

2 PROJECT DESCRIPTION

2.1 PIPELINE ROUTE

The exploitation of the hydrocarbon reserves of the Caspian States of the former Soviet Union is widely recognised as imperative for the future development and long-term political and socio-economic stability of the region. The energy demand within the greater South Caucasus and Central Asia region is, however, insufficient to warrant the level of extraction of petroleum resources necessary to drive this economic uplift. It is therefore necessary to export the hydrocarbons to wider geographical markets.

The proposed Baku-Tbilisi-Ceyhan (BTC) Pipeline will transport oil from the Sangachal terminal near Baku in Azerbaijan, via Georgia, to a new marine export terminal at Ceyhan on the Mediterranean coast of Turkey.

- The Azerbaijan section of the pipeline will be 442km in length. The BTC Pipeline will be routed parallel to the existing Baku to Supsa Western Route Export Pipeline (WREP) for much of its length.
- The Georgia section of the pipeline will be 248km in length. This section, too, will initially be routed parallel to the existing WREP, but will divert south towards the Turkish border.
- The Turkish section of the pipeline will be approximately 1,076km in length. For approximately 40% of its length in Turkey, it will run parallel to an existing BOTA^a East Anatolian natural gas pipeline. At the Turkish-Georgian border two pipelines (BTC Pipeline and the South Caucasus pipeline) will cross from Georgia into Turkey. After a short distance of parallel routing, the South Caucasus pipeline is routed away from the BTC Pipeline before it will connect to the existing BOTA^a East Anatolian natural gas pipeline.

A more detailed description of the Project is provided in Volume 1, Section 4 of the EIA for Turkey.

2.2 CORRIDOR CONFIGURATION IN TURKEY

The Turkish section of the pipeline will comprise a pipe with a diameter decreasing from 46 inches to 42 inches to 34 inches (850mm) along the route.

In the course of basic and detailed design, a number of strategic, routing and design options have been considered. These alternative options are discussed in Chapter 5. This Section of the Report describes only the finalised pipeline concept.

The Turkish section of the proposed BTC Pipeline stretches from Turkgozu on the Georgian-Turkish border to Ceyhan on the Gulf of Iskenderun on the coast of the Mediterranean Sea. From the border with Georgia, the pipeline will cross the provinces of Ardahan, Kars, Erzurum, Erzincan, Gumushane, Sivas, Kayseri, Kahramanmaras, Osmaniye and Adana. It will terminate at a new storage and export terminal (the BTC Marine Terminal), which will be an integral part of the Project.

- The initial section of the pipeline, comprising a length of approximately 22km, travels from the Georgia-Turkey border to the first pumping station (PT1)
- The intermediate section of the pipeline, comprising a length of approximately 928km, travels from PT1 to the pressure reduction station (IPT1).
- The final section, comprising a length of approximately 120km, travels from IPT1 (where the pressure in the pipeline is reduced) to the BTC Marine Terminal.

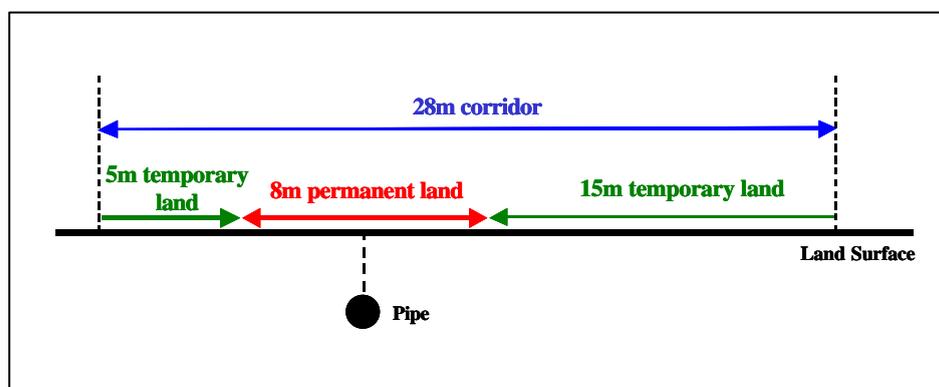
Detailed pipeline routing and engineering design is an interactive and ongoing process and, while this RAP is based on the information currently available, as the design develops, more information will become available and will be subject to ongoing review.

The Construction Corridor is comprised of a standard working width of 28m, modified to a reduced working width of 22m in forested areas (proposed as 123km of pipeline) or an extended working width of 35m where terrain or other features demand.

Close interaction between the EIA team and the engineering contractors has enabled environmental considerations and stakeholder concerns to influence not only route alignment, but also the location of AGI's (pump stations, the pressure reducing station and block valve stations), development of restoration and reinstatement measures and other mitigation measures.

The pipeline will normally be buried to a minimum depth of 1m. The minimum cover, such as in areas of rocky terrain, will be 0.8m. Increased cover depth (as appropriate) will be considered in areas of agricultural land where deep ploughing is undertaken. Where the pipeline traverses areas with sensitive groundwater aquifers, the depth of cover will be increased to 1.2m. The depth of cover will be increased to 1.5m at railway and main road crossings. At river crossings, the depth of burial will be 1.5m below the calculated scour depth (Figure 2.1).

Figure 2.1 Graphical Representation of the Pipeline Corridor



In areas of shallow groundwater and at river crossings the pipeline will be concrete coated to provide stabilisation by ensuring negative buoyancy, combating the tendency for the pipeline to float.

The key Above Ground Installations (AGIs) associated with the Turkish section of the proposed pipeline are:

- a custody metering station located after the pipeline enters Turkish territory, to monitor the quality and measure of the quantity of crude oil flowing into the Turkish section of the pipeline;

- four pump stations with associated pig launcher/receiver facilities located at intervals along the route to facilitate the controlled flow of oil through the pipeline;
- a pressure reduction station/pigging facility, located prior to arrival at Ceyhan, to reduce pipeline pressure and thereby further facilitate the controlled flow of oil through the pipeline;
- 52 block valve stations installed at strategic locations along the pipeline to enable sections of the pipeline to be isolated in the event of non-standard operating conditions and to facilitate maintenance; and
- facilities for monitoring and maintaining the internal integrity of the pipeline and for preventing the build-up of wax which might otherwise be deposited on the internal walls of the pipeline.

As an integral component of the Turkish section of the proposed BTC Pipeline, a new marine export terminal will be constructed at Ceyhan, where crude oil will be stored prior to loading on to tankers. The BTC Marine Terminal will be built adjacent to the existing BOTA^a storage and marine facilities at Ceyhan. The BTC Marine Terminal will include the following facilities:

- seven floating roof crude oil storage tanks, each with a holding capacity of 150,800 m³;
- a custody metering station located between the tank farm and the marine loading facilities for fiscal metering of crude oil exports;
- marine berthing and loading facilities designed for ships between 80,000 and 300,000 tonnes (dead weight tonnage, DWT); and
- a backup control room for monitoring and control of the entire BTC Pipeline system.

2.3 METERING, VALVES AND PIGGING FACILITIES

There will be a custody metering station located approximately 22km after the pipeline enters Turkish territory. There will be four pump stations (PT1/2/3/4), each with pig launcher/receiver facilities. There will also be one pig launcher/receiver station upstream of the BTC Marine Terminal. The Turkish section of the pipeline is also fitted with 52 intermediate block valve stations to facilitate isolation of discrete sections of the pipeline in case of any breach in the integrity of the pipeline system.

The pipeline terminates at the BTC Marine Terminal which comprises a tank farm for intermediate storage of oil that has been transported down the pipeline, a fiscal metering station to measure the quantity of oil exported and a berthing and loading facility to transfer oil to ocean tankers. The terminal will also house a backup control room for the entire BTC Pipeline. The marine terminal will be built adjacent to the existing BOTA^a storage and marine facilities at Ceyhan.

The BTC Marine Terminal development consists of both onshore and offshore facilities. The onshore facilities, comprising oil storage tanks, pipeline loading facilities and other service facilities, will mostly be located within the confines of the existing BOTA^a property in the district of Ceyhan, Adana province. Although no land is permanently required outside of the boundary fence, an area of approximately 17,5 ha land may be required for the construction camp to be used by on-shore and offshore contractors.

2.4 ACCESS ROADS

Access roads to the various AGI's have been largely identified; most of these involve the use of existing roads. The required new access roads will be designed with adequate slope and cross-fall drainage to channel storm water safely to off-road soak ways, thereby preventing erosion or siltation. They will be constructed with a sub-base, an asphalt base and top course in accordance with Project specifications. All new access roads will be subjected to environmental impact assessment, public consultation and approval prior to the commencement of construction.

2.5 TEMPORARY CONSTRUCTION FACILITIES

The main temporary construction facilities will comprise:

- Pipe storage areas; and
- Construction camps.

Pipe lengths will be transported from the receiving port(s) and stockpiled at one or more main pipe storage areas. The main storage areas will be located in Iskenderun and further pipe storage areas will be set up at each of the main construction camps.

There will be three primary construction camps to accommodate the workers, as well as visitors and third party contractors. It is estimated that there will be a total of approximately 3,000 workers for the entire length of the route, or approximately 1,000 per lot. There will be one primary camp in each lot, servicing the workers of each contractor, or three primary camps in total. There will be a camp at Horasan, Zara (near Sivas) and Goksun. The construction camps will only accommodate permanent workers, as well as visitors. Local workforces will be bussed to the working corridor from their villages and towns on a daily basis.

The locations of the three primary camps have been finalised and their land requirements have been reflected in the RAP.

Table 2.1 Camp Station Locations

Name	Province	District	Village	Km	Easting	Northing	Zone
Lot – A	Erzurum	Pasinler	Cakirtas	255.5	485,031	442,6862	TM 42
Lot – B	Sivas	Zara	Tekkekoy	640.7	396,590	441,2183	TM 39
Lot – C	K.Maras	Goksun	Mahmutbey	908.5	540,970	421,9360	TM 36

Each contractor will set up two to three additional satellite camps near the pipeline work fronts for ease of access for material and workers. These camps will typically be located at a maximum driving distance of one hour from the pipeline. These smaller camps will need to cater to around 300 to 400 workers. Their location will be negotiated with the villagers and adequate rent will be paid for the short duration of the work. The camps will consist of pre-fabricated modules that will be brought in by trailer. They will remain in place for 6 to 9 months and then be disassembled and removed.

Within 90 days from the effective date of the construction contract, the contractors will be required to provide information outlining all additional temporary land acquisition requirements that are needed for the construction period. This will include local storage sites, temporary access roads, extra lay down areas and construction camps. These additional requirements will

be presented to DSA/BOTA^a for approval and their acquisition will be realised by the experienced land team of BOTA^a.

Compensation payments for crops will be paid based on evaluation by agricultural experts prior to land entry.

2.6 CONSTRUCTION PROCEDURE

Contractors experienced in major pipeline construction will undertake construction of the pipeline, terminal and associated permanent facilities, working to the specifications developed by the Project team (BOTA^a and BTC Co.). The pipeline and associated facilities are designed for a minimum lifetime of 40 years.

Pipeline construction is a sequential process and comprises a number of distinct operations. Pipeline construction will be achieved using a number of conventional construction spreads to accomplish pipeline installation and additional special section crews to accomplish river crossings and other specialised pipe segment installations. Mobilisation and construction is estimated to last from autumn 2002 to late 2004. Should the start of the construction period force two winters' worth of work, then the duration estimate will need to be adjusted since construction slows considerably during the winter months (indeed some areas of the route may not be accessible during the winter). The rate of progress of each sequential operation is dependent on the terrain and the nature of the activity. The direction of construction will be at the construction contractors' discretion, in consultation with the Project team and the appropriate authorities taking technical requirements into account.

The construction of the pipeline will require a number of temporary facilities, which will include worker camps, pipe storage yards and temporary access roads.

The entire pipeline and tank facilities at Ceyhan will be subjected to hydrostatic pressure testing to prove the strength and integrity of the pipeline system before operations commence. On completion of construction of the BTC Pipeline, a hydrostatic test will be carried out to demonstrate fitness of the BTC Pipeline and the associated facilities in accordance with the relevant standards. Water abstraction sources will be selected to suit the geographical location of the pipeline and will be large enough to facilitate filling of the pipeline test sections without any detrimental effect to the surrounding environment and existing resource users. The displaced hydro-test water may be transferred to another section of pipe or discharged at a suitable location. Discharge locations, treatment and rates will be agreed to in advance with relevant authorities.

Commissioning of the pipeline, block valves and associated AGIs will ensure that the pipeline system has been constructed in accordance with design specifications, and that the system is ready for operation. Commissioning will also ensure that there are no defects in the pipeline system, which could cause problems during start-up (introduction of crude oil) or during operation.

2.7 OPERATIONS AND MAINTENANCE

Automatic monitoring and control of the entire pipeline will be undertaken through the Supervisory Control and Data Acquisition (SCADA) system. The primary control centre will be located at Sangachal in Azerbaijan, and the back-up control centre will be located at the BTC Marine Terminal at Ceyhan in Turkey. Monitoring and control of the various facilities will be

available locally and remotely from these pipeline control centres. The capability will exist to switch between local and remote modes of control.

Numerous measures have been built into the design of the pipeline to enhance the level of safety of routine operation. These measures include an increased design factor at all crossings (river, road, rail and fault), increased pipe wall thickness in sensitive areas, and the strategic location of block valve stations, which serve to isolate sections in the case of pipeline rupture. In the event of a major incident involving the pipeline, the emergency response plan and, if applicable, the oil spill response plan will be set into immediate operation to mitigate adverse impacts.

The maintenance program will be implemented to sustain smooth operation and to preserve the integrity of physical assets. Contractors will be required to comply with the requirements of the BTC Pipeline Operations and Maintenance Manual. Regular pipeline surveys will be carried out using a variety of techniques including line walking, aerial surveys and intelligence pigging. Monitoring will pay particular attention to sensitive locations including crossings.

Sub-surface warning tape will mark the position of the pipeline along its entire route. Low level marker posts will be provided at all station sites, cathodic protection test stations, road, track, rail and water crossings, AGI facility fences, and any other locations deemed necessary to provide identification of the pipeline route and to aid surveillance. Where appropriate, markers will be in line of sight contact with adjacent markers. All marker posts will be provided with identification plates that will include telephone contact numbers to be used in the event of a pipeline incident. Aerial markers will be installed at intervals of up to 5km along the route to assist in aerial surveillance of the route.

2.8 SUMMARY OF LAND REQUIREMENTS

The key land requirements for the construction of the pipeline and all Above Ground Installations (AGIs) are shown in Box 2.1. As will be increasingly clear from the discussions in this and subsequent chapters, other than for the 8m corridor and the AGIs, most of the land needed for the Project is for temporary use, often limited to a period of only several months. Except for AGIs, and subject to the ex-owners/users of these lands observing certain land use restrictions designed to safeguard the pipeline and pipeline operations, all temporary and permanent land acquired for the pipeline will be made available to ex-owner/users shortly after the completion of the pipeline and related facilities in each section or slice of the pipeline.

Box 2.1 Land Requirements of the Project

• Total affected land for the pipeline	3,105 Ha
• Temporary land acquisition for the pipeline	2,166 Ha
• Pipeline	2,066 Ha
• Primary Campsites	44 Ha
• Campsites at AGIs	56 Ha
• Permanent land acquisition for the pipeline	938 Ha
• Pipeline Rights of Way	837 Ha
• Land for access roads	30 Ha
• Above Ground Installations	71 Ha

The lands that will be temporarily or permanently acquired by the Project are mostly privately owned. There are, nevertheless, public lands (pastures, forests, and other public lands owned by the Treasury and other public agencies) that will also be used. These are shown in Table 2.2 for each province.

Table 2.2: Project Affected Areas by Type of Land

	Affected Areas 28 m Corridor and Facilities (ha)				Expropriated Areas 8m and AGIs (ha)			
	Private Land	Forest Land	Pastures and Grazing	Other Publicly Owned Land	Private Land	Forest Land	Pastures and Grazing	Other Publicly Owned Land
Ardahan	67	3	5	29	55	5	27	12
Kars	176	14	80	44	32	3	24	6
Erzurum	223	109	31	120	113	11	13	31
Erzincan	371	33	48	107	71	37	10	37
Gümüşhane	19	12	0	67	5	4	0	20
Sivas	196	57	3	53	112	0	11	53
Kayseri	116	9	82	21	59	2	10	22
K.Mara ^o	206	8	35	75	56	20	1	17
Osmaniye	70	9	0	22	20	3	0	6
Adana	360	0	38	184	19	1	1	8
TOTAL	1,803	255	321	723	541	88	97	212

Source: BTC, 2002

2.9 USE RESTRICTIONS IN PIPELINE PROTECTION ZONE

To ensure the safety of the pipeline, the Project will impose use restrictions on the 8m corridor, which is subject to permanent expropriation. The exact pipeline position inside the 8m corridor may vary due to installation tolerances. In summary, the use restrictions include the following: it will not be possible to carry out deep plowing or digging, or to plant trees or to construct deep irrigation channels within 8m of the pipeline (i.e. 4m on either side of the centreline). Detailed use restrictions are presented in Annex 2.1.

During the Basic Engineering Phase of the Project, the General Directorate of Basic Health Services (GDBHS) in the Ministry of Health was asked to clarify if the Project would be subject

to Turkish laws on the Regulation on Non-hygienic Establishments. GDBHS ruled that the facilities that are going to be constructed for the Project will be classified as a first class non-hygienic establishment under Turkish law. This requires the establishment of a Health Protection Strip (HPS) in compliance with the relevant regulation. An application was made to the relevant Provincial Directorates of Health and GDBHS to define the Project's HPS. During the process of application the following HPS distances were identified for various Project components:

- For the pipeline: 7m on either side of the pipeline starting from the edges of the pipeline.
- For pumping stations: 150m around the pump house.
- For pressure reduction stations: 80m around the pressure reduction station.
- For block valves: 20m around the block valves.
- For the Ceyhan tank farm: 100m around the Ceyhan tank farm area.

As a result of the Health Protection Strip, it will not be possible to build a house within 7m (either side) of the pipeline, or in the designated zones around the AGIs.

Following completion of construction the original landowners/land users who were using the land prior to land acquisition for the Project will be able to once again use the permanently acquired lands for productive purposes (subject to the land use restrictions, except at AGIs where the land is permanently acquired). This is not considered as providing compensation or mitigation; compensation will be evaluated and awarded independently of this factor, in order to ensure that compensation is fair and equitable.

2.10 CONSTRUCTION SEQUENCING AND PROGRAM FOR IMPLEMENTATION

As previously discussed in this chapter, pipeline construction is a sequential process comprising a number of distinct operations. A simplified programme of activities associated with the Project is provided below.

Figure 2.2: Simplified Program of Activities

