; KP175.5-180.6 Tskhratskaro Pass; KP180.6-183.3 Tsikisjvari Forests; KP183.3-185.2 Surroundings of Tsikisjvari; KP185.2-197 Kodiana; KP204-221 Tiseli-Mtkvari
- during construction, direct and indirect impact on the above mentioned areas (eg construction works, changing drainage conditions, possible oil spills and fires) to be addressed

It is suggested that residual impacts for flora should be further described for KP11-18 Samgori; KP18-28.7 Upper Samgori; KP24.4-53.2 Kumisi Plain; KP53.8-72.8 West of Marneuli; KP92-108 Bedini Plateau; KP129-139.5 to Tsalka Kizil-Kilisa; KP151-157 Mt Tavkvetili; KP172-175.5 to River Ktsia sources; KP225-238 Akhaltsikhe.

Issue Drawn from Comments: 854, 857, 1610, 2256, 3184

Issue Relates to Following Sections of ESIA: Section 8; Section 10

Response To Issue

Off ROW activities

The potential ecological impacts associated with each of the following associated facilities are described:

- supply base at the ports (draft ESIA section 10.2.4.1)
- pipe storage yards and construction camps (draft ESIA section 10.2.4.2.)

- borrow pits and inert material disposal sites (draft ESIA section 10.2.4.3)
- waste disposal sites (draft ESIA section 10.2.4.4.)

Indirect impacts due to changes in hydrological regime

Potential ecological impacts resulting from changes to the hydrological regime of wetlands are described in the relevant geographical section in draft ESIA section 10.2.3 eg for the Mount Tavkvetili wetlands (KP 151-157).

Impact of forest fires

The potential impacts of forest fires as unplanned events for the SCP gas pipeline are discussed in draft ESIA section 10.3. The combined effects of unplanned events for the BTC oil line and the SCP gas line are discussed in draft ESIA Section 13.5.2. A forest study has been carried out in September 2002 and included the assessment of forest fuels and means of fire prevention during the pipeline construction. The forestry report is attached in Appendix IV.

Impacts following reinstatement

The basis of the evaluation of the residual impacts is that potential effects are evaluated taking account of the longer term impacts following reinstatement. Mitigation measures and reinstatement procedures are further detailed in Addendum Section 5.11.1

Impacts to specific areas

The potential direct and indirect impacts during construction on the stated areas are discussed in draft ESIA Section 10.2.3. The potential effects of operation are discussed in draft ESIA Section 10.3. The potential impacts of unplanned events are evaluated in draft ESIA Section 10.5. Addendum Section 5.11.1 provides details of site specific mitigation measures and reinstatement procedures.

Residual impacts

The residual impacts to the stated sections are described in draft ESIA Section 10.2.3 and draft ESIA Section 12.2.

5.11.11 Issue: No net loss commitment & off-set mitigation measures

Description of Issue

Project commitment to no net damage to protected ecological areas states that ' the project will implement compensation plans and environmental investment projects to offset this impact and ensure that there is no net loss to biological diversity'. To evaluate this, the following needs to be addressed: the ROW area cannot be considered a (chain of) ecological units because of its very narrow width. Because of construction and operation a net loss is unavoidable within the ROW and its ancillary facilities. Any investment limited to the ROW will not therefore offset the BTC environmental impact.

The no net loss commitment can only be applied if a wider area is taken into consideration for environmental amelioration. There is no clear commitment on this issue in the draft ESIA. Request BTC should identify mitigation measures, implementation agencies, financing, etc to fulfil its no net loss commitment.

It is suggested that it is unclear what the EIP involves and that the measures specified should be clear at this stage, as they are related to perceived effects.

Issue Drawn from Comments: 396, 543, 858, 2879, 2885, 2949, 2977

Issue Relates to Following Sections of ESIA: Section 10

Response To Issue

No net damage

It is recognized that there will be an unavoidable impact of tree clearing in some 90 hectares (see forestry report, Appendix IV) associated with the ROW clearing. However, the mitigation measure to address this impact involves replanting of trees outside of the ROW at a ratio of 1:1.5 or 2000 trees per hectare (see Section 5.11.5 above). This will result in a replanted area outside of the ROW with a larger number of trees than originally cleared as a result of the project.

It is also recognized that the ROW forms part of a wider ecological system and that impacts may not only occur within the direct footprint of the activities. In acknowledgment of this, the Environmental Investment Plan (EIP) will consider environmental activities that affect sites outside the direct project areas.

BP aims as far as feasible to address the 'no net loss principle' embodied in the World Bank policy OP 4.04. Natural Habitats. This is one of the objectives to be considered by the Environmental Investment Plan (EIP). The principles of the EIP are detailed in draft ESIA Section 13.5.5 and the details of the plan are currently being developed. Priority issues are being identified from work undertaken for the draft ESIA and consultations with a range of stakeholders. Key projects will be developed to be undertaken in conjunction with relevant partners. The detail of the EIP will be elaborated in the autumn/winter 2002.

5.11.12 Fauna - Small mammals

Description of Issue

Section 8.11.3.2: it is suggested that mammals are considered one-sidedly and that attention is paid only to large mammals. It is noted that 40 types of small mammals are subject to protection within the territory of Georgia by legislation. Risks identified include:

- disturbance to Transcaucasian hamster colonies in Tsalka region
- disturbance to rare species of bat in forests near Tetriskaro and Tsikhisjvari, and in the River Khrami canyon.

KP11-18 Samgori: the only now known population of Transcaucasian hamster (Mesocricetus brandti) Kakheti population (population category CR) in Samgori is not indicated.

KP129-139.5: the northern settlements of Transcaucasian hamster (Mesocricetus brandti) Javakheti population (population category VU) are not indicated.

KP 151-157 Tavkvetili Mt & KP 197-204 Sakire: the only population in the world of protected Caucasian mole subtype (*Talpa caucasica ognevi*) is not indicated.

Section 12.2.1.1: the impact on separate species and populations is not taken into consideration, particularly with regard to:

- the only population of Caucasian big-toothed mole in the west end of Trialeti mountain range
- Transcaucasian hamster settlements on Samgori lowland and Tsalka region
- Caucasian black grouse population in sub Alpine and Alpine districts
- rare big kochoba settlements on Trialeti mountain ringe
- the only known population of kokhta gveltava in Georgia
- the snow field-vole and Gudauri field-vole simpatria habitat zone

***Issue Drawn from Comments**:* 1569, 1570, 1581, 1588, 1590, 1591, 1592, 1593, 1607, 2074, 2097, 2107, 2108, 2109, 2111

Issue Relates to Following Sections of ESIA: Section 8; Section 10

Response To Issue

Small mammals have indeed been covered to a lesser degree of detail in the faunal analysis in the draft ESIA (Sections 8 and 10.2). Standard methodology widely used for the purposes of ESIA studies is based on the assessment of key species in the ecosystem. As the ecosystem is composed of hundreds of components, it is not practical to study each of them but to focus on the key elements indicating the health and integrity of entire natural system. If the key species becomes extinct from the given ecosystem, this will change the entire structure of the ecosystem and gradually, most of other species will be eliminated following the so called "elimination chains". Examples of key species might be large mammals regulating the numbers of prey species, large herbivorous ungulates indicating the state of vegetation cover within the ecosystem and some plant species inhabited by insect species that are eaten by birds and bats.

If the EIA studies apply the methodology based on the assessment of key species, one of the above-mentioned animal groups may be considered as those. As the mitigation measures are the essential part of any EIA process, key species may also be used to elaborate such measures.

Correct identification of key species is essential part of the effective conservation policy. Besides, use could be made of such categories as baseline species, species indicating the state of habitat, umbrella species, etc.

Key species are defined as species on which the ecosystem health and integrity is dependent. The assessment of vitality of key species is used to find out the state of ecosystem. Although it seems to be a difficult task to assess all ecosystem components through assessing key species only, but at present this is the most widely used approach. The above approach could be explained through the oldest law of ecology, namely Liebig's law of the minimum. According to the above law, the overall health of biological system depends on the amount of the scarcest of its essential nutrients.

If we consider the ecosystem as a biological system and its constituent species populations as biological factors defining the vitality of the system, application of Liebig's law of the minimum to the ecosystem will reveal that entire system is dependent on the smallest population (factor in scarcest numbers) and its vitality. Key species are as follows:

1) Species in which the metabolism products create conditions for other species individuals. These species may be present in large numbers as an exception from the law of the minimum (eg, prey species, plant species eaten by herbivores)
2) Mutualistic species increasing the sustainability of other populations through their products of metabolism. Mutualism is the beneficial interaction of species populations in which neither species can survive, grow and reproduce without the other
3) Predator species and parasites, which regulate the numbers of other species populations. The extinction of above species may result in the decreased species diversity of the system
4) Species that are considered by people as having aesthetic, spiritual, recreational or economical importance
5) Rare or endangered species

Key purpose of the conservation efforts is to ensure the sustainability of key species also known as focal species.

With regard to the Transcaucasian hamster it is believed that its habitat range and the size of the population would not be affected by the proposed pipeline construction activities, given the small incidence of the area of disturbance within the overall habitat range of this species. Also, the Transcaucasian hamster is not considered to be a critical species for the sustainability of the ecosystem to which it belongs and therefore it is of little significance in the context of the ESIA study.

Bats habitat generally extends over a large area and therefore no significant impacts can be associated with operations that do not involve the complete removal of the habitat. It is however proposed (Mitigation measure n. 1) that prior to clearance of forest areas specialist surveys be undertaken to identify and relocate, if necessary, any endangered species that may be adversely affected by the clearance operations.

The Caucasian black grouse has been extensively addressed in the draft ESIA and specific mitigation measures have been developed to minimise impacts to this avian species.

The “big kochoba” or Great Rosefinch (*Carpodacus rubicilla*), is a Caucasian endemic species which, according to available information, in Georgia is only found on the Great Caucasus. Its habitat is high alpine areas above the rhododendron zone and only in winter does it move down to scrubs in valleys. Even if this species does occur on Trialeti Range, it was not recorded during the surveys, which is not surprising since the pipeline corridor never goes above the forest zone. It should also be mentioned that the Great Rosefinch is often confused with Common Rosefinch which is a common species and occurs in forest habitats.

The Caucasian mole (*Talpa caucasica ognevi*) is not listed in the Georgian Red Data Book and was not included in the Georgian Biodiversity Country Study Report (1996) that was compiled to update the knowledge with regard to endangered or threatened faunal species in Georgia. No information is available in published literature on this species and no evidence of its occurrence within the proposed pipeline right of way has been obtained during the extensive field studies undertaken. On this basis it is not clear how and why the subject species should be considered and impacts estimated, as suggested.

The snake eye lizard (kokhva gveltava) is also not included in the Georgian Red Data Book. Nevertheless, based on verbal communication from Dr Andrej Kantaurov, presumably based on personal information, this species was identified as a potential faunal constraint in the area of Kumisi and specific mitigation measures have been proposed in the draft ESIA Section 10.2.

The snow field vole or the Gudauri field vole are also not listed in the Georgian Red Data Book or the Georgian Biodiversity Country Study Report. Their occurrence within the zone of influence of the proposed pipeline project is not documented and these species have not been observed during the extensive surveys carried out as part of the ESIA studies.

5.11.13 Fauna - Avian fauna

Description of Issue

The following comments were made with regard to avian fauna:

Section 8.11.3.6.1 Tetritskaro Region: it is not clear why there is no information about Gardabani and Marneuli regions (valley of Kvemo Kartli). Because of that the description of the current conditions of the only colony of small white heron, protected by law, in eastern Georgia, at the Mtkvari crossing place, is not included.

Concern expressed over settlement colonies of small white heron and stork in eastern Georgia, on the islands at the Mtkavri East crossing. Concern expressed over the only settlement of Ochopekha in eastern Georgia, near the Mountain of Ialguji, in the Small Lake, at Mtkvari crossing.

The potential of disturbing the Eurasian Crane breeding area to the north of Tsalka lake is not described and should be treated with proper perspective in line with the EU Bird (1981) and Habitat (1994) Directive. Based on the examination of alternative route options (north & south), the risk from each option of disturbing the breeding success of the European Crane should be investigated including mitigation measures.

It is assumed here that avian fauna on the island section in Mtkvari River are accustomed to the nearby industrial noise levels. However, it is unclear whether this was one of the baseline noise measurement locations. Even the Gardabani industrial locations registered reasonably low levels in the noise survey. Also, it is unclear what duration works will be at this significant river crossing.

Only 23 from 96 species of ornithofauna existing along the pipeline passage and protected by Georgian legislation, are mentioned in Table 8-32. The selecting criteria of these species is not clear, as afterwards the indications about other types are also found in the text. Besides this, birds of passage and water birds registered on the territory, are protected by Bonn Convention agreement on Afro-Eurasian birds of passage and water birds.

Issue Drawn from Comments: 349, 780, 787, 1583, 1587, 1588, 1693, 2098

Issue Relates to Following Sections of ESIA: Section 8, Section 10

Response To Issue

No small white heron population have been identified along the proposed pipeline route. A population of Little Egret (*Egreta garzetta*) is known to occur on the riparian islands at the Mtkvari East crossing. Given the distance from the proposed pipeline route (approximately 150m) and the current degree of deradation of the surrounding environment it is not expected that such species could be adversely affected by the proposed pipeline construction. On this basis, Phase II surveys were not carried out at this location. Figure 5-18 shows the location of the Little Egret Habitat in relation to the proposed pipeline route.

Figure 5-18 Habitat of the Little Egrett

Ochopekha or Black-winged stilt *(Himantopus himantopus*) was not recorded on a 2km wide survey area around the centreline of the proposed pipeline route.

Crane (*Grus grus*) was not observed in the proximity of Tsalka Lake, within the area of influence of the proposed pipeline project. Populations of crane are known to occur to the North of Tsalka lake in the small wetlands that characterise this area.

Thirty-three species of birds are included in the Georgian Red Data Book and as such are protected by Georgian Legislation. Of these, fifteen are known to occur or potentially occur in the area affected by the project and are therefore listed in Table 8-32 of the Environmental Baseline of the draft ESIA study. Table 8-32 also lists an additional eight species which are considered threatened or endangered according to the IUCN red list but are not strictly protected by Georgian legislation.

5.11.14 Fauna - Reptiles, amphibians and invertebrates

Description of Issue

Section 8.11.3.4.1. Reptiles: 5 species are indicated in the pipeline impact passage, instead of 10 protected by legislation of Georgia.

Section 8.11.3.4.2 Amphibians: 3 species are indicated in the pipeline impact passage, instead of 6 which are protected by legislation of Georgia.

Section 8.11.3.5 Invertebrates: 4 species are indicated in the pipeline impact passage, instead of 60 which are protected by legislation of Georgia.

Studies about the populations of marsh turtle and Syrian mkvari endangered to become extinct are omitted. It is wrong to explain this fact, saying that pipeline has avoided marshy areas, because these two types can be found anywhere in places of slow flowing and stagnant waters and favourable soil.

Issue Drawn from Comments: 1584, 1585, 1586, 1587, 2099, 2100, 2101

Issue Relates to Following Sections of ESIA: Section 8

Response To Issue

The Georgian Red Data Book lists six species of reptiles and not ten. It is acknowledged that two species included in the Georgian Red Data Book were not listed in the draft ESIA. These are *Elaphe longissima* and *Eryx jaculus.*

The Georgian Red Data Book lists four species of reptiles and not six. It is acknowledged that one species included in the Georgian Red Data Book was not listed in the draft ESIA. This is *Pelodytes caucasicus.*

The Georgian Red Data Book does not list any species of Invertebrates.

With regard to the critically endangered species *Pelobates syriacus* it is believed that because of the extreme rarity of this species it will be extremely unlikely that individuals would be found along the proposed pipeline route. However, a pre-clearance survey (Mitigation Measure n.1) would enable identification of the occurrence of this species along the pipeline corridor and its relocation, if necessary.

5.11.15 Fauna - Mitigation

Description of Issue

Mitigation measure 7: it is noted that only large animals and their protection and monitoring are mentioned and asked what kind of measures will be implemented to take into account the event of disappearing populations or degradation of their habitats.

It is suggested that mitigation measures for fauna are often contradictory. Measures should be specific to animal species. Maps need to be improved in quality and scale. Some of the mitigation measures would result in not useful or even dangerous measures for some species (eg removing animals).

It should be noted that salamander, hamster and snow field-vole are not able to cross a ditch or use soft plugs, because of behavioural peculiarities.

***Issue Drawn from Comments**:* 1574, 1579, 1627, 1851, 1960, 1964, 2202

Issue Relates to Following Sections of ESIA: Section 10

Response To Issue

The implementation of specific mitigation will depend upon the nature and significance of the effect on mammals. Mitigation measures have been designed to avoid potential impacts to prevent infringement of Georgian laws.

Mitigation measures have been developed to address species or a faunal type eg large mammals, where a significant impact has been identified. A number of mitigation measures are appropriate for a range of species. It is not agreed that measures are contradictory or that measures, such as translocation, are dangerous as has been proven by international practise established over the past decade.

The map scale and quality is felt appropriate for the purposes of the ESIA.

Disruption of movement is considered as a potential issue for fauna with more wide ranging movement patterns and habitat requirements than the smaller scale movement and habitat needs of the species mentioned. As such, it is believed mitigation is not required to address movement patterns of the smaller fauna described. However, site environmental staff will be available to remove any small mammals that may find their way into the trench.

5.12 PROTECTED AREAS

5.12.1 Issue: Legal status & permissible activities in protected areas

Description of Issue

Although protected areas are described it is suggested that there is inadequate clarification of the status of the two protected areas crossed by the project. The Ktsia-Tabatskuri Managed Reserve is crossed at KP 165-172. The discrepancy regarding the status of the Managed Reserve is noted but not clarified. If the Reserve is designated, the list of non-permissible activities indicates that a pipeline is not permissible in Ktsia-Tabatskuri Managed Reserve. It is not clarified if the pipeline is compatible with the conservation goals in the Support and Buffer Zones of the Borjomi-Kharagauli National Park. Request:

- clarification on legal status of the Managed Reserve and activities allowed in a proposed reserve
- if the Reserve status is confirmed, evidence to show that the project does not constitute a permissible activity or if alternatives (eg re-routing) are required
- provision of evidence (legal if necessary) of requirements and permissible activities for passing through National Park Zone
- if the project does not constitute a permissible activity in the Support Zone, provide alternative route(s)
- inclusion of locations and descriptions of protected Resort Zones on maps

It was pointed out that WWF and the Ministry of Environment have a number of draft plans relating to management of the Borjomi-Kharagauli National Park. The question was posed as to why the pipelines are not being dual laid.

Attention is drawn to IFC Safeguard Policy - Operational Policy 4.04 which states, "IFC does not support projects involving the significant conversion of natural habitats unless there are no feasible alternatives for the project and its siting, and comprehensive analysis demonstrates that overall benefits from the project substantially outweigh the environmental costs". Taking this into consideration, the ESIA does not discuss the significance of the Borjomi region (eg tourism and future production).

Issue Drawn from Comments: 83, 142, 347, 353, 354, 356, 357, 358, 359, 360, 853, 855 1295, 1350, 1623, 1688, 1863, 1872, 1880, 1944, 1967, 1989, 2009, 2024, 2045, 2276, 2237, 2328, 2329, 2417, 2460, 2716, 2736, 2752, 2754, 2755, 2933

Issue Relates to Following Sections of ESIA: Section 8; Section 10

Response To Issue

Legal status of the Ktsia-Tabatskuri Managed Reserve

The legal status of the Ktsia-Tabatskuri Managed Reserve is discussed in Section 8.12.1 of the draft ESIA.

The Reserve was proposed in 1995 under the Cabinet of Ministers Resolution No. 447 *On Creating Borjomi-Kharagauli National Park & Measures Facilitating Establishment of Protected Areas System*. A definition for a Managed Reserve and additional details covering issues such as management plans and activities in protected areas were provided in the 1996 *Law of Georgia on the Protected Areas System.*

There has been some debate as to the status of the site. The State Department of Protected Areas, Reserves & Hunting Farms and the World Wide Fund for Nature (WWF) have indicated that the site is proposed and not yet formally designated. (BP obtained a legal view on the situation that considers that the Managed Reserve is designated but with temporary boundaries). The development of a management plan is awaited in order to formally define the boundaries. BP is applying the precautionary principle and considers that the site is designated as a Managed Reserve.

Permissible activities in protected areas

According to Article 20 of the Law of Georgia on the Protected Areas System the following activities are not permitted in protected areas:

a. Activities which may cause break up or alteration of environmental systems
b. For the purposes of exploitation, or for any other reason destroying (extermination) of any natural resource, as well as capture, disruption, injuring (disabling), disturbing
c. Damaging environmental systems and species by way of environmental contamination
d. Introduction and dissemination of organisms foreign and exotic species
e. Carrying into the area explosive and toxic matters
f. Any other activity not allowed by individual provision of the Protected Area and the management plan

NB.: there are no individual provisions or management plan for the Ktsia Tabatskuri Managed Reserve. Under the Law, temporary regulations apply until the formulation of the Management Plan. Temporary regulations are not defined for Managed Reserves.

The construction activities for the proposed pipeline would be undertaken in such a way that they do not contravene the listed non-permissible activities.

Studies on route selection and alternatives are covered in Section 4 of the draft ESIA. Further information is provided in Addendum Section 3.

Borjomi-Kharagauli National Park Support Zone

According to Article 5 of the *Law of Georgia on the Protected Areas System* the following zones can occur within a National Park:

a. Strict Nature Protection Zone
b. Managed Nature Protection zone
c. Visitor Zone
d. Rehabilitation Zone
e. Historical and Cultural Zone
f. Administration Zone
g. Traditional Use Zone

This is translated in the *Borjomi-Kharagauli National Park Management Plan* compiled by WWF (1998) into the following zones:

- core zone (strict nature protection zone)
- wilderness zone
- traditional use zone
- recuperation zone
- support zone

The proposed pipeline route passes through the Support Zone for the Borjomi-Kharagauli National Park that surrounds the core, designated part of the National Park complex.

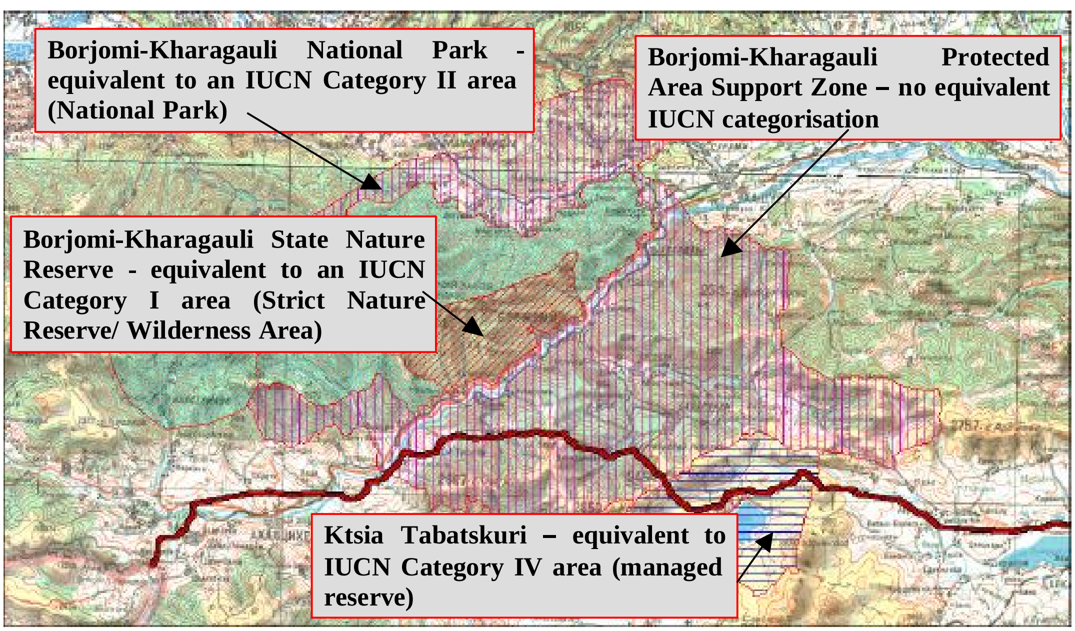
The Support Zone covers an area of 170,846 hectares and is delineated by the administrative boundaries of the five Districts that adjoin either the National Park or the Nature Reserve. The rationale for the establishment of the Support Zone is to secure the support of park neighbours for the sustainable protection of the park. A variety of land uses are conducted within the Support Zone including agriculture and industry. The area also supports natural and semi-natural habitats and should be managed according to objectives that are compatible with the conservation objectives of the National Park and Nature Reserve.

The mitigation measures proposed, including reinstatement, take account of the objectives of the National Park.

Borjomi-Kharagauli National Park Zones

The National Park zones are described above and illustrated in Figure 5-19.

Figure 5-19 Borjomi Kharagauli National Park Zones



Dual lay

To minimize the disturbance in some sensitive areas, it is anticipated that both the BTC and SCP pipelines will be constructed simultaneously to avoid revisiting the area and obviate the need for interim reinstatement. In a number of cases, the width of the FCI-ROW is restricted to 20 metres with the pipelines being 10 metres apart.

Borjomi region

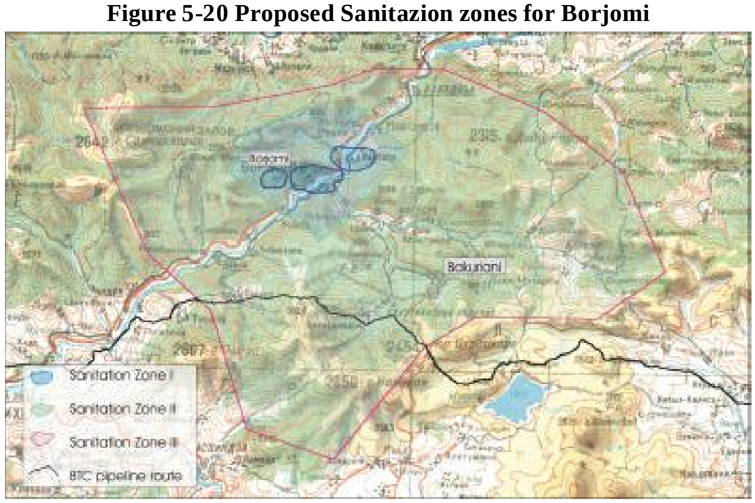
The Borjomi area was granted the status of "resort" by Presidential Decree in 1998. The general legal regime applicable to all resorts in Georgia, including the Borjomi Resort, is set by the Law on Sanitary Protection Zones in Resorts and Resort Areas (March, 1998). Under the Law, resorts have three types of sanitary protection zones: (i) strict regime zone; (ii) restricted regime zone; and (iii) monitoring regime zone. The monitoring regime zone includes the following areas:

a) areas of formation and expansion of hydro-mineral resources and climate
b) forests surrounding the resort
c) other territories, which, if used in disregard of sanitary rules, may negatively impact the hydrogeological, sanitary and landscape-climatic conditions of the resort

The Law states that "activities that do not have negative impact on natural curative resources and the sanitary conditions of the territory are permissible within the monitoring regime zone."

Under the Law, specific regulations are required to give legal force to the sanitary protection zones, and these must be approved by the President of Georgia. At the time of writing of this Addendum, the regulations applicable to the Borjomi area were draft and, hence, do not have legal force. Figure 5-20 shows the proposed zones for the Borjomi area. The pipeline crosses the proposed zone (iii). Assuming that the zones are ultimately approved and gain legal force, the restrictions applicable to zone (iii) will apply to the pipeline. This means that as long as the pipeline activities do not have negative impact on natural curative resources and the sanitary conditions of the territory, the pipeline would be a permissible activity within the monitoring regime zone.

Figure 5-20 Proposed Sanitazion zones for Borjomi



It is considered that the pipeline will not have any deleterious effect on the Borjomi mineral waters. Further information is given on this conclusion in Section 5.5.6 of this Addendum.

OP 4.04 natural habitats

Due regard was taken of IFI Policy OP4.04 Natural Habitats during the design of the project and in undertaking the ESIA. This does not absolutely preclude development on natural habitats[1]. The IFC will not invest in projects that significantly convert or degrade other natural habitats unless careful and comprehensive review and analysis indicate that:

- No feasible alternatives exist for the project or it's siting
- The overall benefits from the project substantially outweigh the environmental costs
- Project plans include mitigation measures acceptable to IFC
- Project sponsors have the ability to implement necessary conservation and mitigation measures, or the project includes plans which are acceptable to IFC for developing this capacity

The mitigation programme has been developed to address the policy and fulfil the requirement to *'remove or reduce adverse impacts on natural habitats or their functions, keeping such impacts within socially defined limits of acceptable environmental change'* (OP4.04). The ecological mitigation focuses on natural habitats along the pipeline route including those in the Borjomi region. The natural habitats policy does not require the tourism potential of natural habitats to be taken into account – it is concerned with the protection, maintenance, conservation and rehabilitation of natural areas. Tourism issues in the Borjomi region are however addressed in Section 6.4.1 of this Addendum.

[1] Natural habitats are defined as:
'land and water areas where (i) the ecosystems' biological communities are formed largely by native plant and animal species, and (ii) human activity has not essentially modified the area's primary ecological functions.'

5.13 UNPLANNED EVENTS

5.13.1 Issue: Borjomi area oil spill impact

Description of Issue

Attention is drawn to potential contamination of the Borjomola River, emphasizing that should a spill take place between KP 182-199 contamination hazards will apply to groundwater streams, mineral waters, surface waters and subsequently impact the Borjomi Mineral Water Company. Three ways in which contamination of groundwaters could take place are detailed within comments received:

1) The Borjomula gorge crosses hypsometrically elevated ground water recharge zones in deep lateral faults of highly fractured and permeable hydrogeological structures. The surface waters which infiltrate into the fractures together with atmospheric precipitation move from this location to hypsometrically lower elevations. This means that towards Gujaretistskali gorge, a large deposit of mineral waters of diverse mineralization and with a high CO_2 content exists (including a mix of Esentuki, Narzani and soda-containing waters). Should the waters of Borjomula become contaminated, contamination will, in the first instance reach mineral water deposits (Mitarbi, Tsagveri and many others) associated with the mid-Eocene volcanogenic deposits.

2) There are juvenile volcanogenic lava formations deposited in the basin of the River Borjomula which are highly permeable both vertically and horizontally, that is, in the direction of the lava flow. Should oil be spilled it will quickly reach the base of the lava flow through gravity and through vertical open fractures. At the lava base there is a circulating turbulent current of fresh water with high potable qualities. These currents presently feed the potable and utility water supply of Borjomi resort and of associated communities as well as the commercial industry of bottled Borjomi waters.

3) Contamination of ground potable water of lava flow or of the river Borjomula poses a realistic threat to the central area of the Borjomi mineral water deposit. Both pathways would carry oil and associated dissolved products to the dissected Borjomi anticline arc where there are outcrops of carbonate beds of basic Borjomi mineral water aquifer serving as a natural discharge area for Borjomi mineral waters.

Based on the above it is requested that consideration be given to either a re-route away from the area or the implementation of additional pipeline protective measures in particular concrete coating.

Issue Drawn from Comments: 189, 275, 276, 277, 313, 314, 329, 331, 336, 337, 361, 362, 363, 364, 37, 463, 465, 532, 533, 613, 776, 796, 797, 837, 838, 1042, 1082, 1503, 1520, 1639, 1672, 1818, 1846, 1847, 1848, 1903, 1904, 1905, 2116, 2143, 2198, 2199, 2213, 2257, 2292, 2293, 2402, 2416, 2459, 2615, 2616, 2620, 2622, 2652, 2885, 3001, 3002, 3085, 3123, 3125, 3180, 3195

Issue Relates to Following Sections of ESIA: Appendix E Annex IV

Response To Issue

This topic is partly covered in Section 5.5.6 and further explained in the JW Lloyd report attached as Appendix I. In summary, as a result of the deep circulation patterns, the groundwater hydraulic heads encountered in the wells in the 'mineralised' groundwater fields are above ground surface. Irrespective of whether the 'mineralised' groundwater reaches the ground surface through fractured zones, or as a regional upward leakage, the fact that in the vicinity of Borjomi flows are upwards means that it is not possible for shallow groundwaters to move downwards into the producing strata.

As noted in Section 5.5.8 the Quaternary lavas are not crossed by the pipeline ROW. The lava pile groundwaters are topographically driven in the classical mode such that hydraulic head control is centrally along the topographic divide. Groundwater discharges to the Rivers Borjomola and Gujaretis Tskali, so that it is not possible for contaminant to enter the lava groundwater system as suggested by gravity flow. It should also be pointed out that although the lavas are jointed and fractured the bulk porosity is not excessive. If it were, perennial springs, such as that at Daba (discharge range about 0.7-2.1 l/s), would not exist.

It follows from the response above that if contaminant cannot enter the lava groundwater system, it cannot be transferred from that system into the 'mineralised' groundwaters.

5.13.2 Issue: Oil spill impacting lava flows; Tskhratskaro – Kodiana section

Description of Issue

The description of the underlava fresh water in Appendix E Annex IV p3 is questioned.

At KP 182 it is not substantiated why it is unlikely that the contaminated groundwater could travel from the spill location at KP182 to the outcrops of lava flows and thus contaminate the associated fresh water springs. The maximum speed of the underlava flow is questioned and clarification is requested. The view is held that if a spill occurs between KP 179-182 the underlava fresh water flow will be contaminated.

Issue Drawn from Comments: 275, 276, 314, 327, 333, 334, 335, 338, 411, 1601, 1901, 2156, 2199, 3163

Issue Relates to Following Sections of ESIA: Appendix E Annex IV

Response To Issue

At KP 182 a 'tongue' of lava is present to the immediate north of the pipeline (see figure below). A spillage adjacent to this 'tongue' could result in hydrocarbon initially entering the lava. However, because of the topography and the groundwater hydraulic head distribution associated with the local topographically driven flow any hydrocarbon would move to the river and not continue further in the lava formation. The hydrocarbon could not move northwards across the valley through the lava 'tongue', as the groundwater head gradient is towards the river.

A detailed study of the local hydrogeological conditions has been commissioned during the ESIA disclosure phase and the report of this study, outlining in more detail the issues described above is enclosed as Appendix I.

5.13.3 Issue: OSM mitigation – Tskhratskaro-Kodiana

Description of Issue

Additional mitigation measures to prevent any potential contamination of Borjomi drinking waters are requested.

It is suggested that the pipeline section from Tskhratskaro - Kodiana is one of the most significant and sensitive areas within the route. In the event of an oil spill in this area the consequences are believed to be significant. Thus additional mitigation measures are requested including: KP180-203 the technical risks and mitigations should be further developed and agreed in advance of construction; provide additional emergency measures specific to Borjomi area including concrete cladding of pipeline; establish marketing defence and strategy to protect Borjomi Mineral Water Company. In addition, it is requested that additional oil spill response modelling is undertaken in the Tsikisjvari area.

It was felt that there was insufficient assessment of the risks associated with pipeline activities and that the requirements of HGA, Appendix 3, part 3, 3.5 for a Risk Assessment had only partially been fulfilled. The reason given was that risk assessment should assess risks other than oil spills, such as accidents, natural disasters, plant and equipment breakdown, explosions and security issues. In particular, an assessment of how the reputation of Borjomi Spring Waters could be affected by the presence of the pipeline and the associated pollution risks, including decisions to invest, was requested. Advisable to provide commercial evaluation of ground water resources / deposits. Quantitative assessment of the socio-economic impacts of an oil spill or hazardous materials spill contaminating Borjomi springs catchments area was requested, including an assessment of the impact on the mineral water industry, tourism and drinking water supply and quality.

Issue Drawn from Comments: 277, 302, 327, 331, 332, 364, 463, 516, 842, 998, 1022, 1042, 1049, 1298, 1299, 1300, 1301, 1302, 1361, 1407, 1408, 1409, 1410, 1418, 1419, 1420, 1421, 1459, 1497, 1503, 1520, 1562, 1595, 1902, 2143, 2147, 2156, 2165, 2166, 2291, 2402, 2413, 2414, 2553, 2554, 2614, 2615, 2616, 2622, 2652, 2780, 2822, 2839, 2840, 2878, 2879, 3001, 3002, 3004, 3005, 3006, 3007, 3008, 3011, 3125, 3163

Issue Relates to Following Sections of ESIA: Section 8, Section 10; Appendix E Annex IV

Response To Issue

Additional mitigation measures for the catchment of the Borjomola river have been developed to minimise the risk of surface waters contamination as a result of an oil spill. Appendix VI describes in detail the specific mitigation measures that are evaluated and selected for the Tkhratskaro-Kodiana section of the proposed pipeline route. These include:

The following measures have been built into the design of the pipeline and reduce any likelihood of failure even further:

- Highest standards of design including high grade steel and significant pipe wall thickness
- Depth of burial is 1m
- Regular security and pipeline patrols
- Corrosion coating protection
- Regular monitoring of pipeline for any internal or external faults

The above measures mean that the likelihood of a pipeline failure is almost zero. Nonetheless, BP has designed other measures to make sure that if there was a leak, that it would be detected immediately. Rapid detection of any failure and leak would occur by:

- Central operation control would immediately detect pressure variations in case of leakage equal or greater than 1% of the pipeline flow and the pipeline would be shut down
- Leak detection system for small leaks
- Groundwater monitoring to detect small leaks in key areas
- Increased monitoring of pipeline by special patrols
- Increased community awareness programmes to assist in reporting any issues

Finally, should there be an actual spill, the project has designed special mitigation measures in the Bakuriani area to make sure that there is an immediate response, the oil is captured and environmental damage is minimized as much as is possible. These measures include:

- Specially trained oil spill response personnel located permanently in the area
- Specially designed oil spill response equipment located at strategic locations in the area to allow immediate response and capture any oil spill

With regard to drinking water deposits (fresh and mineralised) in the Thratskaro-Kodiana section of the proposed pipeline route, it has been demonstrated that these cannot be contaminated by an oil spill because of the specific hydrogeological regime in the area that would not allow migration of contaminated water from the surface water courses to the groundwater deposits. Water intakes from alluvial deposits can however be contaminated if oil reaches the rivers where the intakes are located. A full report describing these processes is included in Appendix I.

Additional detailed modelling work will be carried out in this region prior to commencement of the pipeline operation to enable the design of the response plan hat would be required in this region.

5.13.4 Issue: Oil spill risk at Jandari Lake

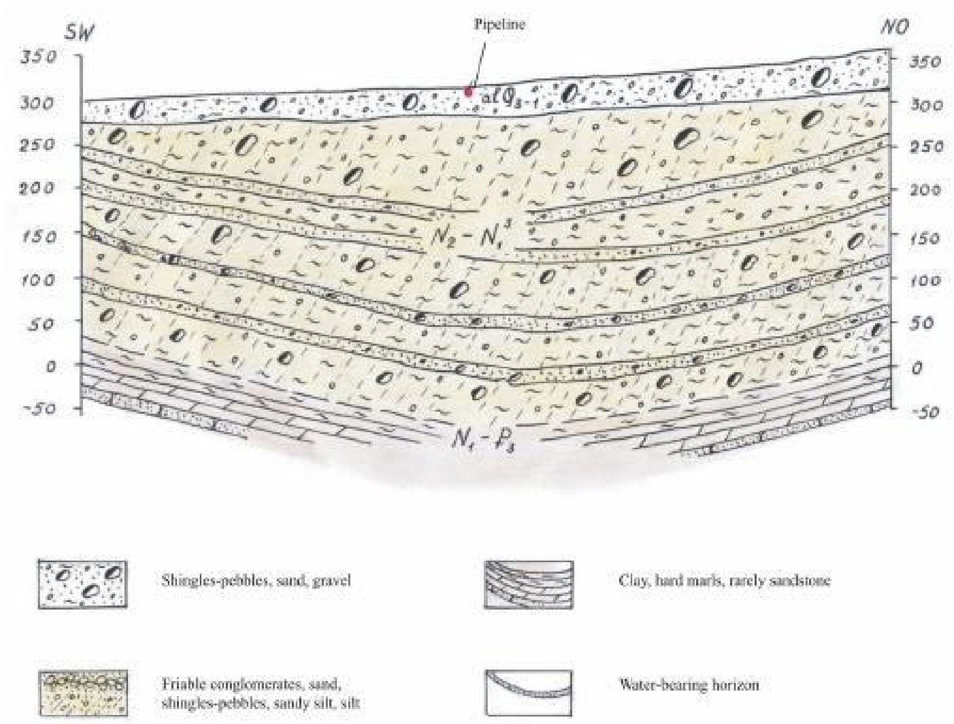
Description of Issue
Concerns were expressed over the likelihood of contamination at Jandari Lake. It is requested that further oil spill mitigation measures are considered. Substantiation is not given as to why it is unlikely that borehole water will not be contaminated in the vicinity of the Jandari Lake in the case of a pipeline rupture. It is proposed that trenches or canals should be excavated such that in the event of a spill oil will be diverted away from the lake.
Issue Drawn from Comments: 264, 265, 2195, 2196
Issue Relates to Following Sections of ESIA: Appendix E Annex IV

Response To Issue

An oil spill in the Gardabani area would possibly result in contamination of surface waters and in contamination of the most shallow groundwater system in the proximity of the spill location (alQ_{3-1}) in the cross section below. Because of the low density of oil, the contaminated plume of groundwater would be confined to the upper surface of the aquifer, affecting a thickness of 2 to 3m of the aquifer itself.

The local abstraction boreholes that extract drinking and irrigation water are installed in deep confined aquifers within the upper Miocene-Pliocene volcano-clastic formation (N2-N13 in the cross section below) and are naturally protected from surface contamination. This aquifer is in fact pressurized. Pressure is maintained in the area encroached by the pipeline because of the presence of very low permeability clay strata interbedded with the volcanoclastic strata. The presence of clay ensures that the deeper aquifers are protected from contamination because neither water nor contaminants can penetrate the clay. In addition, the pressure regime of the deep aquifers enables fluids to move only upwards thus precluding any possibility for surface contaminants to migrate to depth. The lithological sequence and the hydrogeological properties of these formations are described in more detail in the draft ESIA in Section 8.5.3. Figure 5-21 below shows the hydrogeological cross section in the Gardabani area.

Figure 5-21 Hydrogeological cross section, Gardabani Area



Contamination of shallow groundwater would be addressed promptly after its discovery and measures would be taken to ensure the hydraulic containment of the contaminated area and the recovery of oil and contaminated groundwater. Details of these response measures are described in Section 5.12 of this Addendum.

The most appropriate means to protect surface water through the interception of oil will be evaluated during the detailed development of the oil spill response plan and its associated manual. The framework of the oil spill response plan is enclosed in the draft ESIA in Appendix E, Annex 5.

5.13.5 Issue: OSM at Mtkvari crossing & Kumisi Lake

Description of Issue

Comments were made regarding the possibility of pipeline failure at the Mtkvari East crossing. It is pointed out that in the case of a failure the oil would reach the local irrigation system and Rustavi power station in 17 minutes, followed by contamination of the ecosystem, damage to crops and to the river habitat. It is suggested that additional mitigation measures to prevent contamination should be implemented, including the installation of pneumatic equipment, which while in operation, creates a bubbly plume and interferes with the movement of the contaminated flow.

A similar forecast is made in the event of an oil spill in the proximity of Kumisi Lake, which would entail lake, land ecosystem and groundwater contamination. It is suggested that diverter trenches be excavated so that oil would not flow towards the lake.

Issue Drawn from Comments: 266, 267, 337, 2197

Issue Relates to Following Sections of ESIA: Appendix E Annex IV

Response To Issue

The design of the Mtkvari river crossings is such that the risk of failure of the pipeline because of river bed or bank erosion is accounted for. The design of the river crossings is addressed in Section 4.2.2 of this Addendum.

The most appropriate means to protect surface water through the interception of oil will be evaluated during the detailed development of the oil spill response plan and its associated manual. The framework of the oil spill response plan is enclosed in the draft ESIA in Appendix E Annex 5.

5.13.6 Issue: Groundwater protection at Tetritskaro and Bedeni Plateau

Description of Issue

It is questioned whether groundwater contamination at Tetritskaro can be mitigated through the proposed oil spill response measures. Additional site specific measures to safeguard groundwater from contamination are requested.

It is suggested that if a rupture took place on Bedeni Plateau this would result in contamination release to the River Khrami. The River Khrami is the main source of Rustavi water supply. Contamination of the River Khrami is inadmissible because Rustavi is experiencing a deficit of drinking water.

In addition, Bedeni Plateau contains the recharge zone of the Bedeni underground stream, where the waters infiltrate into the Upper Pliocene – Lower Pleistocene dolerite lava, while travelling towards Marneuli Plain. These waters reach close to surface level in the area of Marneuli and discharge beneath alluvial and pro-luvial deposits. The water from these aquifers represent the main resources of potable water supply for local residents.

Issue Drawn from Comments: 268, 272, 269, 1648, 1665, 2198

Issue Relates to Following Sections of ESIA: Appendix E Annex IV

Response To Issue

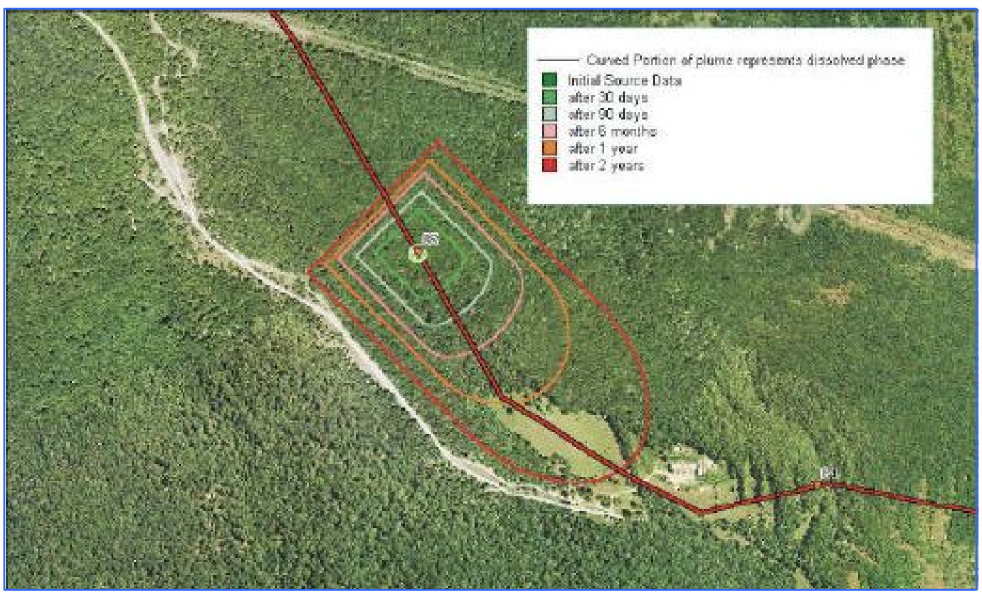
The probability of a large scale oil spill anywhere on the BTC pipeline is extremely low and the likelihood that such an event were to occur on the Bedeni plateau is also extremely low given the absence of significant geohazards or other potential causes of failure within the catchment of the River Khrami.

The Tetritskaro region, including the Bedeni plateau, and in particular the section of the pipeline where fractured lava are the most superficial geological structure, has been recognised as being an important groundwater resource where attention should be focused upon during the design and implementation of the oil spill response plan.

The possibility that groundwater resources as far as Marneuli could be adversely affected by an oil spill is however remote in the light of the relatively slow velocity of contaminant migration in groundwater. This slow velocity would enable containment of the spill before a significantly large area became affected.

The analysis of consequences shows that a large-scale oil spill would contaminate groundwater in the proximity of the spill and that the extent of contaminated groundwater movement can be minimised through prompt intervention including the installation of groundwater interception and treatment systems. The development of the oil spill response plan and the associated manual will focus on the measures required to achieve the above objectives. An extract from the draft ESIA showing the output of the groundwater contamination model is shown in Figure 5-22 below.

Figure 5-22 Groundwater dispersion model of potential oil spill in Tetritskaro Forest



5.13.7 Issue: Recovery of oil at Narialis Veli

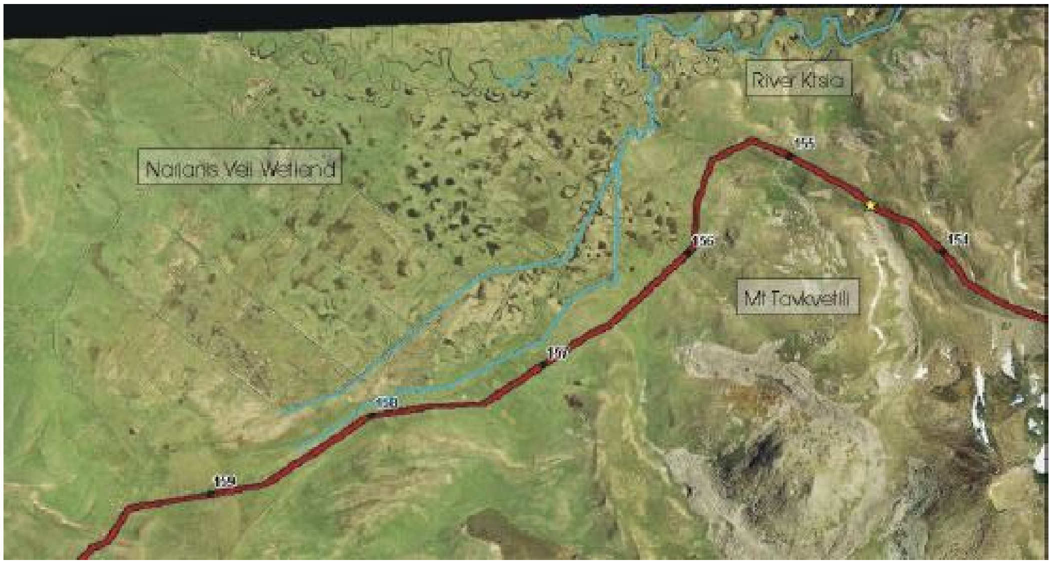
Description of Issue
It is suggested that should there be a spill close to or into Narialis Veli wetland, oil recovery through the same methods as at rivers and reservoirs would not be possible. Specification of oil clean up methods for wetlands are requested.
Issue Drawn from Comments: 273, 2299, 2400
Issue Relates to Following Sections of ESIA: Appendix E Annex IV

Response To Issue

The pipeline route is aligned along the south eastern natural boundary of the Narianis Veli wetland on the slopes of Mt Taukvetili. The pipeline ROW is on the hydraulic right of the perimeter drain that flows into the river Ktsia. Figure 5-23 below shows the characteristics of the area with the main features highlighted. Oil spill modelling carried out at this location shows that the oil would accumulate on the lower slopes of Mt Taukvetili and gradually flow into the perimeter drain or directly into the river Ktsia. Some oil could be deposited on the banks of the perimeter drain but the bulk of the oil is expected to flow along the drain and ultimately into the river Ktsia, and not the wetland. The wetland habitat that could be adversely affected by a large scale oil spill is limited to the banks of the drains and the banks of the Ktsia.

A detailed study of the Narianis Wetland was carried out as part of the ESIA process (Spring 2001 and summer 2002) extracts of which are detailed in Section 5.11. The findings of the study indicate that the wetland has its highest integrity and botanical value in small isolated patches in the central area, approximately 1km to the north west of the pipeline ROW. The whole wetland is an important habitat for wildlife, particularly birds, and it is not expected that the habitat could be significantly affected given the small proportion of wetland that could become contaminated as a result of a large oil spill.

Figure 5-23 Pipeline alignment in the Narianis Veli Area



In the unlikely event of a large scale oil spill, efforts would be focused to the recovery of any oil accumulated in surface depressions and on the clean up of the river banks with suitable biodegradable chemicals. Should the marginal parts of the wetland habitat become contaminated a detailed analysis would be undertaken to select the most appropriate techniques to deal with oil contaminated vegetation and/or fauna.

SOCIAL ISSUES

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6 SOCIAL ISSUES

6.1 INTRODUCTION

This section of the ESIA Addendum responds to comments received during Public Disclosure on social issues.

The structure of this section reflects the draft ESIA as far as possible and is as follows:

6.2 Support for the Project
6.3 Approach, Methodology and Presentation
6.4 Socio-Economic Baseline
6.5 Access to Energy
6.6 Local Employment and Procurement Opportunities
6.7 Land Acquisition and Land Based Livelihoods
6.8 Local Infrastructure, Services and Natural Resources
6.9 Community Relations and Management of Construction Workers and Camps
6.10 Health, Safety and Security
6.11 Government Relations and Legislation
6.12 Residual Impacts
6.13 Community Investment Programme

Within each section the concerns and suggestions received from the project stakeholders are summarized and a response is given.

6.2 SUPPORT FOR THE PROJECT

6.2.1 Issue: support for the project

Description of Issue A variety of different sources expressed support for the project. Reasons ranged from the anticipated income generated for the country as a whole as well as individual regions, positive impacts on the standard of living of Georgians and the possibilities for the employment created. Others praised the level of detail in the draft ESIA, the large number of issues considered and the level of consultation that has taken place between the Company, the Government and the general public.
Issue Drawn from Comments: 596, 601, 604, 607, 611, 612, 615, 621, 625, 627, 628, 630, 631, 637, 641, 642, 643, 645, 653, 663, 689, 696, 766, 770, 1083, 1084, 1099, 1103, 1106, 1115, 1118, 1195, 1366, 1376, 1381, 1401, 1490, 2566, 2585, 2595, 2598, 2678, 2898
Issue Relates to Following Sections of draft ESIA: N/A

Response To Issue

BP appreciates all expressions of support for the project.

6.3 APPROACH, METHODOLOGY AND PRESENTATION

6.3.1 Issue: data collection

Description of Issue

The following criticisms were made of the data collection methodology:

- Several Georgian experts, including the NGO Council and the Academy of Sciences, felt that they should have been involved in the data gathering and analysis
- Comments indicated that people understood surveys were only carried out for the oil pipeline, not for the gas pipeline. They believed that the extrapolation of opinion from the oil to gas pipeline was unacceptable
- It was suggested that previous experience of false information at public meetings has made people wary of these, and that objective feedback cannot be gained from such meetings. Focus groups were recommended as a more effective way in which to share information
- There was criticism that no survey was carried out focusing on the long term cumulative effects of the two pipelines, and there is insufficient consideration of these issues in the draft ESIA
- There was criticism that the uncertainties were not explicit within the methodologies
- Comments were made that the methodology differed between the social and environment impacts and mitigation sections
- Concern was expressed that the household surveys in the ESIA were based on equal sampling, whereas household surveys should be based on proportional sampling
- Criticism was made over the lack of clarity as to how project-affected stakeholders and communities outside the 2km and 5km radiuses for the pipeline corridor and facilities respectively (eg access roads, employment) were identified
- Criticism was made that the draft ESIA over-emphasized risks such as migration, crime and violence caused by drug and alcohol abuse, the spread of AIDS and other STDs, but under-estimated the risks of tension between the community members and pipeline employees and potential damage to local land and other property
- Criticism was made about the interview methodology, including the way interviewers introduced themselves, the lack of notice given prior to the surveys, that only a limited number of project-affected communities had actually been surveyed (contrary to statements in the draft ESIA) and the fact that different numbers of questions were asked to different individuals

Issue Drawn from Comments: 767, 908, 930, 948, 950, 957, 967, 983, 1012, 1013, 1058, 1062, 1257, 1268, 2517, 2526, 2692, 2701, 2809, 2810, 2838, 2848, 2849

Issue Relates to Following Sections of draft ESIA: Section 7, Section 11, Section 16, Section 17, Section 18, Appendix F Annex I Section 4.4

Response To Issue

NGO Council and the Academy of Sciences

Numerous NGOs and specialist organizations, including the Academy of Sciences and members of the NGO Council, were invited to attend various workshops and presentations throughout the data collection and impact analysis process (see Addendum Annex 5). The socio-economic baseline data was gathered independently by international and Georgian experts (an essential element of an internationally recognized ESIA), with guidance from various organizations (see draft ESIA Section 16, Section 17 and Appendix F Section 4.4). Georgian experts from a wide variety of institutions and organizations gave input into the data collection and survey works for the social and environmental aspects of the ESIA. These individuals and institutions, along with references cited, are detailed in draft ESIA Sections 17 and 18 respectively.

Surveys for the Oil (BTC) and Gas (SCP) Pipelines

Surveys were carried out for both the oil and gas pipelines. Draft ESIA Section 16 outlines the baseline data collection and consultations that were carried out for each pipeline at various stages (Phase 1 to 3 SCP, Phase 4 to 7 combined BTC/SCP). This is detailed further in draft ESIA Appendix F Annex 1 Section 4. One survey was conducted to analyse the difference in perceptions between the oil and gas pipelines and to assess whether the results of the original surveying work for the gas pipeline would be valid for the oil pipeline as well. The survey indicated that the results were valid for both pipelines, when used with the additional information collected specifically for the oil pipeline.

Cumulative Impacts

A significant element of the cumulative impacts analysis (draft ESIA Section 13.5.2) was the specific evaluation of the cumulative effects of the oil and gas pipelines. The analysis took account of potential short, medium and long term effects for a range of study factors. The fact that extensive surveys and impact evaluation have been carried out for both pipelines, and that the route and many of the issues are common, has enabled a more thorough cumulative effects assessment.

Focus Groups and Public Meetings

Holding public meetings was one of many tools used during consultation for collecting and giving information. Meetings, workshops, presentations, focus groups, one to one discussions and many interviews were held throughout the process of consultation, as outlined in draft ESIA Section 16, Table 16-1 and draft ESIA Appendix F Annex 1 Section 4. These methods are also discussed in draft ESIA Section 7 and in Addendum Annex 5.

Efforts were made to ensure that public meetings were conducted in an open and transparent manner. Material presented gave details of the most significant issues based on the information in the publicly released draft ESIAs. Candid comments were encouraged throughout the feedback sessions.

Uncertainties

Social impact assessment is not an exact science and is based on some informed assumptions. These assumptions may have led to uncertainties in the baseline assessment or in impacts assessment and mitigation development and hence gaps in the draft ESIA methodology:

Time

Given the time constraints associated with the project, the following limitations exist:

- Additional consultation prior to disclosure to confirm survey results was not carried out. However, consultation was carried out in phases, with each phase confirming the findings to date. Ongoing liaison with Government, NGOs and other key stakeholders provided further substantiation. In addition, the disclosure process provided an opportunity for all stakeholders to give their feedback. Responses to these comments are the basis of this Addendum and feedback will be considered in relevant Management and Monitoring plans

- Baseline assessment at a regional and national level was not carried out. The local level is the most appropriate scale at which to consider potential impacts since it is at this level where the majority of potential impacts occur. Some analysis was completed as appropriate at the national and regional level (draft ESIA Section 9)

  Other reports address issues at the national and regional level which are not covered in detail in the draft ESIA. Key regional and national issues have been covered in a separate independent study commissioned by BP entitled 'Economic and Social Implications of ACG/BTC (and Shah Deniz) in the Regional and National Context' (Regional and National Review) which will be made publicly available in late 2002. The Regional and National Review is intended to complement the ESIAs and has been conducted to better understand the issues and challenges from a broad regional and national perspective, to better understand how the projects can optimise their contributions to the communities and the people of Azerbaijan, Georgia and Turkey, and to minimize potential risks to project delivery

  A report, written by national experts and financed by UNDP entitled, "Initial Capacity Strengthening for Social Monitoring of Southern Caucuses Energy Transit Projects in Kvemo Kartli and Samtskhe-Javakheti Regions, Georgia" provides a useful analysis at this level as well

- Qualitative interviews were carried out with targeted informants or key representatives of communities. Quantitative household surveys were random and the number carried out was broadly proportional to the population of the village. This is standard social science methodology and was considered sufficient to meet the requirements of the draft ESIA and to draw the correct conclusions on which to base impact assessment and mitigation measures

Representativeness of information gathered

Despite the best efforts of the consultation team, some groups may not have been adequately represented during consultation, for example there may have been a lower proportion of women interviewed. However, for the purpose of baseline assessment, sufficient consultation was done with regard to minority groups or groups with less public voice. Ongoing communication by means of contact with community liaison officers and through grievance mechanisms will ensure that any issues that may arise will be dealt with in line with the BTC Co ESIA mitigation measures.

Geographical area

The 4km corridor selected for route-level assessment and 5km impact area around the AGIs were considered to be the maximum areas within which pipeline-affected parties were likely to reside. However, it is recognized that there may be settlements outside of this area which could potentially be affected.

Any communities lying outside of this area that do feel an impact will be able to report any complaints or disturbances. There will be further opportunity for consultation with any additional potentially affected communities once the construction contractor has developed the site specific working practices. For example, Community Liaison Officers could regularly attend the meetings of the heads of sakrebulos to identify and discuss any issues arising outside the 4km corridor.

Design and location of pipeline at time of assessment

Assessment and mitigation measures were based on certain specifications for the pipeline route as provided by the project engineers at the time of assessment in the draft ESIA. Where subsequent changes were made to the engineering specifications, these changes have been taken into account to as great a degree as possible in developing mitigation measures. However, some changes have only been reviewed in theory. The consultation team is confident that the changes made were taken into account such that it is unlikely that any further impacts will be felt that have not yet been covered in the draft ESIA.

Differing Methodologies in the Social and Environment Sections

The methodologies for collecting social and environmental data are very different and therefore often need to be portrayed in different manners, as explained in draft ESIA Section 7.9.2. The methodologies chosen for environmental and social impact assessment were those considered most appropriate for this project. It is usual for the impact assessment methodology to be different since the issues and receptors are not the same. The methodology used for the social impact assessment is considerably more quantitative in nature than usually done for ESIAs and is standard social impact assessment methodology.

Household Surveys and Proportional Sampling

One of the survey objectives was to gather baseline data from which impacts could be assessed and mitigation measures developed. The number of surveys done in each community was based upon the size of that community. This was done in combination with extensive research and consultation with stakeholders, and is considered in international practice as appropriate for the purposes of impact assessment. The responses received during consultation and disclosure indicated that the impacts and mitigation measures developed using this baseline are appropriate. Please refer to draft ESIA Section 7.6.3 for further information on the methodology for data collection and consultation.

Identification of Stakeholders

The potential area of influence of the pipeline and stakeholder types were identified during the Scoping Phase of the draft ESIA (draft ESIA Appendix F Annex I Section 4.3). As stated in draft ESIA Section 7.6, the pipeline was re-routed at a number of locations in response to stakeholder comments during the ESIA data gathering and consultation period. As a result, not all the communities that were surveyed lie within the 4km pipeline corridor and within 5km of pipeline facilities . No communities have been excluded as a result of this, and those that now lie outside the corridor are deemed to be close enough to the 4km or 5km impact area that they should not be excluded from the draft ESIA as a result of the changes. No extra communities were included as a result of these changes as they were already included in the survey population.

The only stakeholders identified as impacted outside the 4km or 5km corridors were those on access roads. People living within 100 m of an access road are likely to suffer from increased nuisance, including noise, emissions, vibrations and dust, as well as increased safety risks (draft ESIA Section 11.5 and Addendum Section 6.8.1). Community Liaison Officers will identify those communities and households as the access roads are identified and used. These communities and households will have access to the same transport mitigation measures as other project-affect communities. Safety mitigation measures are discussed in draft ESIA Section 11.5 and Addendum section 6.8.1). The construction contractor will develop a Traffic Management Plan, which will take into account routes, speeds, times of travel, key roads in terms of local services, etc. Further detail of this Traffic Management Plan is found in draft.

Priority will be given to project affected communities for unskilled work. Communities outside the defined project affected areas will receive positive employment impact through opportunities to apply for semi-skilled and skilled work.

Degree of Emphasis on Specific Impacts and Mitigation Measures

Migration, crime and violence caused by drug and alcohol abuse and the spread of AIDS and other STDs were all identified as potential impacts on communities along the pipeline route, and corresponding mitigation measures were developed. Issues surrounding ethnic tensions are discussed in Addendum Section 6.9.2 and concerns expressed about land compensation and acquisition in Addendum Section 6.7.1.

Consultation Methodology

As described in draft ESIA Section 16.2 Table 16.1, a number of interview types were conducted, each with different aims. These interviews included quantitative household interviews, qualitative interviews on overall attitudes and opinions, qualitative interviews on the cumulative impacts relating to two pipelines instead of one, specific oil related interviews and qualitative interviews focusing on issues not otherwise covered, including shepherds and those close to pipe yards and worker camps and AGIs. Hence, different questions were asked of different individuals, according to the aims of the research and consultation.

Consultation was carried out by a Georgian specialist organization, with whom the international consultants worked in order to ensure the survey work reached international standards. Regional Governors were met prior to the surveys and were requested to alert people to the coming consultation. It is standard international practice that such surveys are done without prior appointment, but rather by asking questions from door to door.

All communities within the pipeline-affected area were consulted during the ESIA process (Addendum Annex 5).

6.3.2 Issue: economic analysis

Description of Issue

Level of Economic Analysis

Criticism was made that there was insufficient economic analysis in the draft ESIA, including of both project components and route alternatives. Other comments included that the draft ESIA should address macro-economic issues, such as the impact of the pipelines in regions other than those through which the pipeline passes and on the socio-economic infrastructure of Georgia as a whole. It was suggested that the mitigation measures should reflect these issues, and should be backed by quantitative calculations and should be presented against a general plan for the socio-economic development of Georgia.

The written report, entitled "Initial Capacity Strengthening for Social Monitoring of Southern Caucasus Energy Transit Projects in Kvemo Kartli and Samtskhe Javakheti Regions of Georgia", written by national experts and financed by UNDP, made a number of comments about the level of economic analysis in the draft ESIA. The report stated that the draft ESIA should have been based on the same principles as their report. The macro-economic and socio-economic framework of Georgia should have been analysed, econometric modelling performed and positive impacts proven through economic investigations. Negative impacts should have been analysed quantitatively and more fully developed mitigation measures would show how deeply they would correct negative social trends. The criticism was made that the ESIA had no quantitative methods in the social appraisal.

Other comments contained in this report have been addressed elsewhere in this Addendum.

Issue Drawn from Comments: 553, 906, 1085, 1255, 1254, 1258, 1293, 1385, 1395, 1396, 1485, 1840, 1945, 2527, 2624, 2625, 2636, 2637, 2702

Issue Relates to Following Sections of draft ESIA: Section 9, Section 11

Response To Issue

Level of Economic Analysis

The 'Economic and Social Implications of ACG/BTC (and Shah Deniz) in the Regional and National Context' (Regional and National Review) will be published in late 2002 and considers broad socio-economic issues and the impact of the BTC and SCP projects on those issues across Azerbaijan, Georgia and Turkey. It takes into account employment, procurement and supply chain management, as well as macro socio-economic issues, such as domestic energy supply and poverty reduction. Such discussion is beyond the scope of the draft ESIA, which has developed mitigation measures in response to potential impacts identified at a route level associated with the actual project.

It is standard ESIA practice to undertake full socio-economic analysis once the preferred route has been identified. Scoping of social issues and a lower level of social analysis is was carried out for route alternatives. This was partly owing to a desire not to raise the expectations of communities on every route option. Social issues were considered as one of the constraints in the route selection process.

UNDP Financed Report

The study, entitled "Initial Capacity Strengthening for Social Monitoring of Southern Caucasus Energy Transit Projects in Kvemo Kartli and Samtskhe Javakheti Regions of Georgia" written by national experts and financed by UNDP, provides baseline statistics at a regional and national level and impacts of energy transit projects at these levels. In this report, a distinction between the agricultural and industrial regions of Kvemo Kartli and Samtskhe Javakheti has been drawn.

The draft ESIA for BTC Co was approached differently, focusing on gathering baseline information at the level of those more directly affected by the project. It provides an analysis and comparison of the each of the six districts across which the pipeline route passes, rather than at regional (two regions) and national level where negative impacts from the project are likely to be less direct and are considerably smaller. (See Addendum Section 6.4.1 "Surveying Communities and comparisons to Regional and National" for the reasons behind this level of analysis).

The Regional and National Review considers broad socio-economic issues, as discussed above. It is acknowledged that the impacts were not measured quantitatively, but that the level of qualitative analysis is robust and sufficient for an understanding of the impacts and development of appropriate mitigation measures. This is the international standard approach for the social impact assessment of equivalent projects.

6.3.3 Issue: demographics

Description of Issue Criticism was made that the draft ESIA contained no assessment of the impacts of the pipeline on demography. It was suggested there should be additional consideration of demographic issues and mitigation measures to minimize demographic problems.
Issue Drawn from Comments: 984, 2529
Issue Relates to Following Sections of draft ESIA: Section 11.6

Response To Issue

There is no reason to believe that the construction and operation of the pipeline will impact demography in the pipeline locality. There is evidence of significant demographic change at the current time in some areas along the route, but this is associated with factors outside the control of the project such as poverty, lack of long term employment opportunities and incentives to certain communities to migrate abroad. It is not envisaged that the employment opportunities created by the project will have any long term impact on employment levels and hence on demographic change. In-migration in search of employment opportunities will be actively discouraged through wide advertisement of the preference given to recruitment of candidates from pipeline-affect communities and through a requirement for proof of habitation in those communities prior to recruitment.

6.3.4 Issue: draft ESIA documentation

Description of Issue

The following comments were made relating to the presentation of material within the ESIA:

- An overview of compensatory measures for communities along the route and beneficiaries at the regional and / or national level was requested. It was felt that the reports mentioned in the draft ESIA (Resettlement Action Plan (RAP), Regional and National Review and Community Investment Plan (CIP)) should become part of the ESIA
- Quantitative information and geographical maps on socio-economic impacts at geographical locations (KP points) were requested
- There were several comments on the detailed wording of the disclosure documentation, such as changing the word 'region' to 'environs' on page 3 of the Community Pamphlet and correcting the spelling of the name of the NGO International Alert. Cross referencing between the text and the reference list was requested in the draft ESIA and criticism was made that the material presented was voluminous, poorly structured, and overloaded with maps and photographs. Criticism was made that the Non-Technical Executive Summary (NTES) was too technical
- It was suggested that the Host Government Agreements (HGAs) had not been published and were not accessible to the general public. Criticism was made that as a result of this, the institutional framework of the project was unclear for district and local administrations
- During the public disclosure period, requests were made for additional disclosure documents, including draft ESIAs, community pamphlets and NTES

Issue Drawn from Comments: 154, 166, 232, 239, 243, 258, 665, 946, 989, 1023, 1024, 1232, 1342, 1343, 1348, 1350, 1414, 1647, 2542, 2543, 2558, 2559, 2676, 2796, 2842

Issue Relates to Following Sections of draft ESIA: All

Response To Issue

Each comment is addressed below:

- The Resettlement Action Plan (RAP) (which provides detail on land compensation measures) and the Economic and Social Implications of ACG/BTC (and Shah Deniz) in the Regional and National Context' (Regional Review) are not required to be part of the ESIA. However, they will be made publicly available in autumn 2002.
  Further details of the Community Investment Programme are given in Addendum Section 6.14.1 and of the land acquisition and compensation process in Addendum Section 6.7
- The methodologies used for collecting social and environmental data are very different and therefore often need to be portrayed in a different manner, as outlined in draft ESIA Section 7.9.2. The methodologies chosen for environmental and social impact assessment were those considered most appropriate for this project. Quantitative socio-economic information that was collected is presented in draft ESIA Section 9, the Socio-economic baseline. Baseline infrastructure characteristics are presented geographically (by KP points) in the Addendum Figures 6.3 a-j

- The recommended changes to the wording are noted here. The draft ESIA will not be reprinted and as such these changes cannot be reflected in the actual documents
- The HGAs have been published in English and Georgian. They form part of the public record, and constitute the law of Georgia. The Georgian government has formal responsibility for communicating legislative changes throughout the country. The projects have made the HGA available to anyone who requests a copy and will continue to do so.
  The project is willing to work with district and local administrations to clarify the institutional framework set out in the HGAs should they directly request such assistance
- Additional draft ESIA documents were delivered to those requesting them during the Public Disclosure Period whenever possible. Details of what documentation was distributed to which organizations and stakeholders is given in the updated Public Consultation and Disclosure Plan (Addendum Annex 5)

6.3.5 Issue: draft ESIA translation

Description of Issue Several comments were made criticizing the standard of translation of the disclosure documentation. In particular, it was felt that technological analysis was difficult owing to errors in terminology. Criticism was made that the Russian and Georgian versions of the Summary of the Disclosure Process do not agree on the locations in which the disclosure documents are on deposit. A comment was made that the Georgian community pamphlet should be more positive with respect to the likely change in access to energy as a result of the project. Some felt that the English version was more positive.
Issue Drawn from Comments: 235, 665, 907, 1412, 1415
Issue Relates to Following Sections of draft ESIA: Appendix F Annex 1

Response To Issue

Translation was provided into local languages in order to facilitate understanding of the disclosure documentation in Georgia. Translation was carried out by Georgian and Russian native speakers , with extensive quality assurance. Unfortunately there were some instances where the translation to Georgian and Russian did not effectively communicate the required information. This was particularly the case for complex technical concepts and terminology. These points have been noted here and increased quality control efforts will be made for future translations.

6.4 SOCIO-ECONOMIC BASELINE

6.4.1 Baseline

Description of Issue

The issues identified with regard to the Socio-Economic Baseline are summarized below.

Data Gaps

- Concerns were expressed over data gaps in the baseline and requests made to describe the means to address these gaps. The gaps identified included:
  - Fisheries (sport, subsistence and commercial)
  - Tourism and tourist areas, in particular the mapping of resorts crossed by the pipelines
  - A baseline assessment of the Borjomi District
  - Gender differences
  - Life expectancy
  - Health baseline information
  - Community water supply, including water sources, centralization and water quality
  - Insufficient consideration of ethnic tensions
  - Education and cultural entities
  - Insufficient information concerning whether the national Maternal Mortality Rate applies along the pipeline route

Requests for Additional Analysis

- Requests were made for quantification and mapping of socio-economic baseline characteristics eg ethnicity, land use and tenure, healthcare and power supply at village level. Requests were also made for KP numbers to be inserted into the maps
- Criticism was made that there were insufficient links between the baseline data and the mitigation measures
- Concern was expressed that the surveys were carried out only in the pipeline-affected areas. This was considered inadequate, as surveys in other areas were felt to be necessary to create control groups for future analysis of pipeline impacts. It was also proposed that pipeline-impacted area data should be compared with regional or national tendencies. Finally, it was stated that a distinction between the agricultural (Samtskhe Javakheti) and industrial (Kvemo Kartli) regions should have been drawn

Data Accuracy

- A concern was expressed regarding the accuracy of data. In particular:
  - GDP is given in the baseline at 10 times the actual GDP
  - Inaccurate employment variable, as the ‘self employed’ category, an important aspect of rural areas, has not been considered
  - Statements regarding service availability, including healthcare facilities, fire departments and banking services (draft ESIA Section 9 Table 9-9)
  - Anomalies regarding the source of income

- Inaccurate data regarding the levels of income and Tsalka's ranking in terms of income
- Inaccurate statements that the largest harvest is from Borjomi and that Akhaltsikhe is known for cereals and viticulture (draft ESIA Section 9) Also, there was no mention of potatoes, the main agricultural product of the region

Issue Drawn from Comments: 315, 428, 746, 750, 910, 911, 915, 946, 960, 1003, 1005, 1007, 1009, 1010, 1015, 1061, 1073, 1256, 1270, 1275, 1286, 1314, 1316, 1317, 1318, 1347, 1357, 1379, 1383, 1384, 1386, 1387, 1388, 1389, 1390, 1391, 1392, 1393, 1394, 1413, 1431, 1433, 1434, 1435, 1488, 1494, 1870, 2144, 2286, 2623, 2624, 2626, 2628, 2629, 2630, 2631, 2632, 2633, 2634, 2635, 2657, 2658, 2704, 2780, 2879, 2885

Issue Relates to Following Sections of draft ESIA: Section7, Section 8, Section 9, Section 10, Section 11, Section 16, Appendix D Annex 1

Response To Issue

Data Gaps

As with any study of this nature, it is not feasible, or indeed necessary to compile an exhaustive description of the baseline environment over all seasons and a number of years. Rather the approach is to undertake sufficient studies at the most appropriate time in order to gain a sufficient understanding of the characteristics of the environment and the significance of potential impacts.

Fisheries

Only 1%of the directly affected communities gave fishing as a source of income during consultation (draft ESIA Section 9.4.6). The environmental baseline assessment in the draft ESIA (Section 8) contains a list of the fish species relevant to surface water bodies. The environmental impact assessment addressed activities that could potentially impact surface waters, such as hydrotest water abstraction and discharge. Appropriate mitigation measures have been identified to address these potential impacts (draft ESIA Section 10). As a result there will be no significant impact on fisheries in the area and additional baseline information was therefore deemed unnecessary.

Tourism and Tourist Areas

Exact numbers of tourists are difficult to quantify as accurate data are not collected at a national or regional level. However, estimates from various local sources such as the Gamgeoba in Borjomi and hotel owners in Bakuriani reveal that both are popular destinations for tourists in summer and winter (see Table 6-1 below).

Borjomi and Bakuriani attract relatively significant numbers of tourists during the summer and winter months. In summer, people come from Tbilisi and other parts of Georgia for their holidays and to escape the heat of the city. Bakuriani in particular is considered a desirable destination owing to the health benefits associated with the high altitude and the fresh air. In winter the ski resorts in these vicinities are visited by Georgian nationals and some foreigners.

It is estimated that there are seven hotels in Borjomi, where the turnover is higher in summer, and approximately 50 hotels in Bakuriani, where the turnover is higher in winter.

Table 6-1 Seasonal Tourist Numbers in Borjomi and Bakuriani

	BORJOMI	BAKURIANI
SUMMER SEASON	380	2,000
WINTER SEASON	200	3,000

Note: data based on telephone survey of hotels and Gamgeoba

Although these tourism figures are high in comparison to the other areas along the pipeline route, they have decreased significantly in the last decade. For example, approximately 17,000 tourists were reported to have visited the area incorporating Borjomi and Bakuriani in 1989.

Baseline Assessment of Borjomi Environs

The Borjomi area has had the same level of socio-economic assessment as the other regions affected by the project. The baseline assessment has concentrated upon the areas considered "project affected" ie 2km either side of the pipeline route and 5km radius around the AGIs. Additional scientific studies have also been carried out for key issues in the Borjomi area, including hydrogeology (see Addenda Appendix I and Addenda Section 5.12.3).

Gender Differences

An analysis of the underlying data reveals that no significant differences were found between the attitudes and opinions of men and women regarding their most significant problems (at household and village level), their concerns and expectations about the construction and operation of the pipeline and other aspects of the project. The baseline therefore does not refer to differences, as they were not revealed during the process of consultation. However, it must be noted that the consultation was done at household level and was not a gender-specific survey.

Life Expectancy

Life expectancy is addressed in draft ESIA Section 9.3. This was based on National data statistics (as sourced in draft ESIA Section 9.3). Life expectancy at birth in Georgia is 73 (World Bank World Development Indicators, Year 2000), with a large discrepancy between life expectancy of women (77 years) and men (69 years). Average life expectancy has improved from 71 years in 1980.

Health Baseline Information

As stated in draft ESIA Section 11 and draft ESIA Section 9.3.6 Footnote (1), all data reported in the section on public health was from National data statistics for the country as a whole. This data is considered to be a reliable representation of health at a national level. The information contained in the baseline was considered to be suitable for the purpose of this ESIA. As discussed in the draft ESIA, it is considered that the only potential health related impact on the community associated with the project is the spreading of some communicable diseases (draft ESIA Section 11 Table 11-6). Mitigation measures associated with health impacts are discussed in draft ESIA Section 11 and Addendum Section 6.10. Hence, it is not considered appropriate to undertake additional baseline health studies as the studies do not relate to predicted impacts for the project.

Community Water Supply

An analysis of community water supply was presented in draft ESIA Section 9.6, including information on access to running water, alternative water sources, reasons for problematic water supply and irrigation systems. The Community Survey Summary (draft ESIA Appendix D Annex 1) provides an overview of infrastructure, including water infrastructure and accessibility for each pipeline- affected community. Further details of water sources and quality can be found in draft ESIA Section 8.8. Additional surveys of community water use will be carried out as part of the detailed studies for the Oil Spill Response Plan. Additional maps showing baseline infrastructure in communities are presented in Figures 6.3a-j of this Addendum.

Ethnic Tensions

The ethnic tensions that exist in Georgia and in the project-affected areas are referred to several times in draft ESIA Section 9. In particular, it is mentioned that there is anecdotal evidence that tensions exist between the Turks and Armenians, primarily for historic reasons. Concerns were also expressed that if "foreign" workers were brought in for pipeline work, it would create tensions. This level of information regarding ethnic tensions was considered to be appropriate for the development of mitigation measures for the ESIA. Further information on mitigation measures to deal with ethnic tensions is given in Addendum Section 6.9.2.

Annex A2 of a study carried out by the Urban Institute and Barents Group for the Georgia Local Government Reform Initiative provides further information in this regard and can be referred to for a more detailed analysis of conflict at a national and regional level. The study is entitled "Baseline Assessment for Georgia Local Government Program", with Annex A2 entitled "Ethnic and Religious Conflict, Internal Displacement and Human Rights".

Education and Cultural Entities

Education is addressed in draft ESIA Section 9.6, including a citing of the adult literacy rate in Georgia (99%) and a breakdown of levels of educational achievement and school attendance at route level. Although school attendance was found to be high (90% in most areas), an analysis was done of why some children do not attend school. The main reason cited was that there was no school in the immediate vicinity. Educational infrastructure is discussed in this section, with many communities reporting that the schools have suffered enormous amounts of deterioration and degradation, to the point that some are unusable.

The Environmental Baseline (draft ESIA Section 9) addresses cultural heritage and archaeology in the form of archaeological sites and historic monuments in draft ESIA Section 8.10. Extensive consultation was conducted with the Centre for Archaeological Studies in order to create a project archaeological strategy aimed at identifying and protecting archaeological resources. There is an extensive and in-depth baseline analysis and any further analysis of 'cultural entities' is considered to be beyond the scope of an ESIA.

Maternal Mortality Rate

The actual number of maternal mortalities is quoted at 68.6 per 100,000 live births in draft ESIA Section 9.3.6 and is compared to the WHO target for 2000 for the European Area of 15 per 100,000 lives. It is not expected that the Project will impact upon the Maternal Mortality Rate and so more detailed analysis was not considered necessary.

Additional Analysis Requested

Quantification and Mapping

The Socio-Economic Baseline (draft ESIA Section 9) addresses baseline characteristics at district level. Where there are villages that are statistically very different from the others in the district, these are noted. Draft ESIA Section 9 Table 9-2 presents a list of the settlements along the route. Appendix D Annex 1 provides detailed information about each village, including information on population, main ethnic groups, attitude to the pipeline, expectations, infrastructure (water, electricity, gas, telephone, roads) and the social needs of the village. Infrastructure characteristics have been mapped (with KP points) and are included in this Addendum, Figures [6.3 a-j].

Links between Baseline and Mitigation Measures

The ESIA methodology and approach followed standard international social impact assessment practice. The first stage involved a scoping exercise to identify key issues that warranted further investigation. Targeted field and desk based studies were then undertaken in order to allow a comprehensive description and understanding of the socio-economic baseline environment. The baseline was analysed in relation to project activities during all phases to understand the potential negative and positive impacts of the project. As appropriate, mitigation measures were developed in response to those issues that were deemed to be of potential significance. There is thus a fundamental and inherent link between the baseline, potential impacts and the mitigation measures. The complexity of the impact analysis and mitigation development means that it is not feasible (or desirable) to attempt to elaborate all of the linkages between the baseline and mitigation measures.

Comparisons between Communities and Regional and National Data

Impacts are most directly experienced at the project level (actual pipeline and facilities construction and operational activities). Understanding the regional impacts is important, but as the level of 'administrative unit' increases, the necessity to conduct baseline assessment decreases, because the cause and effect relationship of project activities and impacts diminishes. It is standard international practice for social impact assessment of projects such as BTC to carry out baseline assessments in the area which will experience direct project impacts.

Other reports address issues at the national and regional level and are not covered in detail in the ESIA report. Key regional and national issues have been covered in a separate independent study commissioned by BP entitled 'Economic and Social Implications of ACG/BTC (and Shah Deniz) in the Regional and National Context' (Regional Review) "The Regional and National review is intended to complement the ESIAs and has been conducted to better understand the issues and challenges presented for the ACG, BTC and Shah Deniz projects from a broad regional and national perspective, to better understand how the projects can optimise its contributions to the communities and the people of Azerbaijan, Georgia and Turkey and to minimise potential risks to project delivery.

The study entitled "Initial Capacity Strengthening for Social Monitoring of Southern Caucasus Energy Transit Projects in Kvemo Kartli and Samtskhe Javakheti Regions of Georgia" provides baseline statistics at a regional and national level. In this report, a distinction between the agricultural and industrial regions of Kvemo Kartli and Samtskhe Javakheti. This will be taken into consideration as a context for the route-level monitoring process.

Accuracy of Data

Incorrect GDP

The GDP is given as US $22.8 Bn in draft ESIA Section 9 Figure 9-1. There are a number of ways of expressing GDP. The figure in the ESIA is shown at purchasing power parity (PPP), as sourced from the CIA World Factbook 2000. According to the World Bank data, total GDP in 2000 was US$3.03 billion.

Employment Variables

Although the baseline section does not use the term "self-employed", this aspect of employment is covered in draft ESIA Section 9.5. The delineation between wage income (ie those with an employer) and income through the sale of agricultural products and livestock (ie those who are in effect self-employed) gives a clear indication that the different groups have been taken into account.

Underemployment is mentioned a number of times in draft ESIA Section 9.5. The number of people whose main source of income is from the sale of agriculture and livestock, etc. is greater than the number whose income is earned through wages. However, the amount of income earned through wages is much higher. This anomaly reveals the level of underemployment.

Service Availability

As stated in the title of draft ESIA Section 9 Table 9.9, statements on service availability are perceptions of services as seen by the surveyed communities and not statements of fact. The footnotes in this section (footnote 1 and 2 under draft ESIA Section 9.6.2) make it clear that these are generalizations. For example, a statement is made that fire departments and banks are virtually non-existent along the route, but the footnote (1) clarifies this by stating that there is, for example, a fire station in Akhaltsikhe, but residents of nearby communities report that the station lacks water and petrol for the fire truck.

Crop Cultivation and Potatoes

The dominant crops in each district are given in draft ESIA Section 9.4.3.1 Table 9-7. This shows that 'vegetables' are the dominant crop type in each district and hence in the entire survey area. Each crop type is described as a whole rather than broken down into specific plant types such as potatoes, cucumbers or tomatoes. Potatoes are mentioned as a 'typical' crop grown in vegetable plots (draft ESIA Section 9.4.2), but the consultants acknowledge that the fact that potatoes are one of the main agricultural products in the survey area.

The statement that "Borjomi is the district where the largest number of respondents cultivate crops" does not necessarily imply that the largest harvest is from Borjomi. The fact that the most grain is grown in Akhaltsikhe in comparison with other districts along the route is true based on the information received from respondents of the surveys.

Source of Income

Draft ESIA Section 9.5.1.2 provides a detailed account of the source of income according to data gathered and analysed from surveyed communities. The number of people whose main source of income is from the sale of agriculture and livestock, etc. is greater than the number whose income is earned through wages. However, the total amount of income earned through wages is much higher because agricultural produce has very low value. This is related to the underemployment issues discussed above.

Concern was expressed that there was conflicting information about the sources of income within this section. There is no conflicting information in this section. This is a misperception based on the anomalies resulting from underemployment, as described above. Even though more respondents earn income from the sale of agricultural produce, their level of income is very low. The most actual cash is earned in the form of wages, but this is distributed amongst fewer people.

Based upon the feedback received, a re-assessment of the analysis was undertaken and has proven these results to be correct. It should be noted that accurate income data is always difficult to obtain through consultation. It is usually necessary to also consider expenditure data, as is presented in the draft ESIA.

Amount of Income

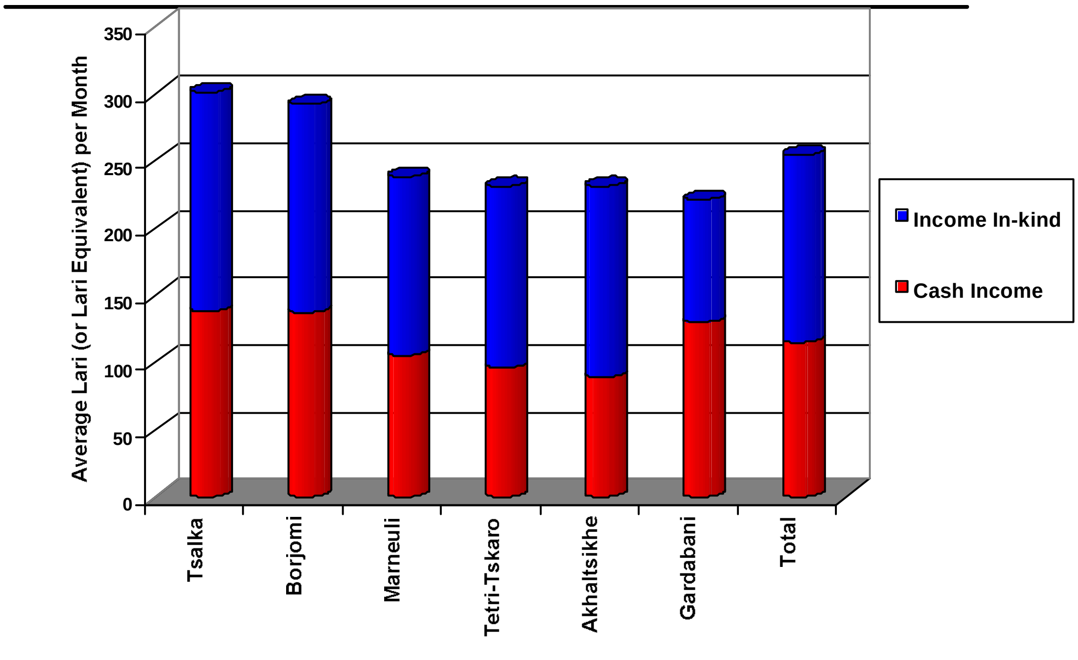
An audit of the data entry process has identified a coding error in the entry of income and expenditure level data. As a result, the data presented in draft ESIA Section 9.5.2 have been revised and are presented below. The ranking of districts by income levels has changed, with Tsalka now ranked the highest and Gardabani the lowest.

This revision process has also provided an opportunity to include in-kind income in the income analysis process; hence this section is now slightly more comprehensive than at the time of production of the draft ESIA.

Income and Expenditure (Revised)

The average household income (excluding in-kind income) the communities surveyed is approximately 115 Lari, or US$51.36 per month. However, if one accounts for in-kind income (that is income in forms other than cash such as vegetables), a large component of an increasingly cash-poor population, the average income is approximately 253 Lari or US$113 per month (see Figure 6-1 below). According to the survey results, surveyed communities in Tsalka have the highest average levels of cash income, at 138 Lari, or US$61.6 per month. However, as in the rest of the districts (with the exception of Gardabani), this accounts for less than 50% of the total income in the surveyed communities. The surveyed communities with the lowest level of cash income is in Akhaltsikhe, with surveyed communities receiving an average of 89 Lari or US$39.8 per month.

Figure 9-1 Average income in the surveyed communities (average Lari, or Lari Equivalent) per month

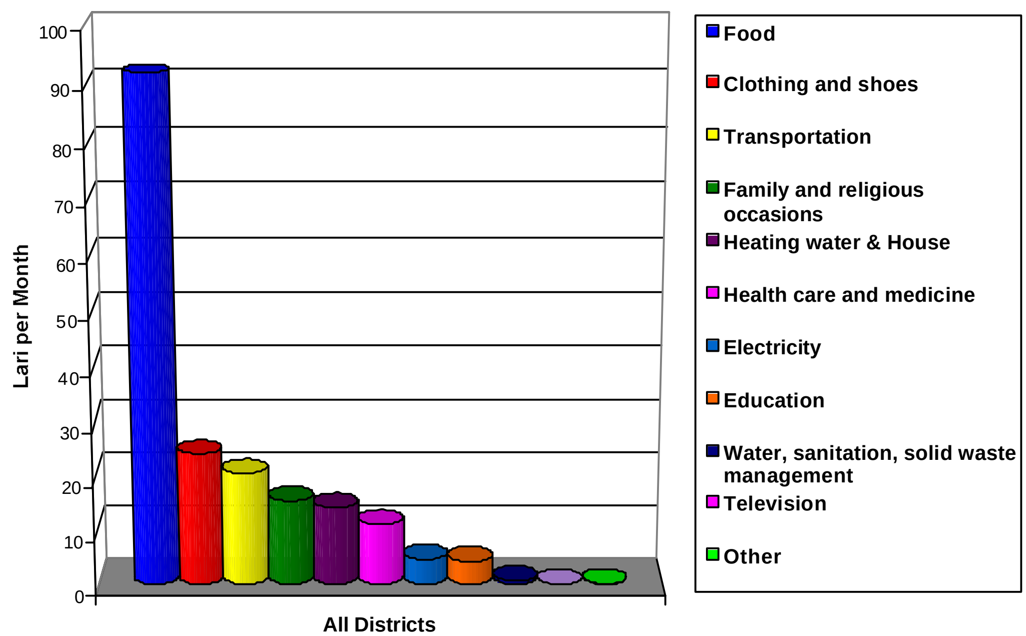


Note: Analysis based on results of quantitative household interviews (n=708)

In the surveyed area, the average monthly expenditure per household is 217 Lari, or $US 96.9 per month (see Figure 9-2 below). Because money income is difficult to calculate, it is not unusual in a survey such as this for expenditures to be reported as higher than income. This reflects, however, the fact that people are becoming increasingly cash-poor.

Residents of Gardabani and Marneuli tend to spend the most each month (292 and 254 Lari respectively), while residents of Tetritskaro report the smallest expenditures per household (174 Lari per month). Approximately 73% of household expenditure for surveyed households across all six districts was on food, transportation and clothing. Education, electricity and water, sanitation and solid waste management represent the three smallest household expenditures. This can be explained by the fact that education is free, there is little electricity to be had, especially in winter, and there are almost no water, sanitation or solid waste management services in existence in rural Georgia.

Figure 9-2 Average household monthly expenditure in surveyed communities



Note: Analysis based on results of quantitative household interviews (n=708)

6.5 ACCESS TO ENERGY

6.5.1 Issue: access to energy

Description of Issue
There were a number of requests from communities that indicated both Georgia the country, and their village in particular, should receive gas from the SCP pipeline. Some communities wished to directly tap the pipeline, others just to receive a supply. Other communities generally requested increased access to energy as a result of the pipelines' presence in Georgia. Expectations about the need to pay for gas and electricity varied.
Issue Drawn from Comments: 59, 99, 115, 118, 132, 138, 152, 185, 191, 201, 592, 651, 669, 1074, 1096, 1122, 1151, 1191, 1200, 1205, 1228, 1372, 1373, 2568, 2570, 2573, 2576, 2592, 2775, 2782, 2812, 2851, 2853, 2854, 2855, 2856, 2947, 2948, 2953, 2966, 2979, 2983
Issue Relates to Following Sections of draft ESIA: Section 9.7, Section 11, Section 12.3, Appendix F Annex 1 Section 5

Response To Issue

The provision of national energy supply and infrastructure remains entirely within the remit of the national government.

BP seeks to provide expertise and experience to those involved in the country's energy planning, and supports the Government and other authorities in rebuilding the energy networks, particularly along the pipeline route. In addition, the Shah Deniz Georgia HGA provides for gas supply from the SCP project to Georgia, which will help mitigate community expectations to some extent, depending on how this additional gas is distributed by the government within the existing gas infrastructure.

It is recognized that access to energy is perceived at the national level and among pipeline affected communities to be of high importance. The responsibilities for ensuring access to energy were outlined during public and community meetings and within community brochures. Some community expectations will not be met as the project will not provide communities with additional power directly. However, the Community Investment Programme will consider projects aimed at sustainable alternative energy supply.

Gas cannot be safely diverted from the pipeline to communities along the route by simple taps on the pipeline owing to the high pressures required for transportation. The risk of local people trying to tap directly into the gas pipeline will be managed through the Community Relations Programme. As stated in draft ESIA Appendix F Annex 1 Section 5, one of the objectives of the programme will be to 'maintain awareness of safety issues among communities along the route'. In addition, there will be regular horseback patrols along the route to monitor the safety and security of the local population (draft ESIA Section 11.3).

6.6 LOCAL EMPLOYMENT AND PROCUREMENT OPPORTUNITIES

6.6.1 Issue: recruitment

Description of Issue

Information about employment opportunities and the recruitment process was frequently requested by communities along the route, Government, NGOs and other stakeholders. Support was expressed for the positive effect employment on the pipeline construction would have in Georgia. Issues and questions raised are summarized below.

Scale of Employment Opportunities

Additional information was requested and criticism made of the scale of employment opportunities, including:

- The total number of people to be employed during construction and operations
- The proportion of Georgian versus foreign employees
- Clarification on the number of skilled, unskilled and semi-skilled workers
- The specific number of people from particular villages or areas to be employed
- Conflicting information regarding the % of Georgian nationals to be employed:
    - Community pamphlet page 5 'it may be possible for Georgian nationals to fill

50-80% of these construction jobs,' pg 6 'it may be possible for Georgian nationals to up to 80% of these construction jobs'

- Suggestion that the HGA states that 80% of employees should be Georgian
- It was felt that based on previous pipeline construction experience, 80% of the workers should be Georgian

The Recruitment Process

General

Questions were asked and feedback given about:

- The date of commencement and duration of recruitment
- Location of recruitment centres and requests for mobile recruitment centres to overcome problems of lack of access to stationary recruitment centres
- Advertisement of jobs, details of the jobs available and qualifications needed
- The responsibilities of the construction contractor for recruitment, including the contractual responsibilities

Corruption

Many comments were given with regard to awareness of, and measures to overcome corruption, such as:

- The need to avoid corruption (payment for employment) and lists of preferred individuals. Some people reported that such lists already exist, and others asked where to leave application forms that had already been filled in
- Requests that local information centres on recruitment and telephone hot lines should be set up as a priority in order to counter corruption
- A suggestion that it should not be possible to sign a direct deal between employers and employees as this diminishes the transparency of the arrangement and encourages corruption

Overseeing/ Managing the Recruitment Process

- Conflicting requests were made regarding the role of local government representatives in the recruitment process. Some requests were made for the supervision of the recruitment process by local authorities (and Gamgebelis) and others said that the involvement of local government representatives would lead to more corruption
- Other requests were for the involvement of local state labour exchanges, NGOs and non-Georgians in recruitment and many organizations offered to help with the recruitment process
- It was also suggested that a collective agreement (contract) should be secured with the trade unions as one contracting party, to manage the collective agreement with the employer and to ensure that the social security requirements for employees are adhered to

Equality and Transparency in the Recruitment Process

Many comments and requests were made regarding equal opportunities during the recruitment process, including:

- The need to further elaborate the anti-discrimination (gender, religion, ethnicity, age, marital status) employment and recruitment strategies, including criteria and boundary conditions
- Prioritisation of the recruitment of those living in communities close to the Right of Way

Skills required

Requests and comments were made regarding:

- The criteria for classification of skilled, semi-skilled and unskilled workers and a suggestion that employment should be based on practical skills rather than formal qualifications
- Concern that only unskilled and semi-skilled local people will be employed by BP, while skilled locals will not be employed
- Specific recommendations about an area with particular skills (eg technical college in Vale, service industries in Borjomi) or with particular needs (eg a particularly new or poor community)
- Specific questions and/or applications for specific jobs eg security staff, welders, public relations, doctors, nurses, English speaker, journalist, drillers, drivers, mechanics, accountants, kitchen workers, economists, engineers, and non-specific jobs

Operations

- Whether people will continue to be employed after construction

Issue Drawn from Comments: 34, 35, 36, 40, 45, 48, 61, 72, 74, 78, 84, 98, 103, 110, 123, 125, 134, 137, 139, 140, 160, 172, 216, 219, 221, 237, 246, 251, 252, 257, 377, 403, 415, 416, 442, 443, 460, 468, 481, 484, 487, 488, 490, 527, 545, 561, 563, 564, 568, 583, 584, 597, 598, 600, 609, 626, 633, 635, 638, 640, 644, 646, 647, 649, 650, 654, 659, 666, 667, 678, 679, 683, 686, 694, 737, 738, 739, 741, 749, 753, 755, 764, 769, 808, 909, 914, 916, 917, 919, 921, 927, 929, 931, 934, 935, 939, 959, 978, 980, 981, 1001, 1107, 1108, 1011, 1112, 1014, 1124, 1125, 1128, 1131, 1133, 1134, 1136, 1138, 1140, 1143, 1148, 1149, 1152, 1154, 1158, 1163, 1164, 1165, 1169, 1172, 1182, 1197, 1202, 1203, 1204, 1206, 1215, 1218, 1221, 1230, 1238, 1259, 1260, 1262, 1271, 1272, 1273, 1276, 1277, 1280, 1338, 1365, 1370, 1397, 1398, 1477, 1491, 2500, 2501, 2502, 2524, 2530, 2531, 2536, 2546, 2565, 2578, 2582, 2588, 2591, 2604, 2608, 2638, 2639, 2642, 2643, 2674, 2699, 2705, 2706, 2711, 2815, 2850, 2863, 2864, 2887, 2890, 2892, 2899, 2902, 2907, 2909, 2910, 2914, 2918, 2925, 2929, 2934, 2938, 2943, 2967, 2976, 2984

Issue Relates to Following Sections of draft ESIA: Section 11.3, Section 14

Response To Issue

Scale of Employment Opportunities

The details of employment opportunities are addressed in draft ESIA Section 11.3 and Table 11-2. In summary, estimations of employment for each of BTC and SCP are as follows:

- Total of 2,500 people employed during peak construction periods, of which
    - 1,700 on pipeline construction
    - 500 on the construction of AGIs
    - 300 on the construction camps and pipe yards
- It is possible that:
    - 50-80% of the 1,700 pipeline construction jobs can be Georgian nationals
    - 30-65% of the 500 AGI construction jobs can be Georgian nationals
    - The majority (almost all) of employees on worker camp and pipe yard construction will be Georgian nationals
- Total of 50 people employed during the operational phase, of which it is possible that 80% will be Georgian nationals
- Estimates of employment at a "local", ie route level were made rather than for specific areas and/ or villages within the pipeline-affected area

Clarification regarding the number of skilled, unskilled and semi-skilled workers will be provided once the construction contractor has finalized the recruitment strategy.

The employment targets (50-80% Georgian nationals on pipeline construction and 30-65% on construction of the AGIs) have been developed to allow the safe and proficient construction of the pipeline and facilities. The targets are believed to be realistic and achievable.

The confusion regarding conflicting information about the percentage of jobs available for Georgian nationals arises from the wording in the Community Pamphlet. "It may be possible for Georgian nationals *to fill* 50-80% of construction jobs" amounts to the same as "*to fill up to* 80% of these construction jobs". The latter sentence provides the estimated upper limit of employment of Georgian nationals. BP acknowledges that this wording should have been more clear.

At no time does the HGA commit to the figure of 80% of employees being Georgian nationals. Rather, it states that BP and any contractor are "*...authorised to select and determine the number of employees to be hired by it or them in connection with Project Activities.*" (Clause 18.2) Furthermore, BP has "*the absolute and unrestricted right and privilege to employ or enter into contracts with, for the purpose of conducting Project Activities, such Persons and their respective personnel (including citizens of the State and, subject to Section 7.2, of countries other than the State) who, in the opinion of such Project Participant, demonstrate the requisite knowledge, qualifications and expertise to conduct such activities*" (Clause 4.1).

In practical terms, the figure of 80% is the absolute upper limit at which the project engineers and consultants estimate that jobs will be filled by Georgian locals. This is based on previous experience of pipeline construction at this level of technological design, as well as the complex landscapes to be dealt with during construction of the pipeline. The engineers and consultants estimate that a project of this type will realistically require specific high-level skills and pipeline expertise, which are unlikely to be found in Georgia, as it is a country with little long-term experience of pipeline construction.

The Recruitment Process

General

Recruitment will begin when the employment strategy has been finalized and recruitment centres have been established. The majority of recruitment of skilled workers will be done within the first few months of construction. The recruitment of unskilled and semi-skilled workers will continue throughout the construction period. As the pipeline construction process moves along the route, and enters different localities, those living in the project-affected communities will be recruited.

It is most likely that recruitment centres will be established in the major towns and cities along the route, including the towns of Gardabani, Marneuli, Tetritskaro, Tsalka, Borjomi and Akhaltsikhe, to ensure they are accessible to all. A recruitment centre will also be established in Tbilisi (draft ESIA Section 11.3 and Table 11.2). The construction contractor will establish mobile recruitment centres if this is deemed to be an effective and accessible mode of recruitment. However, it is most likely that the recruitment centres will be stationary and that the community relations officers will ensure that all applications reach the recruitment centres. Job descriptions, job availability and qualifications required will be posted at each of these recruitment centres, whether stationary or mobile.

The recruitment responsibilities of the construction contractor are outlined in the Invitation to Tender and are described in draft ESIA Section 14 in the Employment and Training Management Plan as outlined in Table 14-1. The employment strategy and the construction contractor's responsibilities will be agreed with BTC Co before recruitment and construction commences.

Corruption

BTC Co take the issue of corruption during the recruitment process very seriously.

At no point will lists of preferred individuals be accepted by the construction contractor. No payment will be involved at any stage in job applications. The only way to apply for a job will be through the official recruitment centres.

The construction contractor will be required to work with BTC Co to establish an employment strategy that is transparent, public and open to all regardless of ethnicity, religion or gender. The construction contractor will advertise detailed information on job opportunities and the application procedures when the recruitment process begins. The mitigation measures which seek to avoid corruption during recruitment are outlined in draft ESIA Section 11 Table 11-2 E3.

BP has already put in place a number of measures to ensure the correct information reaches communities, including:

- Explanation of recruitment process during community and public meetings
- Distribution of employment pamphlets (see Addendum Appendix 5 Attachment 3)
- Clarification of the recruitment process through the media, including advertisements in 11 central and five regional newspapers, television and radio interviews, and the distribution of 700 posters in the regions through the local governor's offices

- A telephone number for employment related queries (effectively a hot line) has already been set up and the number advertised in the advertisements described above

The following additional procedures will be in place during recruitment:

- Any information received by BTC Co regarding corruption will be treated as a matter of priority
- There will be ongoing monitoring of the recruitment process by BTC Co
- The Community Relations Programme will ensure community members are able to report any perceived corruption to Community Liaison Officers (draft ESIA Section 11.6) or to recruitment officers at the recruitment centre (if deemed appropriate)
- Every effort will be made to communicate the correct information in a manner accessible to the community, such as placing posters in those communities without access to electronic media

Overseeing/ Managing the Recruitment Process

As stated above (and in draft ESIA Section 11.3 and Table 11-2) the construction contractor will be required to work with BTC Co to establish an employment strategy that is transparent, public and open to all regardless of ethnicity, religion or gender. The construction contractor will need to be independent of any third parties that may bias recruitment in any way. Recruitment will not be overseen by community members or regional or district authorities. However, the construction contractor will rely on third parties such as local government representatives, local state labour exchanges and NGOs for information and local knowledge that might be useful in the recruitment process. This will be visibly overseen and monitored by BTC Co. In addition, workers will have the right to join trade unions, but direct employment recruitment with the unions will not take place.

Please note that the sentence in Table 11-2 E3 Management and Mitigation Measures “It is suggested that recruitment should also be overseen by a respected local community member. This might be the Gamgebeli, Head of Sakrebulo or an informal community leader such as a teacher or doctor” is retracted.

Equality and Transparency of the Recruitment Process

This issue is addressed in detail in draft ESIA Section 11.3 Table 11-2 and Section 14.3.4. It has also been reiterated throughout consultation and disclosure. Transparency and openness of the recruitment process, as well as prioritisation of the local communities will be a very important part of the employment strategy as agreed by the construction contractor and BTC Co. The prioritisation of project affected communities for employment has been emphasized throughout the ESIA process, as stated in Section 11.3 and Table 11-2.

Skills Required

A basic outline of classifications for skilled, semi-skilled and unskilled workers is given in draft ESIA Section 11.3.1.1. The specific requirements for each skill level will be made available by the construction contractor at the commencement of the recruitment process and throughout construction when further recruitment is taking place. These requirements will be made available at the recruitment centres at least one month prior to recruitment in the area, as well as through the media channels considered accessible to all Georgian nationals. Draft ESIA Section 9.8 details information sources in the pipeline-affected communities.

The selection of workers in each skills group will be done by the construction contractor's recruitment specialists on the basis that it is fair and transparent and the candidate meets the requirements of the job. This will be assessed in a way in which the construction contractor can recruit the most relevant person for the job.

Skilled, unskilled and semi-skilled workers will be given the opportunity to apply for positions relevant to their qualifications. If Georgian nationals with the correct skills and experience apply for the skilled jobs, then they will be given priority over foreigners. However, because of the very specific skills requirements and the need for many years of experience for some of the jobs, it is likely that some Georgian nationals will not be recruited for these particular jobs.

Operations

BTC Co anticipates that approximately 50 staff will be directly employed during the operational phase of the pipeline. Further details of this can be found in draft ESIA Section 11.3.1.2.

6.6.2 Issue: wage levels

Description of Issue Criticism was made that the information in the draft ESIA was limited to the requirements to meet the legal minimum wage. Additional information was requested about the average wage, the method of payment and whether Georgian workers would be the paid the same as non-Georgian workers. It was suggested that if the labour force skills requirements comply with international standards, the salary should also meet those standards. Additional comments were made that according to the philosophy of the HGA, it is necessary that equal salaries are paid for equal jobs, regardless of the nationality of the employees.
Issue Drawn from Comments: 73, 170, 610, 701, 742, 744, 1113, 1219, 1261, 1272, 2641
Issue Relates to Following Sections of draft ESIA: Section 11.3, Section 11.6

Response To Issue

There are no international standards covering the appropriate salary for particular job categories. Salaries over and above minimum wage requirements are generally determined by market forces. As stated in draft ESIA Section 11.3, the construction contractor will be required to pay at least national minimum wage for local workers and expatriates, which will be monitored by BTC Co. All other issues, such as the average wage and methods of payment, will be finalised in the Employment and Training Management Plan. This will be written by the construction contractor working in close liaison with BTC Co in order to ensure that the BTC Co Statement of Social Objectives is implemented and that all jobs are accessible to those with appropriate skills.

The HGA does not contain salary stipulations. The HGA does state that *'[Employment is] subject to requirement that no Project Participant shall be required to follow any employment practices or standards that exceed those international labour standards or practices which are customary in international Petroleum transportation or ii) are contrary to the goal of promoting an efficient and motivated workforce, all employment programmes and practices applicable to* *citizens of the State working on the Project in the Territory, including hours of work, leave, remuneration, fringe benefits and occupation health and safety standards shall not be less beneficial than is provided by the Georgian labour legislation generally applicable to its citizenry'*.

Although the issue of nationality and wage levels is not a subject addressed in the HGA, it is something of which BP is aware. It is unlikely that foreign workers will be employed if there is an appropriately skilled and experienced local labour pool. The construction contractor must reasonably demonstrate to BTC Co that no appropriately skilled locals are available before he can hire foreign workers. Skilled positions will be open to both Georgian nationals and foreigners with the appropriate skill levels. Expatriate workers will be remunerated according to their skills and experience and the market forces in their country of origin. In addition, foreign workers may receive an additional compensation allowance for living away from home.

Where there is an issue over differential wages between Georgian and expatriate workers, this will largely be a perception problem based on the differences between wages for lower and higher skilled work. Any tensions during construction between workers will be managed through the implementation of the Construction Camp Management Plan and Code of Conduct and Camp Rules of Behaviour (draft ESIA Section 11.6). Any tensions between communities and the workforce will be managed as part of the Community Relations Programme by the Community Liaison Officers (draft ESIA Section 11.6).

6.6.3 Issue: training

Description of Issue It was suggested that it would be preferable to train local people to the appropriate skills levels, rather than bring in foreign workers. Additional information was requested on the planned training courses for workers, including the regularity of courses and the number of attendants. A conflicting comment was given that such training would be unlikely to be successful.
Issue Drawn from Comments: 31, 77, 105, 254, 657, 675, 975, 1130, 1264, 1446, 2503, 2644
Issue Relates to Following Sections of draft ESIA: Section 11.3. Section 14.2, Section 14.3

Response To Issue

Construction

Given the short lead time for the construction of the pipeline, it is unrealistic to expect the construction contractor to provide extensive training to local people for highly skilled jobs which require several years training to achieve the appropriate qualifications and experience. Therefore, only those who already possess the necessary basic skills and/or experience to perform the job description should apply. If workers with these skills are available within Georgia they will have the opportunity to apply for these jobs and will be preferentially recruited over foreign workers.

BTC Co will not offer wide-spread training to improve skills levels and then hire individuals from within that pool. Rather, as stated in draft ESIA Section 11.3.2, the contractor will hire unskilled, semi-skilled or skilled personnel and then provide some training to improve their skills.

As stated in the draft ESIA, preference for unskilled labour will be given to local communities. Training will be provided so that every employee meets BTC Co's Health and Safety requirements and understands international construction project standards. Additional training will be provided to some employees in specific skill areas to be identified by the contractor. These may included courses in English language, road vehicles and construction plant operation. These courses will help to build the capacity of local workers for future projects in Georgia, both international and local.

There will also be training for workers in cultural awareness and general environmental management as relevant to their position (see Addendum Section 6.9.5 for further details).

Operations

Expatriate staff will be phased out in the operations phase as national staff acquire and demonstrate the required competence and skills. However, if certain jobs require very specific skills and many years of experience, and if these requirements are not available within Georgia, foreigners will need to be employed to fill these positions.

Training will be addressed in the Employment and Training Management Plan, as outlined in draft ESIA Section 14.2.1 and 14.3.4.

6.6.4 Issue: indirect employment

Description of Issue Criticism was made that the public had received unreliable and controversial information from different sources in the past. In particular, it was stated that incorrect employment information had been publicly released. Concern was expressed that although the project emphasizes the possibilities of indirect employment, this secondary impact is not quantified.
Issue Drawn from Comments: 127, 732, 969, 1260, 1339, 1399, 2640, 2862
Issue Relates to Following Sections of draft ESIA: Section 11.3

Response To Issue

Incorrect Employment Information

BP has disseminated estimated figures of direct employment during construction and operations in a number of ways, including through public meetings, community meetings, articles in the press and the distribution of printed leaflets in local languages. During consultation, BP has taken measures to ensure that expectations of employment creation are as realistic as possible (see Addendum Section 6.9.6).

The details of employment opportunities are as given in draft ESIA Section 11.3 and in Table 11-2. In summary, estimates of jobs created directly by the construction of BTC pipeline are as follows:

- Total of 2,500 people employed during peak construction periods, of which
    - 1,700 on pipeline construction
    - 500 on the construction of AGIs
    - 300 on the worker camps and pipe yards
- It is possible that:
    - 50-80% of the 1,700 pipeline construction jobs can be Georgian nationals
    - 30-65% of the 500 AGI construction jobs can be Georgian nationals
    - The majority (almost all) of employees on worker camp and pipe yard construction will be Georgian nationals
- Total of 50 people employed during the operational phase, of which it is possible that 80% will be Georgian nationals
- Estimates of employment at a "local", ie route level were made rather than for specific areas and/ or villages within the pipeline-affected area

BP cannot be responsible for information disseminated by third parties. For this reason, BP regularly emphasizes the need for potential employees to only consider recruitment given out directly by BP and the construction contractor (see Addendum Section 6.6.1 and 6.9.6).

Quantification of Indirect Employment

The draft ESIA acknowledges the creation of indirect employment by the project (see draft ESIA Section 11.3.2). At no time does the draft ESIA try to quantify this indirect employment, but it does acknowledge that there will be a multiplier effect from local procurement and employment.

Increased employment and local procurement leads to a related increase in cash in the economy, which in turn leads to the creation of more jobs and income as consumers begin to require or demand more goods and services. In economic terms, the multiplier effect shows the relationship between an increase in income and a change in aggregate demand (increased wage income → increased expenditure → increased aggregate demand → increased wage income). In other words, each dollar spent on the project will result in a "multiplier effect" (employment and income) in the broader economy.

At this stage of the project, attempts to estimate the multiplier effect would be based on theory and assumptions. It could be more accurately estimated when project requirements are finalized. BP does acknowledge that the multiplier affect will occur, but cannot quantify indirect employment figures that the are both based on theory and over which BP has no direct control. Indirect employment creation will be discussed in more detail in the Economic and Social Implications of ACG/BTC (and Shah Deniz) in the Regional and National Context' (Regional Review) to be published in late 2002.

6.6.5 Issue: procurement and supply

Description of Issue
Additional information was requested on the procedures to ensure goods and services were purchased from Georgian companies. Questions were asked about how the local population would be able to provide goods and services to the construction workers. It was suggested that the project requirements for equipment should be publicized in the villages along the pipeline route. A variety of offers of goods and services were made. These offers included land for worker camps, private housing, hotels and guest houses, warehouses and other buildings, banking facilities, food, vehicles, materials for construction, construction services, the provision of training by technical colleges and support for land acquisition and management.
Issue Drawn from Comments: 81, 85, 151, 175, 190, 206, 244, 253, 256, 557, 639, 684, 720, 722, 961, 1055, 1166, 1171, 1179, 1211, 1250, 1251, 1253, 1367, 2900, 2961, 2970, 3131, 3132, 3134
Issue Relates to Following Sections of draft ESIA: Section 11.3

Response To Issue

The draft ESIA sets the overall principles and goals for local procurement to ensure that as much benefit as possible passes to Georgian companies and local communities. Local sourcing of goods and services will be maximized, provided local suppliers can offer sufficient quality and reliability and can meet the standards of BTC Co.

It is the task of the construction contractor to draw up the detailed procedures as to how these goals will be reached. It is also up to the construction contractor to decide what types of equipment are needed and at what stage. The construction contractor will contact local suppliers for equipment provision as and when appropriate to the construction schedule.

All offers for provision of goods and services will be passed to the construction contractor by formal letter from BP following the completion of the draft ESIA. It will be the decision of the construction contractor to contact any individuals or companies in the event that the contractor wishes to take up these offers, which are appreciated.

The construction contractor will publicise the fact that goods needed for the project will not be purchased informally at camp locations or work sites, but instead through formal contracts with suppliers.

On 8^{h} May 2002, BP representatives ran a 'Share Fair' which aimed to introduce Georgian companies to the business opportunities resulting from the WREP, BTC and SCP projects and the HSE requirements to be met by suppliers. Over 200 individuals, local companies and NGOs participated. At the Share Fair, companies were requested to register their interest in the supply of goods and services to the projects and this list will be passed to the construction contractor.

6.6.6 Issue: tourism

Description of Issue

There were a number of comments requesting additional assessment of the positive and negative impacts of the pipelines construction on the development of tourism in and around Bakuriani and Borjomi. Concerns were expressed both over the impact on decisions for long term investment in tourism and damage that may be done to the reputation in the case of an accident.

It was suggested that an assessment of the value of the forest and landscape in and around Borjomi should include values other than timber, including the socio-economic and recreational value of the forest.

Issue Drawn from Comments: 291, 297, 339, 347, 352, 370, 372, 534, 620, 634, 662, 949, 998, 1003, 1300, 1346, 1355, 1419, 1462, 1484, 1486, 1554, 1561, 1847, 1952, 1953, 2056, 2549, 2600, 3086

Issue Relates to Following Sections of draft ESIA: Section 10, Section 12, Appendix E Annex 1

Response To Issue

Tourism

It is recognized that the promotion of tourism within the Borjomi, Tskhratskaro and Sakire areas is a priority for local people.

There will be short term negative impacts of construction in Borjomi and Bakuriani as a result of the noise, dust, increased traffic and visual intrusion associated with construction. Mitigation measures to manage these specific impacts are described in Section 10 of the draft ESIA. These impacts will be sufficiently short term as to have no significant long term effect on tourism.

An oil spill in the area would not necessarily have any negative impact on tourism. The likelihood of such an event is extremely low (draft ESIA Section 10.5) and there are a number of design and operations measures in place to minimize the risk and impact of any unplanned event (see Addendum Section 5.12).

Potential impacts on tourism are more likely to be as a result of the visual impact (draft ESIA Section 12.2). A number of mitigation measures have been designed to reduce the visual impacts and the potential effects on tourism, including:

- Re-instatement of the cleared ROW with shrubs and shallow rooted trees
- Re-instatement of project areas in forest areas with tall forest tree species, except directly over the pipeline
- Creation of irregular edges along the ROW to soften the corridor effect
- Use of changes in direction along the ROW to reduce the distance over which the ROW can be viewed

The implementation of mitigation measures over the long term, as described in the Landscape Management Plan (draft ESIA Appendix E, Annex 1) will reduce the significance of the impacts over time as the reinstated vegetation features blend with the surrounding landscape.

There are a number of positive benefits of the pipeline to tourism. Expatriate workers and their families are likely to visit the tourist resorts, and bring money to the region. This will lead to indirect employment opportunities. Additional benefits include those positive residual impacts highlighted in draft ESIA Section 12.3, such as upgrades to existing roads, the building of new roads and the enhancement of local experience and employability will mean there is an improved skills base for the tourism companies to draw on after construction, as well easier access to tourist resorts.

Further discussion of issues specific to the Borjomi area is presented in Addendum Section 5.12.3.

Socio-economic and Recreational Value of Forest

The pipeline does not enter Borjomi Kharagauli National Park and therefore has no impact on the forest there.

It is recognized that forests have a number of additional values over and above those identified in the draft ESIA. This includes not only the value of the timber and food products such as berries, but also the value associated with flood control and the prevention of top soil erosion. Non-use values include those associated with pleasure or appreciation of the forest, ie aesthetic values, and those associated with obligation or duty, ie ethical values (for example feeling that the forest should be left intact to pass on to future generations).

The Right of Way is considered too small in relation to the remaining forest to have any impact on these forest values. Every effort has been made to minimize felling of trees and the pre-ROW clearance surveys will identify specific individual trees in the ROW for preservation.

6.7 LAND ACQUISITION AND LAND BASED LIVELIHOODS

6.7.1 Issue: land compensation and acquisition

Description of Issue

There were a large number of questions about, and criticism of, the land compensation and acquisition process from communities, NGOs and regulators. The following issues were raised:

Land Acquisition Process

- The timing of land acquisition and payment
- The timing of the identification of land owners, and when and how those landowners will be informed
- Clarification of process of dispute resolution and whether force will be used
- Clarification of process to communicate land acquisition process to land owners
- Information about to whom claims should be referred
- Method of payment of compensation, including measures to ensure the money would

not be later stolen

Calculation of Compensation

- The amount of compensation per square metre of land
- The calculation of compensation, including the calculation of the market value of agricultural land and land with permission for building, as well as different crops and animal husbandry and bee keeping
- If there will be annual variation in the amount of compensation and the number of years for which compensation will be paid
- The calculation of compensation in other countries and for the WREP
- The involvement of NGOs, local government and others in the compensation negotiations
- Desire for local government both to be, and not to be, involved in the calculation and negotiation of compensation
- Clarification as to how customary rights beneficiaries will be compensated
- The amount of land to be compensated if the Right of Way only covers a portion of it
- Need for commitment to valuation of lost assets at replacement cost and preference for 'land for land' approach to compensation

Qualification for Compensation

- Compensation for unregistered land, leased land and land owned by the Sakrebulo
- Acquisition of land if the landowner cannot be identified or is not in Georgia
- Limitation of compensation to land-owners on 44m Right of Way, in particular the lack of compensation for those owning land at 45m and above.
- Specifically which land plots will be crossed by the pipe line
- Compensation for those who use the land but do not own it, such as shepherds using seasonal pastures
- Clarification of the compensation for access to forests, fishing and grazing as lost livelihoods

Other

- Criticism of the employment of an NGO which protects land owners rights as an independent third party
- Quantification of the people, livelihoods and businesses to be displaced
- Whether the Company will own or rent the land
- Clarification as to assistance people will receive to ensure they can manage money received
- Criticism of the lack of consideration of the risk of misuse of compensation income
- Clarification as to whether families will be physically displaced
- Quantification of land use and property changes per KP locations.
- Recommendation that land users are educated in how to manage their land to prevent erosion and increase productivity after construction

Issue Drawn from Comments: 39, 42, 46, 47, 49, 50, 53, 55, 64, 65, 75, 80, 89, 90, 91, 92, 93, 94, 100, 102, 112, 113, 114, 116, 120, 121, 124, 126, 128, 129, 141, 143, 148, 150, 158, 159, 168, 192, 194, 198, 217, 220, 230, 233, 250, 376, 385, 387, 388, 389, 390, 392, 395, 397, 401, 402, 404, 410, 413, 417, 419, 420, 421, 422, 425, 434, 436, 437, 439, 440, 448, 453,

455, 458, 462, 464, 466, 467, 473, 477, 478, 483, 486, 491, 492, 494, 499, 506, 507, 510, 521, 524, 525, 526, 551, 554, 555, 556, 570, 571, 572, 618, 670, 671, 674, 676, 690, 693, 695, 721, 760, 762, 818, 917, 918, 936, 937, 938, 940, 941, 943, 947, 968, 970, 977, 985, 991, 1000, 1006, 1021, 1039, 1040, 1109, 1121, 1127, 1129, 1135, 1137, 1139, 1141, 1144, 1150,1168, 1174, 1175, 1176, 1177, 1178, 1181, 1190, 1192, 1196, 1198, 1207, 1210, 1216, 1220, 1222, 1227, 1229, 1239, 1265, 1266, 1274, 1281, 1307, 1310, 1337, 1353, 1368, 1429, 1445, 1452, 1458, 1460, 1481, 1643, 1852, 2031, 2504, 2505, 2506, 2507, 2508, 2509, 2510, 2511, 2517, 2532, 2544, 2563, 2587, 2593, 2597, 2599, 2645, 2646, 2647, 2648, 2649, 2673, 2684, 2685, 2686, 2707, 2787, 2790, 2792, 2795, 2798, 2817, 2818, 2819, 2833, 2866, 2867, 2868, 2869, 2870, 2871, 2872, 2873, 2874, 2883, 2888, 2891, 2894, 2896, 2903, 2904, 2905, 2911, 2913, 2916, 2919, 2921, 2922, 2924, 2927, 2930, 2932, 2935, 2937, 2940, 2942, 2944, 2959, 2960, 2969
Issue Relates to Following Sections of draft ESIA: Section 11.4, Section 14.3

Response To Issue

Full answers to these queries will be given in the Resettlement Action Plan (RAP) which will be publicly available in autumn 2002. A summary of the key information to be presented in the final RAP, dealing with those issues of particular concern to communities, will be distributed to affected landowners, beginning in late September. Consultation with directly affected land owners began in July 2002 through notification meetings, organized and led by a Georgian land rights advocacy NGO. This land acquisition strategy is in line with the World Bank OD 4:30 *Involuntary Resettlement*.

It is beyond the scope of the ESIA to respond to many of the specific comments on land acquisition and compensation received during Public Disclosure. Nevertheless, an update on the current land acquisition strategy, giving additional information from that presented in the draft ESIA and detailing recent developments is given below.

Land Rights Acquisition

The project conducted an extensive legal review of the HGA and Georgian Legislation, to find the most effective and efficient mechanism to obtain the land rights required to build and operate the pipelines, whilst minimising the impact on affected landowners. This concluded that the most effective mechanism available to the projects is to acquire full ownership rights over the land required for the projects.

Estimates of land to be acquired given in the draft ESIA have therefore been updated. The projects will require 248km long and 44m wide Right of Way, total area 1088 ha. In addition, the projects will:

- Permanently acquire land for Above Ground Installations (including two pump stations, one intermediate pigging station, 16 block valve stations and 10 check valve stations) with total area of 70 ha
- Temporarily acquire 85 ha for temporary facilities such as worker camps and pipe yards
- Require less than 3 ha for accessroads (permanent and temporary)_
- Temporarily acquire less than 10 ha for special construction areas

With the exception of AGI land (pump stations, pigging stations and valve stations), following construction of the pipelines the project will allow the previous landowner / land user to have free access to the land acquired for construction of the pipeline. The project will endeavour to return ownership of the land to the original owners. Currently, however, there is no effective property right that can be transferred back to the landowner whilst allowing the project to enjoy the essential rights required for safe operation of the pipeline, as granted in the HGA. Hence, the Project will promote legislative changes, possible as part of a new pipeline legislation, to enable the transfer of land back to original owners encumbered with certain restrictive property rights. Until the appropriate legal framework is in place, the project will retain land ownership.

Payments for Land and Compensation

The project has developed procedures for both the land acquisition and land usage compensation for both lessees of state land and registered owners of land. These documents have formed the basis for the Resettlement Action Plan (RAP). The RAP should be consulted for full details of the land acquisition procedure, land valuations and compensation calculation, but the key points are outlined below:

- Owing to the number of land sales in the regions affected by the Projects being very low, it was not possible to establish a land valuation using a market approach. The WREP pipeline used the State Land Replacement Fee (SLRF) as a basis. As the SLRF is believed to represent a significant premium to the real market value and considers the basic factors of land valuation in its calculation, the figure is adopted as being the basis for private land acquisition and valuation
- The project will aim to enter into a negotiated agreement with the landowner, with expropriation only used as a last resort
- Only private land within the combined BTC and SCP 44m corridor will be purchased
- Crop compensation will be based upon the "gross market value" of crops, ie the turnover generated by the crops, with no deductions for crop inputs. Yields have been taken from figures provided by the Department of Agriculture of each region. An independent consultant has carried out market surveys in Tbilisi and regionally to determine the price of crops that farmers would receive at harvest time

For private land, the project will:

- Purchase land in 44m corridor using State Land Replacement Fee as basis for valuation
- Pay one year crop compensation
- Return land to owner for use with minor restrictions
- Pay three years compensation on land that is 'orphaned' and agreed to be uneconomic
- Replace or compensate full market value for non-moveable assets
- Assess on a case by case basis compensation for reduced production post construction

For state land leased or used by individuals or entities, the project will:

- Pay lease / tenant for standing crop at time land is taken
- Pay compensation for lost crops for construction period, typically for three years
- Pay three years compensation on land that is 'orphaned' and agreed to be uneconomic
- Pay three years compensation for pasture using hay as basis for calculating compensation
- Replace or compensate at full market value for noon-moveable assets

6.7.2 Issue: land use restrictions

Description of Issue Information was requested about when and how the Right of Way and land adjacent to it could be used after the pipelines had been laid and whether the use of roads and the movement of animals and people would be restricted.
Issue Drawn from Comments: 38, 205, 207, 211, 227, 405, 664, 1213, 1234, 1284, 1572, 2562, 2589
Issue Relates to Following Sections of draft ESIA: Section 11.4

Response To Issue

As stated in Section 11.4 of the draft ESIA, following construction land use will revert to its former use following reinstatement with certain restrictions on agricultural uses. This includes the designated 8m Pipeline Corridor (as defined in the Host Government Agreement (HGA) [1]where restrictions will apply in relation to planting trees, building, drilling and deep ploughing. Further details of land use restrictions during pipeline operations will be found in the Resettlement Action Plan which will be made publicly available in autumn 2002. The movement of animals and people across the pipeline will not be restricted. Vehicle travel along the Right of Way will be restricted.

6.7.3 Issue: land acquisition and grievance procedures

Description of Issue Questions were asked as to the Company's response should the village decide that the pipeline could not be built near their village. In addition, some communities stated that, unless they received compensation from the Community Investment Programme, they would prevent the pipeline from being built.
Issue Drawn from Comments: 52, 3142, 3143
Issue Relates to Following Sections of draft ESIA: Section 11, Appendix F Annex 1

[1] Under SCP HGA Article 6, Appendix 2:
"Pipeline Corridor" means an area of land (including exclusive control of the area above such land and rights to the land's subsurface, in each case to be specified upon designation of the Construction Corridor by the SCP Participants), within the Construction Corridor eight (8) metres, as notified by the SCP Participants to the State Authorities.

Under BTC HGA Article 6, Appendix 2:
"Pipeline Corridor" means an area of land (including exclusive control of the area above such land and rights to the land's subsurface, in each case to be specified upon designation of the Construction Corridor by the MEP Participants), within the Construction Corridor eight (8) metres wide extending from the Point of Entry to the Point of Terminus.

Response To Issue

Good community relations are essential to the project and community concerns will be given high priority. The Community Relations Programme will aim to build and maintain constructive relationships between communities and the project, as well as manage any complaints against the sponsor companies and contractors (draft ESIA Appendix F Annex 1). The project aims to ensure the pipeline provides significant benefits to communities, for example, through fair and adequate compensation for land and the prioritisation of local people for recruitment.

During the land acquisition process, the project will seek to resolve grievances before resorting to the judicial system as far as possible. Avenues for project – affected individuals to express grievances, including through independent third parties, will be publicized in each village as part of the land acquisition notification process and in project information pamphlets. The project will engage suitably experienced national NGOs to collect grievances, facilitate entry into the grievance system and monitor outcomes. In the event of failure of non-judicial approaches to grievance resolution, Georgian legislation provides for aggrieved parties to take action through civil courts, with avenues for appeal.

The ESIA process is a formal regulatory approval procedure that aims to ensure all significant environmental and social impacts are assessed and addressed before approval to proceed will be granted. The Public Disclosure process provides an opportunity for people to air their concerns and influence the conditions of the approvals process.

The Community Investment Programme (CIP) is not a form of compensation, it is a form of goodwill from the project towards the community. The CIP is provided by BTC Co to ensure project-affected villages receive additional direct benefits from the pipeline passing through their communities. It is not a legal requirement and is not designed to mitigate impacts associated with the project. Decisions on projects to support under the CIP will be based on the criteria outlined in Addendum Response 6.14.1 and will not be influenced by threats of disruption to the project.

6.7.4 Issue: reinstatement – social issues

Description of Issue

Soil Productivity

Concern was expressed that soil will not be fully returned to previous productivity levels and that land fertility would be irreversibly affected by a lengthy construction period.

Community Participation in Reinstatement

A number of requests were made for training of local farmers in how to preserve soil fertility and prevent erosion in areas that have been restored, in ensuring newly planted saplings survive, and in involving the local community in the planting of trees and reinstatement in general.

A request was made for specific pipeline crossing points once the restoration has been completed.

Issue Drawn from Comments: 593, 1461, 1481, 1493, 1523, 2214, 2215, 2216, 2871
Issue Relates to Following Sections of draft ESIA: Section 8, Section 10, Appendix A Annex I

Response To Issue

Soil Productivity

Impacts on soils and associated mitigation measures, including the Reinstatement Plan, are detailed in Addendum Section 5.6.1. The objective of the Reinstatement Plan is to return the soil to its pre-construction condition or better in terms of fertility and erosion potential. In some cases this may require the addition of conditioning agents such as fertilisers and improvers. Agricultural productivity will be monitored for approximately two years post construction and instances of reduced fertility will be assessed on a case b y case basis.

Community Participation

Local people will be employed to assist in reinstatement works. There may be some scope for the landholders to be involved in discussions with the reinstatement specialists to determine the most appropriate means to achieve pre-construction soil conditions. Post-reinstatement monitoring will be undertaken to check the effectiveness of the reinstatement, specifically erosion control methods.
Community Liaison officers will continue to be active during the operational phase and will be able to address any perceived reductions in soil fertility and crop yields. Post re-instatement crop production will be monitored and any issues dealt with on a case by case basis. BTC Co will consider offering assistance to farmers in re-establishing previous activities, should such assistance be appropriate when reinstatement is complete. The land acquisition and compensation process will ensure that land not available during construction is appropriately compensated (see Addendum Section 6.7 for further details).

The depth of burial is sufficient to ensure that the integrity of the pipeline is protected from movements of agricultural vehicles. Thus there is no requirement for specific crossing points.

6.8 LOCAL INFRASTRUCTURE, SERVICES AND NATURAL RESOURCES

6.8.1 Issue: traffic and transport

Description of Issue

Scale of transport associated with the project

Criticism was made that there was no consideration of transport, by road, rail or ship in the draft ESIA. It was requested that mitigation measures and residual impacts be developed for impacts on local infrastructure, services and resources. It was stated that the income to Georgia per tonne cargo delivered through Batumi and Poti ports would be $8 – 10.

Further information was requested on a range of transport issues, including the Transport Management Plan, freight flows by volume, noise and geographic distribution, quantification of damage to and repair of roads, length and details of auxiliary roads and the relationship between traffic limits and European standards.

Community Concerns

Communities along the route expressed concern that the vibrations associated with an increase in heavy vehicles on the roads would further damage local roads and nearby buildings. They requested further information as to the intensity of the traffic movements.

Communities expressed concern about the increased noise, and dust and increased risk of road traffic accidents and requested additional warning of increased traffic movements.

There were a number of requests for the improvement of existing roads that would be available for use by the local communities once construction was completed.

Issue Drawn from Comments: 33, 68, 82, 95, 106, 146, 184, 187, 188, 210, 215, 225, 319, 430, 594, 925, 954, 973, 1052, 1077, 1188, 1247, 1267, 1359, 1369, 1451, 1479, 1482, 1499, 1505, 1522, 1534, 1643, 1853, 1962, 2512, 2523, 2567, 2569, 2572, 2580, 2611, 2612, 2687, 2698, 2946,2954, 2968, 2982, 3077, 3128

Issue Relates to Following Sections of draft ESIA: Section 11.5, Section 12.3

Response To Issue

Scale of transport associated with the project

A detailed review of the transportation infrastructure has been undertaken as part of the ESIA process and is included in Appendix C Annex I of the draft ESIA.

Further to this, a Traffic Management Plan will be developed by the construction contractor and will be subject to review and approval by BP. The Plan will describe speed limits and enforcement, restrictions on traffic using the ROW, off road driving, and use of public networks. This Plan will consider the potential for traffic related impacts to occupied dwellings, in terms of noise, dust and burden on existing infrastructure. Exhaust emissions from construction or operational vehicles and plan are not anticipated to lead to a noticeable worsening of air quality as described in Addenda Section 5.3.2, 5.3.3 and 5.4.2.

Community Concerns

BTC Co and the construction contractor will always seek to avoid causing damage to infrastructure where possible. Measures to protect infrastructure impacted through the construction process are outlined in draft ESIA Section 11.5.

The construction contractor will document the initia l condition of all roads and bridges prior to construction commencing. The construction contractor will be required to ensure that all roads used are left in a condition at least as good as found on completion of the work. The government will also document road conditions and monitor road conditions during construction.

The construction contractor will assess and document the likely impact on houses judged to be close enough to traffic routes where there is a risk of vibration induced impacts. This documentation will be agreed with the house owner/occupants and a copy of documentation provided to the house owner/occupants.

Mitigation measures have also been developed to cover potential impacts on localized infrastructure such as fences and irrigation channels. Where damage can not be avoided cash compensation based on full replacement cost (as required by the World Bank), or replacement structures/facilities will be provided. The full re-instatement option will involve direct replacement of the structure by BTC Co with no cash transaction taking place.

When new roads are required for construction, communities will be able to put forward a case to keep those new roads which are not located in ecologically sensitive areas. The operating company will consider requests on a case by case basis, in consultation with authorities and land owners, taking into account land acquisition impacts. Any new roads in ecologically sensitive areas will be removed.

Addendum Sections 5.3.2, 5.3.3 and 5.4.2 detail mitigation measures which address the impacts of noise and dust on communities. A number of mitigation measures are in place to reduce the risk of traffic-related accidents (draft ESIA Section 11.5). These include:

- communities will be informed prior to activities commencing in their area about any likely increase from the project to traffic volumes
- the minimization of traffic through communities
- the development of a Traffic Management Plan by the construction contractor which will take into account schools, pedestrian crossing areas and key roads for local services
- a programme of traffic safety awareness raising and information provision in communities affected by traffic
- all drivers will be trained in defensive driving

6.8.2 Issue: energy use by construction contractor

Description of Issue
The communities on the pipeline route have limited access to energy. Concerns have been raised that the increased energy demand from the project and / or the construction contractor will put pressure on existing energy networks and supply and reduce that available for the local population. It was suggested that mitigation measures should be developed to ensure there is no net loss in local energy supply and a resulting negative impact on local communities.
Issue Drawn from Comments: 712, 942, 1008, 1038, 1046, 1702, 1705, 2513, 2688
Issue Relates to Following Sections of draft ESIA: Section 4.7, Section 5.6, Section 14.3.3

Response To Issue

Power supplies for all permanent facilities, worker camps and pipe storage yards will be generated locally. Power requirements for each facility have been studied and assessed in the context of a Best Practical Environmental Option (BPEO) study. Results of the BPEO study are detailed in draft ESIA Section 4.7.

One of the objectives of the Infrastructure and Services Management Plan is to ensure ‘No Net Loss’ to community infrastructure, services and natural resources as a result of construction and operation.

6.8.3 Issue: community water supply

Description of Issue

It was felt that there was inadequate consideration of the mitigation measures to reduce impacts on local community water resources.

Additional information was requested on baseline community water supplies.

Concerns were expressed by the communities along the route that the project will interrupt and / or pollute drinking and irrigation water supply and the secondary impact this would have on health. Specific concerns included:

- Measures for where drinking water pipes or irrigation channels go near or cross the Right of Way
- Possible changes to naturally irrigated land owing to ground water flow being interrupted by construction
- Whether irrigation channels would be restored if damaged
- Concern that specific water courses may be polluted, including but not limited to the Tsikhisjvari stream, the Khrami River, Borjomi ground water, Borjomula stream, and Tsalka reservoir
- Concern that blasting would damage underground water supplies

It was requested that the Construction Contractor should be contractually obliged to include provisions on securing alternative sources of drinking water supply for the villages and cattle camps that become affected by possible re-routing of spring waters. Regular water sanitary tests were requested.

Issue Drawn from Comments: 88, 177, 202, 208, 245, 248, 263, 269, 270, 271, 309, 552, 558, 624, 763, 952, 1025, 1035, 1053, 1135, 1185, 1193, 1317, 1405, 1406, 1457,1495, 1502, 1557, 2198, 2409, 2416, 2550, 2551, 2552, 2553, 2560, 2609, 2610, 2613, 2617, 2620, 2621, 2859, 2929, 2939, 2952, 3000, 3001, 3003, 3009, 3010, 3012, 3016, 3017, 3018

Issue Relates to Following Sections of draft ESIA: Section 11.4, Section 11.5, Section 10.3, Appendix F Annex I.

Response To Issue

Issues surrounding the baseline data on community water supplies are dealt with in Addendum Section 5.5.4.

There is no predicted impact on community water sources during construction (draft ESIA Section 11.5). The Construction Contractor is obliged to put in place mitigation measures to ensure that local communities do not suffer from reduced water supply as a result of the construction. These measures include:

- Water sources for project use will be identified during construction that do not affect the amount of water required for local use. Suitable sources that are acceptable to local communities will be confirmed before construction commences. Communities who use the same water sources as the project will be routinely consulted to understand if there has been any negative impact on their access to water and project water draws will be adjust as appropriate (draft ESIA Section 11.5)

- Flow in irrigation channels will be maintained via fluming or pumping. Any damage to irrigation channels made during construction will be repaired (draft ESIA Section 11.5)
- Sediment control measures will be used on all river crossings (draft ESIA Section 11.5)
- Alternative water sources will be provided to communities in the unlikely event that access to drinking water be halted by construction (draft ESIA Section 11.5)
- Damage to irrigation channels will be avoided wherever possible. Should damage occur, either there will be cash compensation based on full replacement cost or the damage will be repaired or replacement channels built (draft ESIA Section 11.4)

Construction is extremely unlikely to damage natural water flow paths to naturally irrigated land. However, BTC Co will monitor the impact of construction on land and property outside the Right of Way and approved construction areas. Communities will be made aware of ways to contact Community Liaison Officers should they feel damage has occurred (draft ESIA Appendix F, Annex 1).

Issues regarding water resources and human use have been addressed in Addendum Section 5.5.10 and discussion on the risk of surface or groundwater water contamination is presented in Addendum Section 5.12

6.9 COMMUNITY RELATIONS AND MANAGEMENT OF CONSTRUCTION WORKERS AND CAMPS

6.9.1 Issue: consultation and disclosure to date

Description of Issue

A range of questions and comments were made on the consultation and disclosure processes to date.

Pre-disclosure Consultation

- Criticism was made that insufficient consultation had been carried out
- Further information was requested about the scoping of the draft ESIA, including the steps undertaken, a summary of the results and examples of documentation used
- A summary of the results of Phases 1-6 of the consultation was requested

Public Disclosure

Availability and Clarity of Disclosure Documentation

- Clarification of the number, type, location and language of disclosure documents, clarification of the dates of disclosure and criticism that the documentation was only available in English on the web-site
- Criticism as to the effectiveness of the distribution of documents in the communities. Two surveys, of four villages and 16 villages, found that some communities had been given no information or just received a non-objective project assessment from the company, especially in the central and western sections of the route
- Criticism that information that was advertised as publicly available was not available

in practice

- Criticism that where information was available, there was insufficient detail on the start date of construction, construction contractor, land compensation, employment opportunities, location of worker camps, the social investment program, the route, contact points for local communities and where responsibilities fall within the project, particularly the responsibilities of the local administrations

Stakeholder Involvement

- Questions as to which stakeholders were consulted during public disclosure and how they were consulted
- Complaints were made that neither Borjomi Mineral Water Company (GGMW) nor Borjomi-Kharagauli Natural Park Council had been contacted during the consultation process

Timing

- Criticism that the Public Disclosure overlapped with local elections, meaning that local administrations could only play a limited role in the distribution of documentation and gathering of comments

Publicising the Public Disclosure

- Questions as to the methods of informing NGOs and the public of opportunities to comment on the draft ESIA, including timing of advertising

Disclosure Meetings

- Criticism that the disclosure contravened IFI guidance which stated that meetings should not be the only means of information disclosure
- Criticism that there were no disclosure meetings in Bakuriani and Tsalka
- Questions about the method of recording disclosure meetings and the distribution of the meeting minutes
- Criticism that was difficult for people to attend the meetings owing to them being held on working days in locations with poor road access
- Criticism that after community meetings, the full draft ESIA was only left in the village where the meeting had taken place, despite the fact that this meeting was supposed to cover several different villages

After the Public Disclosure Period

- Information was requested about how comments would be responded to and how much time will be needed to revise the draft ESIA prior to submission for final approval
- A request was made for a survey to check that the attitude in the villages has changed as a result of the public disclosure

Issue Drawn from Comments: 54, 107, 164, 396, 400, 456, 457, 681, 697, 723, 724, 726, 727, 728, 729, 730, 747, 758, 920, 951, 956, 988, 996, 1016, 1018, 1059, 1060, 1064, 1065, 1066, 1067, 1068, 1069, 1070, 1071, 1189, 1290, 1321, 1322, 1323, 1324, 1325, 1326, 1327, 1328, 1329, 1330, 1331, 1332, 1333, 1335, 1489, 1533, 1556, 2370, 2541, 2557, 2601, 2605,

2606, 2662, 2663, 2664, 2665, 2666, 2667, 2668, 2669, 2670, 2671, 2672, 2779, 2788, 2791, 2796, 2797, 2805, 2806, 2807, 2808, 2821, 2823, 2824, 2825, 2826, 2827, 2828, 2829, 2830, 2831, 2832, 2834, 2835, 2836, 2837, 2839, 2840, 2841, 2843, 2844, 2845, 2846, 2847, 2861, 2880, 2881, 2884, 2889, 2893, 2902, 2915, 3093
Issue Relates to Following Sections of draft ESIA: Section 7, Section 16, Appendix F Annex 1

Response To Issue

Predisclosure Consultation

The scoping process involved a series of meetings with NGO, Government and other stakeholders, focus group, community consultations and a national workshop. The steps undertaken are outlined in detail in the draft ESIA (draft ESIA Appendix F, Annex 1, Section 4). No Scoping Report is required in the draft ESIA. However, the Scoping Report was submitted to the regulator. The results of Phases 1 to 6 of consultation, including both the data generated through questionnaires and attitudes and perceptions, are presented in draft ESIA Section 9, the PCDP.

Public Disclosure

Full details of the Public Disclosure, including document distribution, community and public meetings and feedback collection are given in the Public Disclosure and Consultation Plan (PCDP) (Addendum Appendix 5). The PCDP has been updated from the draft ESIA (draft ESIA Appendix F) to reflect the most recent disclosure activities associated with the significant public disclosure phase. Only those comments not already covered in the PCDP are addressed below.

Availability and Clarity of Disclosure Documentation

Community Pamphlets, Non-Technical Executive Summaries and posters advertising the date, location and transport arrangements to community meetings were distributed in every village along the pipeline route. Additional copies of all documents were left with the village gamgebeli.. Documents were available to take away from every community and public meeting. Moreover, additional documents were distributed part way through the disclosure period when feedback forms were collected from the villages. In total, almost 11 tonnes of documents were distributed during the disclosure period and it is considered that as much as reasonably possible was done to distribute information. Further information on the distribution of documentation is given in the updated Public Consultation and Disclosure Plan (Addendum Annex 5).

As shown in the PCDP (Addendum Annex 5) disclosure documentation was made available in a large number of public buildings, including regional administrative centres and libraries. Senior representatives from all those locations committed to make the documents publicly available and visits to the locations during the disclosure period confirmed that this was so. It was not practically possible to monitor all locations continuously throughout public disclosure.

Criticism was made that the disclosure documentation contained insufficient information on a range of subjects. The disclosure documentation contained up to date information on all of these subjects, and full information was given in the publicly available draft ESIAs. Additional information on land compensation will be provided in the Resettlement Action Plan, which will go through a separate public disclosure process (further information on the land compensation process is given in Addendum Section 6.7.1. The project contact points for local communities will be widely advertised as the Community Relations Programme is set up.

Stakeholder Involvement

Both the Georgian Glass and Mineral Water Company (GGMW) and Borjomi-Kharagauli Natural Park Council representatives were met prior to and during the Public Disclosure period (see Addendum Annex 5).

Timing

Local administrations and gamgebelis played an invaluable role in the distribution of disclosure documentation, the collection of feedback and the publicising of meetings. They have also played a full role in all other earlier consultation and disclosure activities. This role is outlined fully in the PCDP (see Addendum Annex 5). It is acknowledged that the elections did make disclosure more complex, but each village is so small that should an individual want disclosure information, it would not have been difficult to ascertain where it was deposited.

Disclosure Meetings

All project affected people were invited to attend a community meeting as part of the Road Show (Addendum Annex 5). Community meetings were held in Kizil Kilisa in the Tsalka district and in Tsikhisjvari in the Borjomi district, close to Bakuriani. A public meeting was also held in Borjomi. Transport to these meetings from the surrounding villages was provided through the regional administrative authority. Meeting locations were chosen so as to be relatively equidistant between villages and to provide a suitably accessible location.

After the Public Disclosure Period

The aim of the public disclosure was to provide opportunities to comment on the draft ESIA so that these views could be incorporated into the final ESIA. The feedback received from the public consultation has been key to highlighting the most significant issues and concerns of the community and stakeholders. As a consequence of this, a number of issue areas and concerns will receive additional attention in the planning effort and implementation of the mitigation measures described in the draft ESIA.

6.9.2 Issue: ethnic tension

Description of Issue

Criticism was made that insufficient attention has been paid to ethnic tensions in the draft ESIA. It was felt that there is a realistic threat of inter-ethnic conflict some regions, especially between the Armenian and Georgian populations and particularly in the Samtskhe-Javakheti region.

Concern was expressed that conflict may occur between different ethnic groups on a range of issues. In particular, there may be tension between those who gain employment and those who do not, as well as between co-workers from different ethnic groups. Moreover, it was felt there was insufficient awareness that competition for the benefits of the project may provoke tension between the different ethnic communities themselves. Additional mitigation measures to address these issues were requested.

Issue Drawn from Comments: 912, 923, 933, 953, 1268, 1269, 2518, 2693
Issue Relates to Following Sections of draft ESIA: Section 11.3, Section 11.6

Response To Issue

Additional information on ethnicity and sources of ethnic tension are given in Addendum Section 6.4.1. There is potential for the project to exacerbate existing ethnic tensions in the following circumstances:

- If project benefits such as employment are realized or perceived to be realized only by particular ethnic groups or particular individuals
- If the distribution of funding through the Community Investment Programme is perceived to be unfairly distributed between different ethnic groups

A number of mitigation measures are in place to ensure the project does not exacerbate existing ethnic tensions. These are outlined below.

Recruitment

The Construction Contractor will be required to work with the BTC / SCP Partners to establish an employment strategy that is transparent, public and open to all regardless of ethnicity, religion or gender. Mitigation measures to ensure this occurs are described in draft ESIA Section 11.3.

The construction contractor will ensure, as far as possible, that employment opportunities are communicated in the most appropriate manner for each ethnic group, and also for men and women. Job vacancies will be posted in all relevant local languages and in locations frequented and available to all members of the community.

The construction contractor will try to ensure that fair representation in employment distribution of unskilled workers is given between ethnic groups that are represented.

Day to Day Working

Training will be provided to all staff, both national and expatriate, on camp management rules and overall discipline and cultural awareness. This will include community relations orientation (draft ESIA Section 11.6).

The construction contractor is required to develop a Construction Camp Management Plan, to include a Code of Conduct and Camp Rules of Behaviour to address, among other things, community liaison and ethnic tension (draft ESIA Section 11.6). The Community Relations team will have representatives able to speak the local languages.

There will be zero tolerance of ethnic disputes between hired workers. During their period of employment, workers will be bound by a code of conduct which will include zero tolerance of racial harassment, whether of fellow workers or of villagers along the route. Evidence of disputes between workers will result in either warnings, mediation by community relations team, or dismissal, as appropriate.

Evidence of racial harassment of villagers by workers will be dealt with through mediation via the community relations team in the first instance, and by warnings and dismissal if necessary.

Any instances of harassment of workers by villagers will be dealt with through community relations team using methods most appropriate to the particular incident and communities involved.

Community Investment Programme

There is potential for the uneven distribution of project benefits to lead to ethnic tension. The selection of investment opportunities within the Community Investment Programme (CIP) will consider this issue and the implementation of a communications plan will clearly demonstrate the transparency of the distribution of CIP benefits.

6.9.3 Issue: previous construction and compensation experience

Description of Issue

There were a number of comments from community members who had reported poor experiences associated with the construction and operation of the WREP pipeline. These primarily related to:

- Unfulfilled expectations of employment, in particular the hire of foreign rather than local workers
- Damage to irrigation channels
- Damage to drinking water pipes
- Degradation of roads
- Unfulfilled expectations of access to energy
- Lack of receipt of ‘social funds’
- Promises to repair damage to roads and irrigation channels not being kept
- Lack of compensation for permanent noise from pump stations
- Receipt of less fertile land from the State as compensation
- Lack of compensation for loss of land
- Differing prices paid for harvest compensation, leading to conflict within communities

In addition, there were complaints about promises of compensation for other construction projects (not WREP related) and industrial accidents which have never been received.

It was suggested that failure to address these concerns could further destabilise a country that had already seen much political, social and economic upheaval.

Issue Drawn from Comments: 51, 108, 117, 2778, 2781, 2783, 2784, 2785, 2786, 2799, 2800, 2801, 2802, 2803, 2804, 2813, 2814, 2816, 2886, 2950, 2951, 2957, 3014

Issue Relates to Following Sections of draft ESIA: Section 11.3, Section 11.4, Section 11.5, Section 11.6

Response To Issue

Complaints with regard to the WREP have been passed to the WREP project team. The BTC project has been designed to take into account lessons learned from the WREP, particularly the issues surrounding land and roads. It is expected that the measures developed will minimize grievances in this area.

Nevertheless, there will be a grievance procedure available to the community for them to identify any issues of concern, either with the construction contractor or with the BTC project in general. This will ensure that concerns are effectively communicated.

6.9.4 Issue: general construction impacts

Description of Issue

A number of requests were made for additional information about construction impacts and mitigation measures. These requests are summarized below:

- Documentation detailing the criteria for the appointment of the construction contractor
- The environmental and social impacts of the sourcing of raw materials (water, sand, gravel, etc.)
- The risk that construction could be interrupted owing to a lack of money
- Whether the buildings and worker camps would be demolished after construction or transferred to the local administrations
- A number of queries about the proceeds from the sale of cut trees and a request they be supplied free of charge for the restoration of schools and community and cultural buildings. It was stated that according to Georgian law, proceeds from timber sales should go to the regional administrative centres

Criticism was made that it is not explicit that BTC Co is responsible for the commitments made in the social mitigation section.

Issue Drawn from Comments: 560, 565, 928, 995, 1028, 1030, 1110, 1159, 1201, 1225, 1297, 1480, 1558, 1559, 1594, 2555, 2584

Issue Relates to Following Sections of draft ESIA: Section 11

Response To Issue

Each additional request for information is addressed below:

- The criteria for the appointment of the construction contractor is a matter of commercial confidentiality and cannot be made publicly available. BP can confirm that environmental, social and safety issues were, however, a key part of the selection criteria
- Raw materials will be sourced from Georgian companies wherever possible, provided quality and cost considerations can be met. Exact procurement details are not yet known. However, the maximization of the procurement of goods and services from local companies will deliver cost benefits to the project, generate employment and put revenue into the local economy. This revenue will in turn create indirect employment.

Use of natural resources, such as water and aggregates, will be subject to environmental approval on a case basis by BTC Co and by the relevant permitting authorities.

- It is not considered a risk that construction will be interrupted owing to a lack of financing
- A combination of permanent and temporary buildings will be needed during construction. At the end of the construction phase, communities will be able to put forward a case to keep those buildings which the construction contractor is willing to leave in place. These requests will be considered on a case by case basis, in consultation with authorities and land owners, taking into account land acquisition impacts
- As stated in the draft ESIA Section 11.4, the high value timber that is felled will be sold if possible, and the cash invested into the Community Investment Programme. Small trees and branches will be made available for communities to use for building materials, firewood or otherwise. Through discussions with the communities, Community Liaison Officers will identify appropriate pick up points from the wood off the ROW
- BTC Co and / or the construction contractor are obliged to implement the mitigation measures described in the draft ESIA.

6.9.5 Issue: cultural awareness training

Description of Issue

Additional information was requested on the long term interaction between the construction and operation of the pipelines and local social values.

Support was expressed for the training of non-Georgian construction workers in the differences between the customs and practices of Georgia compared to their home countries. Additional information about the training was requested. One comment was made that local authorities should participate in the training courses.

It was requested that a ban on hunting should be included in the 'Code of Conduct for Camp Workers'.

Issue Drawn from Comments: 145, 542, 576, 765, 1027, 1029, 1456, 2579

Issue Relates to Following Sections of draft ESIA: Section 11.6, Appendix F Annex I

Response To Issue

Construction

A number of mitigation measures have been developed to minimize the impact of the construction workers on local social values during the construction of the pipelines. These measures include:

- Georgian nationals will be recruited whenever possible, reducing the number of foreign workers and therefore the impact on local social values. It is estimated that 50 – 80% of jobs will be filled by Georgians
- Unskilled workers will be recruited from communities living close to the pipeline route to work on the construction in their area. As the pipeline construction process moves along the route, and enters different localities, those living in the project-affected

communities in that locality will be recruited, thereby also minimizing potential regional tensions owing to competition for jobs

- All jobs will be advertised widely in Georgia. If Georgian nationals with the correct skills and experience apply for the skilled jobs, then they will be given priority over foreigners. However, because of the very specific skills requirements and the need for many years of experience for some of the jobs, it is likely that some foreign workers will be needed for the skilled jobs
- There will be obligations on the construction contractor to:
    - carry out induction training for construction workers (see draft ESIA Section 11.6). This training will include camp management rules and overall discipline and importantly, cultural awareness for foreign workers. The training will increase awareness about the local area and cultural sensitivities such as religious customs, existing ethnic tensions and attitudes towards foreigners, activities and interests of local communities where the activities of construction workers might create tensions (eg hunting), local festivities, attitudes towards women, as well as raising awareness on health considerations, including STDs
    - develop Code of Conduct and Camp Rules of Behaviour (see draft ESIA Section 11.6), including a disciplinary framework
    - publicise Code of Conduct in local communities so that local residents are aware of the expected behaviour of construction staff
    - develop Community Relations Plan and hire Community Liaison Officers (see draft ESIA Appendix F Annex 1)
- The sponsor company will have overall responsibility for community liaison and will ensure that the contractor caries out their responsibilities (draft ESIA Appendix F Annex 1)
- There will be ongoing monitoring of the social performance of the construction contactor (draft ESIA Appendix F Annex 1)

Operations

During pipeline operations the majority of employees are expected to be Georgian nationals and will therefore it is not expected that there will be a large impact on local social values.

In addition, there will be an ongoing Community Liaison Programme, including community meetings, and monitoring of social issues to ensure that any issues that do arise are dealt with swiftly and effectively.

Hunting

There is a rigorous ban on all activities that could create tension between the construction work force and the local population or un-necessary disturbance to the local fauna. Bans imposed include hunting, littering and other forms of antisocial behaviour. The Construction Contractor is required to develop a Construction Camp Management Plan, to include a Code of Conduct and Camp Rules of Behaviour to address, amongst other issues, the ban on hunting (see draft ESIA Section 11.6).

6.9.6 Issue: community expectations

Description of Issue

The draft ESIA discusses the high expectations communities have of the Community Investment Programme and the employment opportunities generated by the pipeline. It was felt that there was inadequate consideration of these expectations in the mitigation measures and that the public meetings did not do enough to decrease community expectations. It was felt that it was necessary to consider the differences in expectations between the Samtskhe Javakheti and Kvemo Kartli populations.

One group of NGOs stated that these unrealistic expectations are being exacerbated by attempts by the company's current practice of registering people interested in a job at a recruitment centre. The NGOs research had shown that in Tetritskaro, 2,000 people have been registered, in Borjomi 5,000 and in Vale 2,000. There was criticism that the publication of job opportunities had led to corruption and the creation of informal labour exchanges. The establishment of permanent information centres and telephone hot lines was suggested.

The same group of NGOs stated that project-affected people believed they will not benefit at a local level from the transit fees that the Georgian government will receive from project sponsors.

Issue Drawn from Comments: 528, 971, 1263, 1334, 1380, 2528, 2703, 2811, 2860, 2865, 2882, 2987

Issue Relates to Following Sections of draft ESIA: Section 11.3

Response To Issue

Community expectations are being managed on an ongoing basis through the provision of information by BP, through public meetings, community meetings, articles in the press and the distribution of printed leaflets in local languages.

As the Community Relations Programme is set up over the coming months, there will be further opportunities for information dissemination through leaflets, posters and recruitment centres, feedback from local people at regular community meetings and the monitoring of community expectations (see draft ESIA Appendix F Annex I).

Community Investment Programme Expectations

BP has made significant efforts to communicate the limitations of the Community Investment Programme (CIP). It has been stressed that the CIP will address some priority issues but cannot fix all of the problems for any community. BP will continue to publicise the scope of the CIP in order to manage community expectations. In particular, the limitations will be made clear during the first six months of the CIP when NGOs carry out Participatory Rural Appraisals type activity (PRAs) to enable communities to assess and prioritise their needs (see Addendum Section 6.14.1).

Employment Expectations

The perception that BP is currently registering people interested in recruitment is incorrect. No recruitment or registration of interest in employment is being carried out by the project at the current time, neither will it be carried out at any time in the future. All recruitment will be carried out by the Construction Contractor through official recruitment centres. No lists of preferred or registered individuals will be accepted during the recruitment process and no payment will be involved at any stage in job applications. This information has been widely disseminated through the meetings, leaflets, etc. outlined above and in the PCDP (Addenda Annex 5), as well as in recent advertisements.

The only way to apply for a job will be through the official recruitment centres along the pipeline route. The construction contractor will advertise detailed information on specific employment opportunities, the skills required and the location of recruitment centres when the recruitment process begins

Mitigation measures to ensure transparency in recruitment are covered in Section 11.3, Table 11-2 of the draft ESIA. Efforts to distribute the correct employment and recruitment information will continue

Unofficial preferred lists of applicants will not be accepted as part of the recruitment process. Interested parties should be aware that they should not pay anyone any money in order to receive preference for a job. This information has been widely communicated by BP and will continue to be reiterated. For example, employment leaflets detailing the recruitment process were distributed as part of the disclosure documentation during public disclosure (see Addendum Appendix 5).

, The project will make every effort to communicate the correct employment information in a manner accessible to the communities.

Transit Fee Expectations

Details of the tariff and gas purchase to be paid by BTC Co and SCP Co are outlined in Addendum Section 6.11.2. It is important to note that BTC Co and SCP Co cannot determine how Georgian tax revenues are allocated. This is a matter exclusively for the Government of Georgia.

6.9.7 Issue: community liaison and consultation in the future

Description of Issue

Criticism was made of the lack of clarity amongst local communities as to how they should interact with the project. Recommendations were made as to the most appropriate methods for community consultation in the future, including more frequent meetings, with information presented in more simple ways and the establishment of Consultation or Information Centres. In addition, it was requested that information should be regularly published in local papers, on television and / or in a newspaper specifically dealing with the pipeline construction. Offers were made to assist with community liaison and there was a recommendation to provide free legal advice to discuss issues such as compensation or employment. It was recommended that a specific programme to raise awareness amongst those who seasonally cross the route for animal pasture to be implemented.

It was recommended that studies on public opinion and how to change it should be carried out, considering ethnic, religious and historical characteristics. Future community liaison should be based on the results of such studies.

Specific questions about the timing, location and subject of future meetings between the community and the company and / or the contractor were asked. Further detail was requested on the grievance procedures, specifically in the case of complaints about noise.

Issue Drawn from Comments: 70, 104, 136, 149, 163, 186, 242, 247, 398, 412, 426, 432, 446, 449, 452, 459, 606, 632, 673, 725, 731, 768, 850, 922, 976, 1198, 1223, 1279, 1282, 1336, 1382, 1440, 1441, 1475, 1663, 2525, 2534, 2535, 2540, 2594, 2700, 2709, 2710, 2715, 2793, 2798, 2895, 2908, 2915, 2920, 2926, 2931, 2936, 2941, 3135

Issue Relates to Following Sections of draft ESIA: Section 9, Section 11.6, Section 16, Appendix F Section 5

Response To Issue

Community liaison and consultation will be ongoing throughout the construction and operation of the pipelines. Details of the Community Relations Programme, including objectives, management structure, division of responsibility between the construction contractor and operator and within each team, community meetings and grievance procedures, can be found in Section 11.6 and Appendix F Section 5 of the draft ESIA.

The ways in which communities will be able to interact with the project will be widely publicized in the communities through the most appropriate media as the Community Relations Programme is set up over the coming months. More detailed information about the timing and locations of future meetings will be provided as the community relations team is recruited and begins to operate. It is expected that Community Liaison Officers will have meetings at each village near construction activities on a weekly basis. Questions about the project can be directed towards the Community Liaison Officer at these meetings. The nature of these community meetings will try and take account of the specific characteristics of the community, including ethnic and cultural backgrounds.

The grievance procedure for any community complaints about noise will be the same as for other community concerns (see draft ESIA Section 11.6). It is believed that the majority of issues will be raised at the weekly meetings between Community Liaison Officers and communities and dealt with appropriately. The formal grievance procedure aims to provide additional safeguards. Details, including purpose and scope, responsibilities and process flow chart (including complaints log and monitoring) are presented in the draft ESIA Appendix F Annex I Section 8).

As detailed in the draft ESIA Sections 9 and 16 and Appendix F, Section 5, consultation and surveys carried out to date have identified the individual characteristics of project-affected communities. Further detailed understanding will be developed by the Community Liaison Officers as they work in each village. Therefore, it is not believed that further surveys are required.

All suggestions as to approaches to more effectively communicate with the local population will be taken into account as detailed procedures are established over the coming months. A Georgian land rights advocacy NGO publishes a regular newspaper that has been used in the past to disseminate information about the project. This newspaper will continue to be used, together with other appropriate methods, to distribute information to communities. This newspaper is distributed free of charge to villages along the length of the pipeline route.

6.10 HEALTH, SAFETY AND SECURITY

6.10.1 Issue: safety

Description of Issue

Criticism was made that health and safety components were not considered in the draft ESIA. Additional social quantitative risk assessment of unplanned events during construction and operations was requested, to include fire or explosions owing to both natural and human-caused accidents. It was felt that insufficient attention had been paid to the risk of flooding and associated impacts.

An offer was made to carry out additional studies of impacts of health and safety and international compensatory measures. A request was made for the construction contractor to write a management plan for the safety of the local population.

General concern about the safety of the pipeline was expressed by communities and NGOs. There was concern about the risk of explosions, radioactivity and that the oil and gas pipelines were running parallel. It was reported that people living close to the 'Turkmenistan – Armenia gas pipeline' were particularly concerned because poor maintenance had led to a gas explosion in the past. Additional information was requested about emergency procedures and the responsibility for compensation in the case of an accident. Recommendations as to equipment needed to respond to an emergency were made.

A range of questions were asked as to the health and safety protection of the workforce, including who was responsible and the level of compensation for injury or death.

Training for those handling hazardous waste was requested.

Issue Drawn from Comments: 37, 97, 114, 156, 171, 213, 386, 408, 423, 438, 451, 461, 469, 523, 546, 548, 579, 608, 672, 1100, 1114, 1212, 1217, 1224, 1352, 1400, 1402, 1403, 1404, 1424, 1478, 1519, 1534, 1867, 2030, 2523, 2548, 2679, 2680, 2682, 2698, 2820, 2875, 2906, 2963, 2971, 3137

Issue Relates to Following Sections of draft ESIA: Section 5, Section 10.5, Section 11.7, Appendix B Annex 2, Appendix F Annex 1

Response To Issue

Health and safety issues are discussed in Sections 10.5, 11.7 and Appendix F Annex 1 of the draft ESIA. BP's stated goals are 'no accidents, no harm to people and no damage to the environment'. Details of BTC Co. commitments to Health and Safety are given in Appendix B Annex 2. A range of features have been incorporated into the pipeline design in order to minimize the risk of accidents (draft ESIA Section 5).

Safety Risk Assessment

The draft ESIA Section 10.5 details a quantified risk assessment of risk to people for the SCP project. The section describes the potential risks to public safety and the environment presented by the proposed SCP project owing to unplanned events. The main issue of concern from an unplanned event or accident affecting the SCP is a failure resulting in a gas release. Therefore, a quantified risk assessment has been undertaken to assess the risk of SCP project failure to people. The main focus of risk assessment for a gas pipeline is the estimation of risk to the public, unlike that for an oil pipeline where it is environmental impact. However, the risk assessment carried out for the BTC pipeline has taken into account the additional risk posed by the adjacent SCP project.

Risk is frequently expressed as:

Risk = likelihood of occurrence x magnitude of consequences

Risk can therefore be lowered by reducing either the likelihood of occurrence, or the severity of consequences. However, the most effective way to reduce risk is by preventing the initial failure occurring; this applies equally to safety and environmental impacts. This is particularly true in the case of public safety because in the event of a major release from either a large hole or pipeline rupture, the gas in a section can be released in a short time. It is, in general, only the major releases from large holes or ruptures that may affect population at any distance from the pipeline.

The principal focus to reduce risk in the case of a gas pipeline is, therefore, to reduce the potential for a major accident to occur. The good performance of pipelines historically has been achieved through the industry's development of comprehensive, internationally recognized codes and standards based on good engineering practice and operational experience.

In addition to following the requirements of codes and standards, the industry has increasingly augmented its approach to pipeline safety through the application of hazard and risk management principles.

Risk transects have been calculated for the locations with three different classes according to ASME B31.8 and, therefore, the three different factors, and give the following key conclusions:

- The risk to an individual if they were present at all times never exceeds 10^{-5}/year
- In Class 1 locations (ie unpopulated or very sparsely populated regions), the maximum risk to an individual if they were present at all times never exceeds 2 x 10^{-6}/year
- In Class 2 and 3 locations, the maximum risk to an individual if they were present at all times never exceeds 1 x 10^{-6}/year
- In Class 3 locations, the risk to an individual if they are present at all times never exceeds 5 x 10^{-7}/year, and drops rapidly at a short distance from the pipeline

Hence, it is apparent that when compared to well established and published criteria of acceptable risk for communities (for example UK HSE, 2001) (draft ESIA Section 10.5) and common oil and gas industry practice for western international operators, the risks presented by SCP are extremely low.

Community Liaison and Safety

As part of the Community Relations Programme, there will be regular meetings with project-affected communities. One of the objectives of these meetings will be to maintain awareness of safety issues.

Community liaison teams will meet every community along the route prior to construction. At these meetings, safety briefings will cover both real safety risks, such as the potential for people and livestock to fall into the open trench, and perceived risks, such as radioactivity. There is no radiation associated with the pipeline, or the oil and gas itself. Particular attention will be paid to allaying concern in communities about gas pipeline explosions.

The construction contractor is required to apply BP's corporate policies on employees and health and safety. BP's health and safety standards are set within the context of the stated goals of 'no accidents, no harm to people and no damage to the environment'. In addition, the construction contractor is obliged to apply the eight core International Labour Organisation (ILO) Conventions on employees working conditions.

6.10.2 Issue: health

Description of Issue

A number of stakeholders felt that there had been insufficient consideration of the primary and secondary impacts on human health and welfare and corresponding health mitigation measures were inadequate. Concerns about health issues include both local communities and the workforce. Further information as to how the health requirements of Georgian legislation would be met was requested.

Further information was requested on whether Georgian medical service institutions, hospitals and physicians would be used, potentially reducing the local population's access to healthcare services.

Concern was expressed over the range of diseases that could be transmitted by foreign workforce, including HIV / AIDS and other communicable diseases. In particular, it was felt that the mitigation measures to prevent the spread of HIV were insufficient. It was requested that foreign workers should undergo preliminary medical checking to identify and treat these diseases.

Confirmation that the incineration of hazardous waste and emissions to air from the construction were safe for human health was requested.

Issue Drawn from Comments: 212, 378, 381, 383, 427, 429, 433, 435, 441, 447, 469, 536, 748, 751, 754, 757, 924, 944, 1031, 1033, 1034, 1312, 1313, 1315, 1358, 1430, 1432, 1465, 1487, 1868, 2059, 2060, 2627, 2656, 2681, 2958, 2964

Issue Relates to Following Sections of draft ESIA: Section 5, Section 11, Appendix E Annex II

Response To Issue

Measures to be taken to protect both community and construction worker health were outlined during public meetings and within community brochures. These measures can be found in Section 11.6 of the draft ESIA.

Health and medical services will be available within the worker camps for the construction workers only. Therefore, construction workers will not need to draw upon the local health and medical services. The pipeline construction will therefore not reduce local people's access to health services. BTC Co will employ Georgian doctors wherever possible, but it is anticipated that this will not reduce the number of Georgian doctors providing medical care to communities along the route.

References to the ESIA have been provided on the following measures identified as important during the disclosure:

- Training on communicable diseases (draft ESIA Section 11.6)
- Controls on community drinking water to ensure quality (draft ESIA Section 11.5)
- Application of hygiene standards (draft ESIA Section 11.6 xxx)
- Waste Management Plan (Section 5.13; 5.14)
- Identification of land potentially contaminated with anthrax (Addendum Section 5.7.2)

More detailed health data gathering was not conducted during the ESIA baseline surveying phase. It was considered that the only potential health related impact to the community associated with the project is the spreading of some communicable diseases. Hence, the assessment of project related potential health impacts and mitigations focus upon communicable diseases. The communicable diseases to which communities were considered to be susceptible were STDs, including HIV. Testing was considered an invasion of privacy which might unnecessarily raise concerns and tensions, and hostility towards the project.

All foreign workers will be required to have the appropriate immunizations before arriving in the country. Health awareness and communicable disease training, including HIV, will be provided to both workers and communities close to worker camps.

BTC Co will provide a community outreach programme on communicable diseases such as HIV. The Community Investment Programme may involve some projects which focus on improving community health (see Addendum Section 6.14.1), and HIV in particular.

The construction contractor is required to provide health awareness training for workers, including sexually transmitted diseases at induction and periodically during construction. The construction contractor is also obliged to carry out an awareness raising programme on HIV and other STDs for communities close to the worker camps.

The Environmental Standards for maximum allowable emission levels are presented in Appendix E Annex II, Table 3.1 of the draft ESIA. Emissions to air and water and respective responsibilities are detailed in Addendum Section 5.3.

6.10.3 Issue: compensation for unplanned events

Description of Issue

Questions were asked as to how local communities and farmers would be compensated in the event of an accident, such as an oil spill or gas explosion. Information was requested on compensation in general, financial compensation specifically and details of how any loss of water supply owing to oil contamination would be compensated.

Issue Drawn from Comments: 222, 761, 1208

Issue Relates to Following Sections of draft ESIA: Section 11

Response To Issue

Any contamination that occurs as a result of the project will be effectively cleaned up so that there is no long term effect on soil productivity and use. Monitoring will be carried out to check that the soil and land has returned to its former state of productivity and use.

In addition to the obligation imposed on the BTC Participants by Section 12.3 of the HGA to take all action to remedy harm and restore land and other harmed matters to their prior condition regardless of fault or causation, Sections 10.1 and 10.2 further set forth the principles of liability applicable to the BTC Participants in the event of a breach by them of the national environmental legislation. The BTC Participants shall be liable to the State Authorities for loss or damage arising from any breach by them of the HGA or the national legislation of Georgia. Moreover, the BTC Participants shall be liable to third parties for any breach of the standards set forth in the HGA or the national legislation; provided, however, that the BTC Participants shall not be liable to the State Authorities for punitive or consequential damage.

BTC Co will abide by BP policies. BP HSE Policy states that BP will:

- Meet or exceed applicable HSE legislation, regulations and company requirements
- Maintain a commitment to incident and pollution prevention, maintaining emergency response plans and resources, and manage emergency situations resulting from our activities

6.10.4 Issue: sabotage

Description of Issue

A range of questions were asked about the systems in place for the protection of the pipelines from sabotage during construction and operations, including a risk definition procedure, further details of emergency response procedures and alarms and details of responsibilities for pipeline security. A request was made for a risk assessment of fire or explosions caused by sabotage.

Attention was drawn to the reduced risk of sabotage that would result from good relations between BP and the communities.

A comment was made that in one area there were many former staff of the Ministry of Internal Affairs with security training and that they would prevent people from other regions

working on pipeline security.
Issue Drawn from Comments: 214, 249, 393, 471, 502, 605, 620, 699, 955, 1086, 1101, 1152, 1242, 1363, 1478, 2519, 2564, 2596, 2694, 2876, 2877, 3013, 3137.
Issue Relates to Following Sections of draft ESIA: Section 6.10, Section 10.5, Section 11.6

Response To Issue

A full description of risk assessment and mitigation measures associated with accidents, natural disasters, plant and equipment breakdown, traffic accidents, hazardous material spills, explosions, fires, sabotage and security issues are presented in ESIA Section 6.10.1 and in Addendum Section 5.12.

Good community relations are essential to the safe operation of the pipeline. Constructive relationships between the project and the communities will be built through the Community Relations Programme and other project benefits. These relationships will reduce the risk of sabotage of the pipeline and increase the probability that members of the local community would report any sabotage or interference to representatives of the pipeline.

The recruitment of security staff will be the same as that for other positions. The recruitment process will be transparent, public and open to all. Positions available and skills required will be widely advertised. Skilled, unskilled and semi-skilled workers will be given the opportunity to apply for positions relevant to their qualifications. Priority will be placed on recruiting unskilled workers from those communities close to the pipeline route. If Georgian nationals with the correct skills and experience apply, then they will be given priority over foreigners. The recruitment process will not be influenced by threats, by lists of preferred individuals or by financial transactions.

6.11 GOVERNMENT RELATIONS AND EGISLATION

6.11.1 Issue: legislative requirements

Description of Issue There was criticism that there was insufficient consideration of the Georgian and international legal and legislative requirements and international standards relating to the social issues in the draft ESIA, including the opportunities to make amendments to the legislation.
Issue Drawn from Comments: 1344, 1349, 1356, 1429, 1493, 1525, 1953, 2330, 2329, 2331, 2338, 2965
Issue Relates to Following Sections of draft ESIA: Section 6, Appendix B.

Response To Issue

All relevant legislative requirements are presented in Section 6 and Appendix B of the draft ESIA. The amendment of Georgian legislation is the role of the Georgian government.

6.11.2 Issue: tariff

Description of Issue

There were a number of questions on the annual tariff to be paid to the Georgian government, including how much gas Georgia will receive from SCP, both during construction and after, how and where the tariff will be spent, why it is not going directly to the region through which the pipeline passes, and whether and how it will be transferred to the regions.

It was felt that foreign companies working on the construction should not be exempt from taxes.

`1Issue Drawn from Comments: 71, 155, 203, 505, 567, 656, 698, 1283, 1371, 1374, 1377, 1378

Issue Relates to Following Sections of draft ESIA: N/A

Response To Issue

Georgia will benefit in a number of ways from the BTC and SCP projects. There will be an annual tariff, employment, the local procurement of goods and services and the right to purchase gas. Further details of the tariff and gas purchase are outlined below. It is important to note that BTC Co and SCP Co cannot determine how Georgian tax revenues are allocated. This is a matter exclusively for the government of Georgia.

Foreign companies are exempt from taxes under the HGA.

BTC Profit Tax

BTC will contribute income to Georgia through a "Profit Tax." The mechanism by which this tax is calculated is set out in Appendix 1 of the HGA. The Profit Tax Amount is based on the scale outlined in Table 6-2 below.

Table 6-2 Profit Tax Amount Scale

YEARS	TAX RATE
1-5	$0.12/bbl
6-16	$0.14/bbl
17-25	$0.17/bbl
26-30	$0.20/bbl
31-35	$0.225/bbl
35-40	$0.25/bbl

Table 6-3 below shows the annual contributions from BTC profit tax, assuming initial transit volumes of 400,000 bbl/day reaching a plateau of 1,000,000 bbl/day by year 6.

Table 6-3 Annual Contributions from BTC profit tax (based on specific assumptions)

YEARS	CONTRIBUTION
1	$18 million/year
6-16	$51 million/year
17-25	$62 million/year
26-30	$73 million/year
31-35	$82 million/year
35-40	$91 million/year

Total profit tax contributions from BTC to Georgia over the first 40 years of the project with the above volume assumptions are thus $2.5 billion.

It is important to note that BTC Co. cannot determine how Georgian tax revenues will be allocated. This is a matter exclusively for the Government of Georgia.

SCP Minimum Tax

SCP will contribute income to Georgia through a "Minimum Tax." The mechanism by which this tax is calculated is set out in article 8.3 of the HGA between and among the SCP Participants and the Government of Georgia ("SCP HGA"). The "Minimum Tax Amount" is defined in Appendix 1 of the SCP HGA and starts at $2.50/mcm (transit volumes) in year one and escalates by 2% every year thereafter for the entire 59-year term of the HGA.

SCP will initially be used to supply the Turkish market. A Sales and Purchase Agreement (SPA) with Turkey has already been negotiated and agreed. Contribution from the minimum tax associated with this SPA is roughly $20 million/year at plateau.

It is expected that additional SPAs with Turkey and European markets will be entered into. The SCP System has a maximum transit capacity of 30 BCM. If SPAs were entered into for the maximum transit volumes, then contributions from the annual "minimum tax contribution" would be approximately as shown in Table 6-4 below.

Table 6-4 Contributions from minimum tax assuming maximum transit volume

YEAR	CONTRIBUTION
10	$90 million
15	$100 million
20	$110 million
25	$120 million
30	$135 million
35	$150 million
40	$160million
45	$180 million
50	$200 million
55	$220 million
60	$240 million

It is important to note that SCP Co. cannot determine how Georgian tax revenues will be allocated. This is a matter exclusively for the government of Georgia.

SCP Georgia Gas Agreement

Appendix 7 of the Host Government Agreement (HGA) between and among the Government of Georgia and SCP Participants, dated 17th April 2002, sets out the gas sales agreement. The HGA includes agreements for option and supplemental gas:

1. *Option Gas:* Georgia has the right (not obligation) to buy up to 5% of the transit volume in respect of the SCP System for the previous year. The Sales and Purchase Agreement with Turkey plateaus at 6.6 BCM/year (year 4 and beyond), meaning that Georgia has an option for 330,000 MCM/year from that contract. The SCP System has a 30 BCM/year capacity, which results in Georgia's maximum annual option gas being 1.5 BCM/year. Georgia must nominate the desired quantity in advance on an annual basis. The price is \$50/MCM for the first year, escalated at 2% per year thereafter. Daily quantities are to be delivered rateably (approximately equal in both summer and winter). Term is 60 years.

2. *Supplemental Gas:* Georgia has the obligation under the HGA to purchase the following gas volumes:

Year 1:	200,000 MCM
Year 2:	250,000 MCM
Year 3:	250,000 MCM
Year 4:	300,000 MCM
Year 5:	300,000 MCM
Year 6-20:	500,000 MCM

The price is \$55per MCM x (Monthly Gross Calorific Value in kcal per cubic meter/8500). This amount is escalated at 1.5% per year after the first year. Georgia has a "take or pay" obligation for the annual contract quantity. The seller is obligated to make 60% of gas volumes available in winter (Oct-Mar). The term is 20 years.

It is important to note that SCP Co. cannot determine how the gas will be distributed or allocated. This is a matter exclusively for the Government of Georgia.

6.11.3 Issue: joint venture partners

Description of Issue

It was suggested that there was inadequate information in the draft ESIA about the Joint Venture Partners, who they were, why they are different for BTC and SCP and what their obligations and responsibilities were.

Issue Drawn from Comments: 966, 1311

Issue Relates to Following Sections of draft ESIA: Section 3.1

Response To Issue

The Baku-Tbilisi-Ceyhan pipeline (BTC) and South Caucasus Pipeline (SCP) are two separate and independent projects. BTC is a crude oil pipeline project while SCP is a natural gas pipeline project. The two projects have different shareholders, and are subject to separate Inter-Governmental Agreements and Host Government Agreements. BP is independently operating both projects on behalf of the respective shareholder groups. A number of shareholders have interests in both projects. The pipelines will follow parallel corridors for much of the route from Azerbaijan through Georgia and into Turkey.

BTC will construct, own and operate a pipeline that will export crude oil 1,760 kilometres from Azerbaijan and the Caspian region, through Georgia, to Ceyhan on the Turkish Mediterranean coast. The BTC Co Shareholders are currently: BP of the United Kingdom (38.21%); the Azerbaijan state owned oil company, SOCAR (25.00%); Statoil of Norway (9.58%); Unocal of the United States (8.90%); TPAO of Turkey (7.55%); Eni of Italy (5.00%); Itochu of Japan (3.40%); and Amerada Hess of the United States (2.36%). In addition, TotalFinaElf of France has acquired the right to purchase a 5% interest in BTC Co; this transaction will be finalised in the near future.

Commitments and obligations for both the BTC and SCP projects are spelled out in the respective Host Government Agreements, which are publicly available. The BTC Co will operate according to BP corporate commitments and responsibilities as a minimum. Partners have an opportunity to contribute to project policy through regular management committee meetings and other internal processes.

6.12 RESIDUAL IMPACTS

6.12.1 Issue: residual impacts

Description of Issue

General Residual Impacts

It was felt that there was insufficient consideration of the long term positive and negative residual impacts, particularly during operations. Additional information was requested on mitigation measures to deal with residual socio-economic impacts.

Accumulating Residual Impacts

Concern was expressed that residual impacts could accumulate. Examples given were those potential residual impacts identified in the draft ESIA, including unfulfilled expectations of employment or improved access to energy, lack of project benefits penetrating into the communities, increased risk of accidents and increased levels of dust, noise and vibrations associated with traffic. Residual impacts may accumulate when a community that is generally disappointed with the number of people recruited from their village also experiences a road traffic accident or disruption to infrastructure services.

It was suggested that mitigation measures should be developed for the interaction of environmental and social impacts.

Geographic Location of Residual Impacts

Criticism was made that there were no mitigation measures to deal with high and medium residual and cumulative environmental and social impacts per Route Section or Unit, such as KP 151 – 157, 175-183 and 185-204.

Issue Drawn from Comments: 401, 474, 1020, 1031, 1032, 1037, 2521, 2522, 2545, 2696, 2697, 2714
Issue Relates to Following Sections of draft ESIA: Sections 10, 11, 12, 13, Appendix F Annex 1

Response To Issue

Mitigation measures associated with the examples given above are identified in the Impacts and Mitigation sections (draft ESIA Sections 10 and 11). It is recognized that not all impacts can be fully mitigated and residual effects will be experienced. These are described in detail in draft ESIA Section 12. Potential residual impacts occur because it is not possible to fully mitigate every potential impact.

The ESIA methodology firstly considers the significance of a potential impact and then applies appropriate mitigation measures. The significance of the impact is then re-assessed to determine whether there is any "left-over" or residual impact likely to remain after the application of the mitigation measures. Hence, all residual impacts have already had mitigating measures identified. The draft ESIA tries as far as possible to reduce the level of the residual impacts to as low as is reasonably practicable.

Many of the residual impacts will be managed through the Community Relations Programme (Appendix F Annex I Section 5). Close collaboration with communities will ensure problems are identified and rectified before they become significant. The provision of a formal grievance procedure will ensure any larger issues are dealt with effectively. The sponsor companies will monitor the performance of the Construction Contractor and ensure that community relations remain strong and positive. Finally, although the Community Investment Programme is not designed to compensate for, or mitigate against, negative residual impacts, it will help that communities see positive, long lasting benefits from the pipeline.

Accumulating Residual Impacts

It is recognized that residual impacts may accumulate, such as in the example given in the issue description above. The nature of accumulating residual impacts is such that they are likely to occur in specific communities over a short time period depending on the specific activities that take place close the community in question. They are unlikely to occur throughout the length of the pipeline route.

It is primarily through the systems for communication and feedback discussed in the Community Relations Programme (draft ESIA Appendix F Annex 1) that accumulating residual impacts can be identified and mitigated. Through maintaining close contact with communities and organising regular meetings with community members and village leaders, issues will be identified and rectified on a case by case basis as required.

Both environmental and social residual impacts may accumulate. For example, a community may be disappointed with the lack of increased access to energy and at the same time angry at changes in the landscape. The mitigation of these impacts is the same as described above – the identification of such problems through close community liaison and mitigation on a case by case basis as required.

Geographic Location of Residual Impacts

Residual impacts are considered in draft ESIA Section 12 and, as discussed above, will be managed through the Community Relations Programme. These residual impacts apply equally throughout the pipeline route.

It is acknowledged that there may be geographic differences in the significance of residual impacts owing to differences in community perceptions or to higher levels of project activity close to those communities for a short length of time. However, the close liaison with communities through the Community Relations Programme, will identify particularly significant geographic areas and ensure problems are dealt with appropriately.

6.13 COMMUNITY INVESTMENT PROGRAMME

6.13.1 Issue: community investment programme

Description of Issue

Criticism was made that details of the proposed Community Investment Programme (CIP) were not included in the draft ESIA. It was felt that since the CIP is effectively a mitigation activity designed to address the residual and / or cumulative impacts of the pipelines, it should be included. In addition, it was suggested there should be regulatory control over any proposed changes to the total amount of money available through the CIP.

Additional questions were asked about the scope and contents of the CIP, including the criteria for selection of assistance, details of the projects to be supported, how the CIP will contribute towards poverty alleviation, details of the monitoring and evaluation of the programme and of the measures to ensure there was no discrimination in the allocation of funds. The request was made to ensure assistance goes directly to the communities and not through the central Government.

Questions were asked about the relationship between the value of the oil passing through a region and the value of compensation to be received. Some communities stated that, unless they received compensation from the CIP, they would prevent the pipeline from being built.

Issue Drawn from Comments: 58, 112, 131, 153, 399, 479, 504, 623, 733, 734, 735, 740, 743, 745, 913, 926, 945, 962, 965, 972, 979, 997, 999, 1004, 1017, 1231, 1236, 2975, 3142, 3143

Issue Relates to Following Sections of draft ESIA: Section 9.7, Section 13.5.5

Response To Issue

Goal of the Community Investment Programme

The goal of the BP Georgia Community Investment Programme[2] (CIP) is to promote sustainable social, economic and environmental development for the communities along the BTC and SCP project route. This will be achieved through support for sustainable income

[2] This programme is implemented by BP on behalf of BTC Co.

generating activities, investments in infrastructure and programmes in environmentally sustainable energy.
The CIP is designed to ensure that the communities affected by the pipelines see some additional positive and long lasting benefits from the project. It is not compensation and is not designed to mitigate residual and / or cumulative impacts. Although there is a direct link between the value of the oil passing through the pipeline and the tax revenue going to the Georgian Government, the CIP is an additional programme provided at the discretion of BP. It is an added value programme over and above the requirements of the project and of the draft ESIA. as well as a form of goodwill from the project towards the community, with the aim of producing a harmonious environment and increasing pipeline security. It is not a regulatory requirement, is not required by international standards or law and is therefore not a requirement of the draft ESIA.

Additional information on the CIP

It is proposed that the CIP will carry out activities in four key sectors to address the main concerns of the host communities. These sectors were selected based on the priorities found in the survey carried out for the draft ESIA. Meetings held with donor organizations confirmed these sectors as those they have identified as priorities for Georgia. The sectors are presented in order of priority as identified by the communities themselves:

- Infrastructure development
- Sustainable income generation (through micro-credit, agriculture, agri-business and small business development)
- Water supply
- Environmentally sustainable energy

BP intends to use NGOs and other civil society groups to implement and manage its CIP and engage with communities. To this end, BP will seek applications from qualified national and international NGOs registered in Georgia to implement the CIP for BP and on behalf of the shareholder companies. BP will release a Request for Proposals in the coming months. BP will make an award under this RFP to any eligible applicants whose proposal conforms to this RFP and offer the greatest benefit and prospect of achievement of BP CIP objectives.

Owing to the high expectations of communities, BP is keen to see some initial tangible NGO interventions in each of the pipeline route communities before the arrival of the pipeline construction workers. Therefore there will be a phased implementation of the CIP.

Longer term projects will form the bulk of the CIP projects. However, during the initial six months, NGOs will carry out Participatory Rural Appraisals type activity to enable communities to re-assess and prioritise their needs. There will be some small ‘quick impact’ projects carried out in each of the communities along the route.

Criteria for Project Selection

The CIP will apply consistent criteria for the selection of both individual projects and partners for implementation of projects. These criteria draw on international social investment best practice and local experience gathered through the implementation of the existing programmes in the countries.

These criteria will be further detail in the RFP, but include the following:

- **Community needs based:** programmes and projects designed in consultation with communities and other stakeholders experienced in community investment and development in the country
- **Impact:** material delivery of programmes and projects directed toward social, economic and/or environmental benefits to communities directly or indirectly affected by the project
- **Sustainability:** programmes and projects designed to deliver lasting benefits, whether short-term or long-term in nature
- **Transparency:** transparency of programmes and projects that is open to internal and external scrutiny to allow potential beneficiaries, NGOs, and governments to understand the approach
- **Prevention of duplication:** in selecting projects, avoiding duplication of the efforts of other companies, international and local agencies or government departments; leveraging opportunities with existing programmes and co-operating with existing organizations
- **Local participation:** programmes and projects aimed to encourage participation and contribution from local communities
- **Local implementation:** as far as possible, use of local NGOs in project implementation and project management
- **Partnerships:** programmes and projects that encourage partnerships with a range of organisations/civil society
- **Measurement:** identifiable targets and measurements of programme and project success
- **Best practice:** programme and project that are "best practice" in community investment - recognizing this is new and evolving practice in the country
- **Leverage:** programme and project facilitate the flow of additional funds into the project area and encourage the development of additional activity in the communities beyond the scope of the CIP

6.13.2 Issue: Requests for community investment programme assistance

Description of Issue

A wide variety of requests for information about and support through the Community Investment Programme were made by communities along the pipeline route.

These requests included assistance for schools (building of new schools, repair of existing schools, supporting teachers and supply of equipment), repair of roads and bridges (and information about which roads will be repaired), improvements to existing or creation of new water supply infrastructure (quality, domestic use, irrigation channels, sewerage system), gas and electricity supplies and infrastructure (including renewable energy sources such as hydro schemes), telecommunications, provision of emergency services, medical facilities, restoration of houses, churches and monuments, the construction or repair of community facilities, such as a sports ground, House of Culture or Community Centre, public baths, and funds for supporting the homeless, for village celebrations and for supporting regional development plans.

A number of additional requests were made for donations either linked to compensation for non-specified impacts or unlinked to compensation for the pipeline construction. Suggestions as to possible community investment projects were also received from the Government, NGOs and other stakeholders. These suggestions included infrastructure development (roads, bridges, water supply, waste collection and disposal), poverty alleviation, health care facilities, specific conservation projects, restoration of monuments, capacity building of Georgian scientific organizations, waste heat recovery on line pump drives and the possibility of stimulating local investment in equipment suitable for future road maintenance and as part of the emergency response plan. Suggestions were made to raise the population's awareness about environmental issues including conservation, waste management and pollution control.
Issue Drawn from Comments: 32, 41, 44, 57, 58, 63, 69, 76, 79, 83, 86, 87, 96, 101, 109, 111, 130, 133, 157, 161, 162, 165, 169, 173, 174, 178, 182, 199, 200, 209, 223, 224, 226, 228, 229, 236, 238, 240, 241, 394, 414, 418, 528, 573, 574, 580, 591, 599, 616, 636, 652, 687, 816, 817, 963, 974, 982, 993, 1002, 1041, 1093, 1094, 1095, 1097, 1116, 1123, 1126, 1132, 1142, 1145, 1146, 1147, 1153, 1155, 1156, 1157, 1160, 1162, 1167, 1173, 1180, 1183, 1184, 1186, 1187, 1194, 1199, 1231, 1233, 1236, 1244, 1245, 1246, 1248, 1249, 1252, 1340, 1439, 1443, 1444, 1447, 1448, 1449, 1450, 1463, 1464, 1466, 1467, 1513, 1515, 2217, 2218, 2238, 2388, 2516, 2519, 2520, 2521, 2537, 2538, 2571, 2574, 2575, 2577, 2583, 2586, 2675, 2677, 2691, 2695, 2712, 2713, 2776, 2777, 2789, 2794, 2852, 2857, 2858, 2897, 2949, 2955, 2956, 2980, 2981, 2985, 2986, 3126, 3127, 3129, 3130, 3133, 3139
Issue Relates to Following Sections of draft ESIA: Section 9.7, Section 13.5.5

Response To Issue

All requests for assistance have been noted and will be passed on to the NGOs who would be responsible for running the CIP. The aims and objectives of the CIP, management structure, prioritised areas of activity and criteria for the selection of projects are detailed in Addendum Section 6.14.1.

CUMULATIVE EFFECTS

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7 CUMULATIVE EFFECTS

7.1 INTRODUCTION

The Georgian section of BTC is part of an overall scheme to extract crude oil from the ACG oil field in Azerbaijan and export such oil to end users in the Mediterranean region. The oil production project and the pipeline construction projects in Azerbaijan and Turkey are the subject of separate ESIAs that discuss the direct impacts associated with those activities.

The Section of the draft ESIA on cumulative effects presented the assessment of impacts that may result from the interactions of construction and operation of the BTC pipeline with other projects and activities.

The assessment was carried out in accordance with IFC Procedure for Environmental and Social Review of Projects (IFC, December 1998), which states that environmental assessment should include consideration of:

"Cumulative impacts of existing projects, the proposed project and anticipated future projects."

The projects that need to be considered alongside the project being assessed should be identified as follows:

"Assessment of cumulative impacts would take into account projects or potential developments that are realistically defined at the time the environmental assessment is undertaken, where such projects and developments could impact on the project area".

Cumulative impacts are those that may result from the combined or incremental effects of past, present or future activities. While a single activity may itself, result in an insignificant impact, when combined with other impacts (significant or insignificant) in the same geographical area and occurring at the same time, it may result in a cumulative impact. Cumulative impact assessment has a number of components including:

- Assessment of the effects over the area of the impact of the project resulting from interactions between the project activities and other activities in the same geographical area
- An assessment of the effects of project activities over an extended timeframe including the past, present and future resulting from interactions between the project activities and other activities occurring at the same time

The sections below address the feedback received from the public and interested stakeholders on cumulative effects of the projects. For full reference to the assessment of the Project Cumulative Effects the reader should consult the Draft ESIA, Section 13.

7.2 RESPONSE TO FEEDBACK

7.2.1 Issue: Cumulative Impacts – National Level

Description of Issue Environmental and social plans should address impact on sustainable development issues (biodiversity, global climate change) and relate to BTC Co corporate commitments in these areas.
Issue Drawn from Comments: 548, 858, 1037, 1089, 1594, 1595, 1615, 1952, 2296, 3149, 3201
Issue Relates to Following Sections of ESIA: Section 13.4

Response To Issue

Sustainable Development

Wider global and regional issues are covered in an additional, independent study entitled "Economic, Social and Environmental Review in the National and Regional Context", which will be publicly available at the end of September. This study is described in the draft ESIA Section 13.3.9. The aim is to identify the economic, social and environmental implications of the ACG, BTC and Shah Deniz projects at the regional and national level. Topics covered by the regional review include biodiversity and greenhouse gases. The assessment provides advice on steps to enhance the sustainable development opportunities presented by the projects and to minimize any risks that they present.

The project Environmental Management System (EMS) (see ESIA Section 14.2) and all management plans will conform with BP policies on sustainable development and biodiversity.

7.2.2 Issue: Cumulative Impacts – Route Level

Description of Issue It is requested that the impact on existing activities, which will alter or cease as a consequence of the project is addressed (eg how the reputation of Borjomi Spring Waters could be altered, impacts on tourism, land farms and hotels). It is suggested that while cumulative impacts of various projects are considered, the ESIA addresses impacts by areas or summarily, but makes no comment on the combined, total impact it produces and whether the proposed mitigation/remedies are appropriate to this level of overall impact. Provision of information on cumulative impacts and mitigation measures is requested, specifically with regard to:

- Reuse of BTC camps by SCG project
- Reuse of waste disposal sites
- Worst case emergency aspects (eg gas pipeline accidents in proximity of AGIs)
- Cumulative impact of the two pipelines and impact of a combined 100m corridor as opposed to a smaller one pipeline corridor
- Cumulative impacts of `Mitigation Measure 8` where local re-routing at wetland territories is subject to engineering-geotechnical design (where the local negative influence on wetlands may decrease, it may increase at other sites, especially if whole route length is assessed)

Issue Drawn from Comments: 858, 1037, 1285, 1595, 1615, 1633, 1678, 1855, 2275, 2298, 2309, 2312, 2343, 2350, 2465, 2696, 2697, 2766, 2820, 3015, 3024, 3032, 3100

Issue Relates to Following Sections of ESIA: Section 13.5

Response To Issue

There are no commercial activities that are expected to alter or cease as a result of the project. Where land use is impacted this has been addressed by the land compensation process in Section 11 of the draft ESIA and is further described in Section 6 of this addendum. It has been demonstrated that the probability of an oil spill to occur and to have significant effects that would affect the sustainability of local industry is virtually zero. Specifically, the co-existence of the project with the existing Borjomi water business has been analysed in Section 13.5.4 of the draft ESIA, and is further described in Section 5.12 of this addendum. The impact upon hotels in the vicinity of the project is expected to be positive, as has been the case during the ESIA study phase. It is likely that hotels in Bakuriani and Borjomi will be especially utilised by the project during construction.

The cumulative impacts of the project activities at regional, national and local level have been examined in Section 13 of the draft ESIA in accordance to international guidance on cumulative impact analysis. It was concluded that the overall effect on regional stability, economy, environment and society would be positive.

Specifically:

- Reuse of BTC camps by SCP project, Reuse of waste disposal sites:

  The BTC and SCP Projects will most likely utilise the same worker camps and pipe yards, as well as waste disposal facilities. This is considered beneficial as it will stimulate trade for a longer period of time and will minimise land take for the development of camps. Waste disposal sites will be developed for the project in accordance to European standards. The facilities will be the first of this kind in Georgia and will potentially be available to other producers of waste, thus having an overall beneficial effect.

- Worst case emergency aspects (eg gas pipeline accidents in proximity of AGIs) are not considered cumulative effects and have been assessed as part of the safe design of the facilities.

- Cumulative impact of the two pipelines and impact of a combined 100m corridor as opposed to a smaller one pipeline corridor:

  The cumulative effect of constructing the two pipelines in a combined corridor of 44m (not 100m) has been analysed in Section 13.5.2 of the draft ESIA. It should be noted that each pipeline requires a corridor to achieve construction of 32m. By combining and overlapping the two 32m corridors needed for both pipelines, it has been possible to reduce the width of the corridor that will be disturbed to 44m, instead of a possible 64m. This concept is shown in Figure 13.4 of the draft ESIA.

- Cumulative impacts of `Mitigation Measure 8` where local re-routing at wetland territories is subject to engineering-geotechnical design.

  The 'knock on' effect inferred in the issue raised is not considered a cumulative effect. The impact assessment has been carried out on a 44m corridor of the proposed pipeline alignment. The benefits and disadvantages of local routing options, including the knock on effect referred to above, have been analysed extensively and it is documented in Section 4 of the draft ESIA with additional detail provided in Section 3 of this addendum.

MANAGEMENT AND MONITORING

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8 MANAGEMENT AND MONITORING

8.1 INTRODUCTION

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

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

Section 14 of the draft ESIA document highlights how these principles have been applied to the proposed BTC project. It identifies how all the commitments made in this ESIA will be translated into actions in the field and includes a schedule for implementing the actions, through identifying key roles and responsibilities.

Most of the plans that will be developed and implemented during the construction phase will be developed by the construction contractor and will be subject to the approval of BTC Co.

The section below addresses the feedback received by the public and the interested stakeholders with regard to management and monitoring activities. For full detail of the proposed strategy the reader should refer to the draft ESIA document, Section 14.

8.2 RESPONSE TO FEEDBACK

8.2.1 Issue: Air and water quality – responsibilities

Description of Issue It is asked whether BP will take responsibility that drinking water and air will not be polluted. It is suggested that the responsibilities in case of emission or response measures are not mentioned in the project.
Issue Drawn from Comments: 62, 424
Issue Relates to Following Sections of ESIA: Section 10

Response To Issue

The ESIA is a formal regulatory process by which the project proponent (in this case BP) is responsible for assessment of the environmental and social impacts that may be associated with their proposed project. The proponent must also detail mitigation measures to address these potential impacts. The Government regulator then has the responsibility to assess the ESIA and determine approval conditions. These will include assessment of any air and water impacts. The regulator will also have an ongoing rule in checking on compliance with approval and regulatory conditions.

It is BP's policy and responsibility to meet or exceed applicable environmental and health legislation and regulation including that covering air and water.

8.2.2 Issue: Environmental Management Plans

Description of Issue

Specify who is responsible for the supervision, monitoring, guidance and technical assistance in the implementation of the management plans. Detail which organisations will review and approve the plans (recommend Georgian and foreign experts, and NGOs).

Compliance with IFI OP 4.01, 4.04 and IFC Safeguard Guidelines, EBRD Environmental Policy - Environmental Action and Management Plans. It is suggested that the majority of the Environmental Action Plans are schematic and do not comply with IFI requirements. Management Plans do not have associated costs, schedule or detailed methodology. However, it is noted that as the construction contractor will be finalising the plans, and that this does comply with IFI guidance. It is suggested that an Environmental Management System be developed for construction and operation.

More detail is requested on mitigation measures. Request that all management plans are provided as annexes. Describe how the plans will be incorporated into the contractor's contracts and operational activities.

Environmental and Social issues need to be carefully considered and identified. It is suggested that the environment and social plans should address the impacts on sustainable development issues, such as biodiversity and global climate change, and relate to BTC Co corporate commitments in these areas. This text has been brought over from S17.

Issue Drawn from Comments: 357, 371, 409, 535, 546, 562, 579, 614, 680, 756, 759, 809, 1026, 1043, 1044, 1054, 1056, 1063, 1119, 1303, 1427, 1492, 1525, 1539, 1636, 1637, 1639, 1640, 1646, 1657, 1673, 1674, 1756, 1758, 1759, 1760, 1843, 1844, 1845, 1849, 1850, 1851, 1853, 1854, 1865, 1868, 1953, 1956, 1957, 1958, 1959, 1961, 1962, 1969, 1988, 2010, 2011, 2022, 2023, 2046, 2047, 2058, 2250, 2297, 2305, 2308, 2317, 2320, 2321, 2323, 2324, 2325, 2355, 2386, 2453, 2602, 2603, 2767, 2768, 2770, 2771, 2772, 2912, 2923, 2928, 2933, 2945, 2949, 2952, 2953, 2954, 2962, 2963, 3065, 3187

Issue Relates to Following Sections of ESIA: 14.3

Response To Issue

Management Plan implementation and review

The HGA contains the following requirements in respect of responsibilities for monitoring:

The EIA will include: the formulation of a monitoring programme to verify that mitigation measures are effective, and in the event that additional impacts are identified to ensure that additional appropriate mitigation measures are effected; provided, however, that said monitoring programme shall provide for Government participation at the Government's sole cost, risk and expense, which participation shall not interfere with Project Activities; and provided further, that in recognition that the Government will be conducting its own monitoring of the Project to assure environmental compliance, the MEP Participants will cooperate with the Government in respect of such Project monitoring, but the foregoing general duty of cooperation shall not vary any terms of the Agreement.

The Environmental Action Plans as per IFI requirements will be a separate formal submission to IFC and will comply with the specific IFI requirements. The management plans contained within the Draft ESIA are not intended to be the same document as the Environmental Action Plans. Rather they are a description of the content and structure of the management system that will be put in place for the Project. An Environmental Management System will be developed for both the construction and operation phases.

The construction contractor will develop and implement the management plans during the construction phase. BTC Co will supervise, monitor and provide guidance and assistance when required. It is also possible that other parties such as the Ministry of environment or other government agencies may request a right to inspect the facilities and verify compliance with the plans. BTC Co and SCP Co will develop and implement management plans during operation of the pipeline.

Mitigation measures

The mitigation measures that will apply to the project are described in Sections 10 and 11 of the draft ESIA relating to the environmental and social impact assessments respectively. The management plans will include procedures on how the mitigation measures will actually be implemented. The detail of most of the management plans will developed by the contractor and therefore were not available at the time of production of the ESIA.

The management plans will be based on the environmental and social assessments carried out as part of the ESIA process and on the social and environmental mitigations that have been formulated to mitigate adverse impacts.

Contractors contracts

The contractors will be contractually required to prepare the management plans and to seek BTC Co approval prior to commencement of any activities. Implementation of the stated commitments will be monitored by BTC Co throughout the construction phase to ensure that the management plans are enforced. Monitoring will consist of routine presence of environmental personnel form BTC Co on the construction sites and of periodic formal audits of the contractor’s performance.

Sustainable development issues

BP is committed to policy goals of no accidents, no harm to people and no damage to the environment and publicly reports social, environmental and economic performance. BTC Co will operate according to BP corporate commitments and responsibilities as a minimum. The Joint Venture Partners have an opportunity to contribute to project policy through regular management committee meetings and other internal processes.

There are a number of mitigation measures in the ESIA which are in line with the principles of sustainable development, including:

- Maximising employment of Georgian nationals – Section 11.3
- Training of Georgian nationals to enhance local skills – Section 11.3
- The overarching goal of the land acquisition strategy is to ‘restore or enhance project affected peoples’ living standards, income earning capacity and production to at least without-project levels’ – Section 11.4
- Land will be returned to its original use (with some restrictions on the 8m corridor) after construction – Section 11.4
- Local procurement of goods and services, thus maximizing indirect employment – Section 11.3
- New roads will be built and there will be improvements to existing roads – Section 11.5
- Any damage to the existing road network will be repaired – Section 11.5

The Community Investment Programme will provide communities with sustainable skills that will assist them in the longer term – Section 13.5.5. The Environmental Investment Plan will be developed with sustainable development as a key objective. Further details of the Plan are contained in Section 5.11 of this Addendum.

8.2.3 Issue: Environmental monitoring – construction and operation

Description of Issue
Provide additional information on monitoring during construction, including other project activities such as AGIs, activities outside ROW, and monitoring of river crossings and erosion control measures. It is unclear which management plan incorporates the wildlife programme and river crossings monitoring. Is it necessary to separate social and ecological monitoring systems and how can society and specialists control standards and norms? The frequency of monitoring is often unclear with terms such as "on site audit" and "ongoing”, "regularly" or "periodic". This should be developed in line with international standards and location specific circumstances. Note the necessity to regularly monitor tank bunding for rainwater build-up.
***Issue Drawn from Comments**:* 62, 300, 409, 493, 809, 1029, 1080, 1226, 1296, 1431, 1462, 1594, 1616, 1631, 1641, 1643, 1653, 1820, 1821, 1845, 1850, 1853, 1865, 1867, 1879, 1923, 1965, 1969, 1970, 1971, 1988, 2007, 2013, 2015, 2035, 2138, 2205, 2207, 2210, 2216, 2217, 2218, 2313, 2314, 2315, 2330, 2331, 2337, 2418, 2419, 2429, 2619, 2949, 2952, 2953, 2954, 3141, 3181, 3190, 3
Issue Relates to Following Sections of ESIA: 14.4

Response To Issue

Monitoring during construction

Table 14-5 of the draft ESIA contains details of monitoring applicable to AGIs.

Table 14-3 in the draft ESIA contains details of monitoring of river crossings, and water resources in general, during construction. This is detailed in the table as follows:

- Receptor: Water Resources for the following Potential Impacts:
  - Release of suspended solids to watercourses during construction which has an impact on aquatic fauna and flora
  - Erosion of ROW or other partially reinstated areas
  - Discharge of sanitary waste water to water courses
  - Spill of fuel or liquid waste and contaminated groundwater
- Receptor: Ecology for the following Potential Impacts:
  - Damage to riparian flora and fish during construction
  - Disturbance of surface waters owing to effluents discharge, hydrotest water discharge and extraction
  - Damage to riparian and aquatic ecology owing to directional drilling and mud circulation pits
  - Damage to water courses as a result of discharge of groundwater from trenches
  - Damage to fish and spawning grounds owing to sediment discharge

Table 14-5 also contains a number of monitoring measures related to water resources during the operational phase.

Table 14-3 in the Draft ESIA contains details of monitoring relating to erosion during construction. This is detailed in the table as follows:

- Receptor: Soil for the following Potential Impacts:
  - Erosion of top soil
- Receptor: Landscape and Visual Intrusion for the following Potential Impacts:
  - Construction and reinstatement causing landscape impacts at river crossings

Social and ecological monitoring

Social and environmental (including ecological) monitoring are addressed separately in Section 14 of the draft ESIA. Environment is covered by Tables 14-3 and 14-5, whereas social is covered by Table 14-4.

Monitoring frequency

Table 14-3 and 14-4 specify the frequency of monitoring in the far-right column of the tables. For example in Table 14-3, under the heading of water resource monitoring for release of suspended solids to water courses during construction, monitoring is specified as "at least once at the start of crossing activity and at least weekly until reinstatement is complete and approved by BTC/SCP Partners." The other entries for monitoring frequency are similarly specific. Where appropriate the monitoring specifications have been developed with location specific circumstances taken into account. Hence, Table 14-3 contains KP location points of where the monitoring will be undertaken.

Tank bunding

The monitoring requirements for the checking of the integrity of secondary containment for all petroleum containing tanks is specified in Table 14-5. The need to also monitor the containment for rainwater build up is noted and will be included in the monitoring requirements.

8.2.4 Issue: Social Management Plans

Description of Issue

Extensive feedback was obtained on the plans for management and monitoring of both environmental and social issues. In general, many of the comments focused on the need to see the details of management and monitoring in order to assess the effectiveness of the draft ESIA as a whole. It was felt that lack of inclusion of the management plans was contrary to the draft ESIA process outlined in HGA Appendix 3, Part 3 (requirement to include responsibilities of the government participation in the monitoring programme) and 4.01 of the World Bank Operations Policy. Comments were made that social issues should be included within the Environmental Management Systems.

Monitoring plans were requested according to a range of international standards and guidelines and to provide for Government responsibilities within the monitoring programme. NGO involvement in the monitoring programme was requested. This is primarily an issue relating to the construction phase of the project where the majority of issues will occur.

Issue Drawn from Comments: 497, 851, 932, 992, 994, 1019, 1026, 1036, 1043, 1044, 1045, 1046, 1047, 1050, 1051, 1054, 1056, 1057, 1063, 1072, 1278, 1287, 1288, 1304, 1305, 1306, 1308, 1309, 1345, 1424, 1426, 1427, 1442, 1492, 1643, 1842, 1850, 1959, 2539, 2653, 2962

Issue Relates to Following Sections of draft ESIA: Section 14

Response To Issue

Management and monitoring plans in general

The mitigation measures for the project are those included in the draft ESIA. The nature of the management plans is to describe detailed procedures on how the mitigation measures will be effectively implemented.

The mitigation measures outlined within the ESIA will form the basis of all of the detailed management plans and procedures to be developed by the contractor. The contractor is contractually required to implement all of the measures specified in the draft ESIA and any further measures outlined within the Invitation to Tender (social and environmental measures in their earlier draft form were specified within this document). The construction contractor's specific implementation plans will require review and approval by BP.

To assure both the BTC project team and external stakeholders that these implementation plans are both developed and implemented effectively, the BTC environment and social management team will conduct routine monitoring on all issues, as specified in the monitoring plan outlined in draft ESIA Section 14.4. This will include internal auditing of the activities of the construction contractor, and routine internal reporting on all issues to the BTC environment and social management team, on the following issues:

- Community safety
- Community relations
- Recruitment and employment
- Construction disruption to community infrastructure
- Local procurement
- Traffic management
- Land acquisition and compensation
- Environmental Management as detailed in Section 8.2.2 above

The specific detail of monitoring activities will be developed by the environment and social managers, before the commencement of the construction period.

In addition, independent verification/monitoring will be conducted on key issues of public concern such as:

- Recruitment and employment (including working conditions)
- Grievance procedures
- Community safety
- Community relations
- Land acquisition and compensation
- Relations between construction workers and the communities
- Environmental Monitoring as detailed in Section 8.2.3 above.

Legal requirements

The draft ESIA is in accordance with the HGA requirements on management and monitoring. Specifically HGA Appendix 3, article 3.6 (vi) states that:

3.6 Upon completion of the Baseline Study, the MEP Participants shall cause an EIA of Pipeline Activities and associated operations to be conducted with respect to potential environmental impacts to the Territory (whether from Pipeline Activities within or without the Territory). The EIA shall include:

(vi) the formulation of a monitoring programme to verify that mitigation measures are effective, and in the event that additional impacts are identified to ensure that additional appropriate mitigation measures are effected; provided, however, that said monitoring programme shall provide for Government participation at the Government's sole cost, risk and expense, which participation shall not interfere with Project Activities; and provided further, that in recognition that the Government will be conducting its own monitoring of the Project to assure environmental compliance, the MEP Participants will cooperate with the Government in respect of such Project monitoring, but the foregoing general duty of cooperation shall not vary any terms of the Agreement (including its Appendices).

The World Bank operation policy (4.01) states that it is necessary to write and approve environmental plans prior to commencing a project and that they should be included in the draft ESIA. The draft ESIA does not contravene this policy as it includes draft Environmental and Social Management Plans (see draft ESIA Section 14).

OVERALL PROJECT ASSESSMENT

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9.1 INTRODUCTION

The BTC pipeline will enable Caspian ACG crude volumes to be exported, from the land-locked Caspian Sea, to open market without incremental increase in volumes shipped through the Bosphorus Straits. The BTC pipeline is the environmentally preferred option compared to the alternative transport options such as road and rail. Turkey has been selected as the most suitable export destination as it's the nearest country to Azerbaijan with access to the Mediterranean Sea, the latter providing the nearest open market point of delivery. Georgia has been selected as the most suitable intermediate transit country.

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
- The principle of 'no net loss' is applied. 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 minimize or remove any negative impacts. Further to the public disclosure process additional mitigation measures have been developed in areas where stakeholders concerns raised the significance of the potential impacts.

The environmental and social mitigation measures identified in the draft ESIA and this Addendum 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. The criteria and process for determining the residual impact rankings are described in Section 7 of the draft ESIA.

9.2 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 the 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 and operation of the pipeline, and in the eventuality that unplanned events were to occur. The interaction of the project with other related or unrelated activities is also addressed.

9.2.1 Construction

9.2.1.1 Landscape impacts

High ranking landscape impacts due 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
- 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.

9.2.1.2 Ecological impacts

The impacts to ecology are due 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 as a result of clearing 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 and that not all forest is of primary origin. 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 Managed reserve. The impact will be mitigated by clearing the scrub prior to the breeding/nesting season so that loss of individuals will be minimized. 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. The significance of this residual impact is not fully understood as there is no conclusive evidence that the ROW clearance and construction operations would 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

9.2.1.3 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, due 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.

9.2.2 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 importance of the general area as wildlife habitat and its high landscape value. 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 minimize these impacts.

9.2.3 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 at key locations representative of the most sensitive locations along the pipeline route, 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 system. Secondly the design also includes many features for early identification of a spill event, including a leak detection system, groundwater monitoring in key areas, 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, in the unlikely event that it should occur.

Due to significant concerns expressed by the stakeholders in relation to the possibility of a spill occurring in the Tsikisjvari area additional studies have been carried out to verify the geological and hydrogeological structures and the possibility of contamination of water resources in the area. The findings of these additional studies are reported in Appendix I of this Addendum and show very clearly that there is no possibility for contaminated water or crude oil to reach the mineral water deposits that yield the famous Borjomi water. Also, the studies show that there is no physical pathway between the location of a potential spill and the freshwater deposits used for production of the Borjomi Springs fresh water.

Both the draft ESIA and the subsequent studies carried out in the area identify a risk of contamination of surface waters in the eventuality of an oil spill. This could result in the contamination of drinking water supplies if any draw water from the rivers or from the alluvial aquifers located within the river valleys. In order to protect these supplies in a suitable manner BTC Co will carry out a water supply survey prior to construction of the pipeline so that suitable intervention measures can be devised and deployed in case of an oil spill. This study, as well as other detailed terrain and hydraulic analysis will be carried out as part of the Oil Spill Response Plan development.

9.2.4 Cumulative impacts

Impacts caused by interaction with other projects in the area were also assessed. The main cumulative impacts result from SCP construction following on after BTC construction. This results in an increased duration for many of the construction related impacts and a longer period prior to final reinstatement. It could be however argued that two separate corridors for the BTC and SCP pipeline would have resulted in additional fragmentation of habitats and more widespread disturbance.

9.3 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 temporary and offset by potential economic benefits both to their community and to Georgia as a whole. 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 (see draft ESIA Section 13, Cumulative Impacts). 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
- Benefits from increased knowledge of Georgian social and economic conditions along the pipeline route, as a result of the BTC project baseline studies. The data collected has been 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 draft 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.

[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 construction camp or pipe yard. These communities are likely to experience and be affected by the activities of construction, operation and decommissioning of the pipeline.

The main residual negative social impacts associated with the construction and operation of the BTC pipeline in Georgia are 1) unmet local expectations on access to energy and employment, and 2) 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 Co 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.

9.3.1 Construction and operation phase

9.3.1.1 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.

9.3.1.2 Employment expectations

There was clear evidence that communities expect that the number of jobs to 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.

During Public Disclosure, high expectations were confirmed with attempts to establish ‘preferred individuals’ listings for preferential access to employment and from the circulation of fake application forms. The project has already put in place a number of additional mitigation measures to increase the flow of accurate information about employment.

An employment strategy will be developed to ensure that local employment levels are maximised as far as practical (see draft ESIA Section 11, Socio-economic Impacts and Mitigation) and community consultation has sought to clearly outline the level of employment that is expected during both construction and operation of the pipeline.

9.3.1.3 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.

There was 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.

In addition, there is potential for the project to exacerbate existing ethnic tensions, should project benefits, such as employment or the Community Investment Programme funding, benefit or be perceived to benefit only particular ethnic groups or particular individuals.

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.

9.3.2 Cumulative impacts

Impacts related to the interaction of BTC with other projects at the regional, national and route levels were also assessed. The most important cumulative impact is that the overall construction period (BTC and SCP) will be longer in duration. This will increase both the beneficial and negative impacts of the project, making it vital that the mitigation measures are well implemented.

9.3.3 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.