Integrated ESIA Greece
Section 0 - Non technical summary
# TABLE OF CONTENTS

1. **ABOUT THIS DOCUMENT**
   - Page 4

2. **PROJECT OVERVIEW**
   - 2.1 Project Rationale
     - Page 6
   - 2.2 Key Features of the Pipeline System
     - Page 8
   - 2.3 Project Construction
     - Page 9
   - 2.4 Implementation Timeline
     - Page 10

3. **PROJECT ALTERNATIVES AND PREFERRED OPTIONS**
   - 3.1 Pipeline Route Alternatives and Base Case
     - 3.1.1 Route Alternatives
       - Page 11
     - 3.1.2 Base case Route Description
       - Page 13
   - 3.2 Compressor Station Alternatives and Preferred Sites
     - Page 14

4. **ENVIRONMENTAL AND SOCIOECONOMIC CHARACTERISTICS OF THE PROJECT AREA**
   - 4.1 Introduction
     - Page 17
   - 4.2 Existing Physical and Biological Environment
     - 4.2.1 Topography and Landscape
       - Page 17
     - 4.2.2 Vegetation
       - Page 18
     - 4.2.3 Wildlife
       - Page 20
     - 4.2.4 Protected Sites and Conservation Areas
       - Page 21
   - 4.3 Existing Socioeconomic Environment
     - Page 23
   - 4.4 Existing Archaeology and Cultural Heritage
     - Page 25

5. **STAKEHOLDER ENGAGEMENT**
   - 5.1 Stakeholder Consultation and Project Information Disclosure
     - Page 28
   - 5.2 Grievance Mechanism
     - Page 34

6. **ANTICIPATED IMPACTS AND RISKS, AND FORESEEN MANAGEMENT MEASURES**
   - 6.1 Scope of the Assessment and Studies undertaken
     - Page 35
   - 6.2 Physical Environment - Impacts and Mitigation
     - 6.2.1 Ambient Air Quality and Climate
       - Page 36
     - 6.2.2 Acoustic Environment
       - Page 37
     - 6.2.3 Water Resources (Groundwater and Surface Waters)
       - Page 38
     - 6.2.4 Subsurface and Soil Resources
       - Page 39
     - 6.2.5 Landscape and Visual Amenity
       - Page 41
   - 6.3 Biological Environment – Impacts and Mitigation
     - 6.3.1 Vegetation and Habitat
       - Page 42
6.3.2 Wildlife
6.3.3 Riverine Ecology
6.3.4 Protected Sites and Conservation Areas

6.4 Socioeconomic Environment – Impacts and Mitigation
6.4.1 Economy, Employment and Income
6.4.2 Land and Livelihoods
6.4.3 Infrastructure, Utilities and Public Services
6.4.4 Community Health and Safety
6.4.5 Community Cohesion
6.4.6 Traffic and Transportation
6.4.7 Worker Management and Rights
6.4.8 Cultural Heritage

6.5 Decommissioning Impacts
6.6 Non Regular Operation and Unforeseen Events
6.7 Cumulative Impacts
6.8 Transboundary Impacts

7 ENVIRONMENTAL AND SOCIAL MANAGEMENT AND MONITORING

LIST OF TABLES
Table 7-1 Overview Key Management Plans

LIST OF FIGURES
Figure 2-1 Context of the Trans Adriatic Pipeline Gas Transmission Network
Figure 2-2 Trans Adriatic Pipeline Route Overview
Figure 2-3 Regular Pipeline Working Strip
Figure 3-1 Assessed Route Alternatives
Figure 3-2 GCS00 Alternative Sites
Figure 3-3 GCS01 Alternative Sites
Figure 4-1 Electro-fishing in Aggitis River, Serres Municipality, Central Macedonia – Field survey method to gather data on fish diversity within rivers crossed by the pipeline route
Figure 4-2 Protected Areas along the Pipeline Route
Figure 4-3 Existing DESFA corridor within Loutros Forest
Figure 5-1 Phases of Stakeholder Engagement Process during the ESIA
Figure 5-2 Community Meeting in Ano Kamila
Figure 6-1 The Church of the Assumption near Ptolemaida

TAP Greece Overview Maps: see end of document

Note: All photographs used in this document were taken during ESIA field survey work.
1 ABOUT THIS DOCUMENT

The Trans Adriatic Pipeline (TAP) is a proposed pipeline system that will bring natural gas from new sources in the Caspian region to western and south-eastern Europe. The pipeline will transport gas via Greece and Albania, across the Adriatic Sea and into southern Italy.

As part of the planning, design and permitting process for the TAP, the project must be subject to an Environmental Impact Assessment (EIA) according to Greek legislation. As TAP AG is furthermore committed to follow international best practice, EBRD’s performance requirements and the IFC performance standards, the project identifies, addresses and manages all social, environmental and cultural heritage impacts, risks and opportunities in a systematic and comprehensive manner as part of its Environmental and Social Impact Assessment (ESIA). The ESIA enables the project proponent, in this case TAP AG, to anticipate these effects and consider project controls and measures to reduce or prevent adverse impacts and risks and enhance beneficial effects throughout the project lifecycle.

The ESIA study for the TAP in Greece includes the pipeline itself as well as temporary infrastructure required for the construction phase, such as access roads and construction camps, and permanent operational facilities (i.e. block valve stations and potentially two compressor stations).

The TAP Project was developed in two overlapping phases, ‘Greece West’ and ‘Greece East’. Greece West had an original spatial scope from Nea Mesimvria (close to Thessaloniki) westwards to the Greek/Albanian border. In 2012, due to capacity requirements the pipeline was extended eastwards from Nea Mesimvria to the Greek/Turkish border.

This document presents the Non-Technical Summary (NTS) of the ESIA conducted for the Greek section of the TAP system (the ‘Project’), describing the key features and summarising the results of the assessment\(^1\) in non-technical language.

---

\(^1\)The assessment was undertaken by a team of independent specialists in accordance with Greek legislative requirements as well as the European Union (EU) regulatory impact assessment and environmental framework.
More specifically, it:

- Sets out the background to the Project;
- Describes the pipeline route and provides an overview of the Project construction and operation;

- Presents the alternatives that have been considered in developing the Project;
- Describes the current environmental and socioeconomic characteristics of the chosen route;
- Explains the stakeholder engagement that has already been carried out and what is planned for future phases; and

- Presents any significant beneficial and adverse impacts or risks that have been identified through the ESIA process and proposes measures to manage and monitor these.
2 PROJECT OVERVIEW

2.1 Project Rationale

The Project is a proposed pipeline system that will bring natural gas from new sources in the Caspian region to Western and South-Eastern Europe.

The Project is intended to contribute to the security and diversity of Europe's energy supply by connecting to existing gas networks and will allow gas to flow directly from the Caspian basin into European markets. The Project will be providing the necessary infrastructure to transport gas from the Shah Deniz II field in Azerbaijan by the most direct route to Southern Europe (see Figure 2-1), once production begins in early 2019.

Figure 2-1 Context of the Trans Adriatic Pipeline Gas Transmission Network


The European Union has recognised the TAP Project under the so-called TEN-E (Trans-European Energy Networks) guidelines as a Project of Common Interest for the European Union’s overall energy policy objectives. In April 2013 an Inter-Governmental Agreement (IGA) was signed by the three host countries of Greece, Albania and Italy. In Greece the Project is characterised as one of national importance and the Host Government Agreement (HGA) is under preparation.

The TAP is a 48” diameter gas pipeline that starts in North-Eastern Greece near Kipoi, at the Greek/Turkish border, from where it crosses northern Greece westwards, next through Albania, the Adriatic Sea and finally comes ashore in southern Italy near the area of San Foca (Lecce).

An overview of the TAP Project as a whole is shown in Figure 2-2. This figure shows the entire proposed pipeline route from the Greek/Turkish border through Greece, Albania, the Adriatic Sea
and into Italy. The Figure also shows the respective lengths in km, the pipeline diameter and the gas pressure during operation.

Figure 2-2 Trans Adriatic Pipeline Route Overview

![Diagram of Trans Adriatic Pipeline Route Overview](image)

**Legend:** Bcm/a = billion cubic meters/year; CS = Compressor Station

**Note:** CS01 and CS02 are only required for the 20 bcm/a case.

**Source:** TAP AG (2013)

The pipeline in total is approximately 863 km long and designed with a diameter of 48 inches onshore, which is reduced to a diameter of 36 inches for the offshore section. The pipeline will initially have a capacity to transport 10 bcm of natural gas per year (bcm/yr), or approximately 1,119,000 m³ per hour average flow rate. In a second stage this capacity can be doubled to 20 bcm/yr by scaling up the installed capacity of the compressor stations.

The design lifetime of the pipeline is 50 years; but based on international pipeline industry experience, it can well be expected that the pipeline could actually be used much longer. The compressor station equipment will be replaced after 25 years.

The design will ensure that the gas transport system fulfils all safety requirements of the applicable Greek legislation, European codes and standards.
2.2 Key Features of the Pipeline System

According to Greek legislation the Project has been characterized as an A1 class project (Group 11 ‘Transportation of energy, fuels and chemical substances’, s/n 1 ‘Fuel pipelines of national importance or under European or International networks and associating facilities’).

The pipeline system in Greece will require the following main installations:

- A buried 48 inch pipeline, approximately 543 km in length;
- The initial transportation capacity of the pipeline system is characterised by a throughput of 10 bcm/year but might be increased to 20 bcm/year.
- The pipeline will have a design pressure of 95 barg (bars above atmospheric pressure) for the 10 bcm/yr phase as well as for the potential later expansion to 20 bcm/yr.
- Approximately 22 unmanned block valve stations (BVSs) along the pipeline route. BVSs will be installed at intervals no longer than 30 km along the pipeline. The purpose of the BVSs is to interrupt gas flow and isolate sections in case of maintenance or emergency.
- One compressor station in the border area of Kipoi (GCS00) with 30-45 MW (2 operating compressors and 1 spare unit of 15 MW, each) for the 10 bcm/yr transport capacity.
- This GCS would need to be expanded for the 20 bcm/yr phase to 75-90 MW by installing three additional compressors (15 MW each), thus a total capacity of 5 operating compressors and 1 spare unit of 15 MW each.
- The potential increase to 20 bcm/yr would require a second compressor station in the broader area of Serres (GCS01), where initially only a pigging station (for cleaning and inspection) would be located. This would include compressor power of approximately 100 – 125 MW (4 operating compressors and 1 spare of 25 MW each).
- A permanent 8m wide Pipeline Protection Strip (PPS) will be maintained during operation for inspection and maintenance purposes.

An overview map (6 sheets) showing the key components of the Project in Greece is presented at the end of this NTS.
2.3 Project Construction

Subject to the tendering specifications of TAP AG, Project construction will be likely undertaken by one or more international *Engineering, Procurement and Construction Contractor(s)* (EPC Contractor).

The pipeline and the compressor stations will be constructed by established standard techniques. The standard pipeline working width is 38 m, where the corridor will be cleared and temporarily occupied for construction. A reduction of the working width to 28 m will be implemented in case of physical limitations or environmental, cultural heritage or socioeconomic constraints. In areas where the pipeline has to be constructed in mountainous areas the width can be further reduced to a minimum of 18 m.

A typical cross section of the standard construction working strip is shown in *Figure 2-3*.

**Figure 2-3** Regular Pipeline Working Strip

Source: ENT (2012) CPL00-ENT-100-F-DFT-0011_02--Working Strip

Construction of the pipeline in areas of more remote and steep terrain will require the upgrade of about 30 km of existing tracks and roads in order to allow the passage of trucks with pipe trailers to access the pipeline working strip. Such upgrades for access roads will be established early in the construction phase.

The pipeline will be made of welded steel pipe sections which range between 8 m and 18 m in length. The steel pipe sections will be coated both inside and outside. The internal coating will be an epoxy resin which reduces friction, whilst the external coating will be 3-layer polyethylene to
protect the pipeline from corrosion. Some of the pipeline sections will be additionally coated with reinforced concrete to protect the pipe from external damages. The entire pipeline will be protected against corrosion by a cathodic protection system.

The pipeline will be buried for its entire length. For safety reasons and in order to minimise impacts on existing land uses (e.g. agriculture) the buried pipeline will have a minimum soil cover of 1 m. The burial depth can be increased in cases where local conditions and technical constraints require it.

2.4 Implementation Timeline

The main construction phase of the TAP Project in Greece is anticipated to commence in mid-2015 and will take approximately 3.5 years. It is likely that preparation of temporary infrastructure, such as construction camp sites or pipe yards will commence in advance during mid-2014. Pipeline construction is a sequential process and will last only a few weeks at each location along the route, whereas the initial construction of the compressor station (GCS00) will be a continuous activity at the selected site over a period of 20 months (the potential fitting of the compressors for the 20 bcm/yr case will take some additional months at a later stage).

Commissioning of the TAP Project will take place during late 2018, immediately followed by start-up of operation in early 2019.
3 PROJECT ALTERNATIVES AND PREFERRED OPTIONS

The route of the Project has been selected following an extensive and thorough assessment of various alternatives. The objective of this process was to select a technically feasible pipeline route with the least environmental, socioeconomic and cultural heritage impacts.

A number of alternatives were investigated with regard to the pipeline route and the location of the necessary supporting installations.¹

3.1 Pipeline Route Alternatives and Base Case

3.1.1 Route Alternatives

For the eastern section from the Greek/Turkish border to Nea Mesimvria the route follows the existing DESFA pipeline as far as possible. However, five areas of local alternative corridors deviating from the DESFA route have been investigated with the objective for potential improvements of the base case corridor to avoid local constraints and minimise impacts to the environment. As shown in Figure 3-1 these are in the Kirki area, in the Kavala mountains, the Turf area, the Provatas and the Kamilokorfes areas. A number of alternative routings have been assessed within these corridors considering factors such as bundling advantages, minimisation of technical, environmental, socioeconomic and cultural heritage impacts as well as stakeholder concerns.

In the Kirki area the selected base case route runs parallel to the existing DESFA pipeline. The route alternative GRE Alt_1S is located south at a distance of approximately 2.5 km. Although the selected base case route crosses several protected areas, the impact is minimised due to the existing DESFA pipeline having fragmented the area already in the past. The alternative would require extensive logging of forest to create a new corridor, which is not desirable. Furthermore, potential military restrictions might apply.

¹ For the eastern section from the Greek/Turkish border to Nea Mesimvria, the route refinement process was tailored to follow the Bundling Principle (see Section 3.1.2) but considering local reroutings where considered necessary. The work was conducted in autumn 2012. For the western pipeline section from Nea Mesimvria to the Greek/Albanian border, the route refinement process preceded the Preliminary Environmental Impact Assessment or PEIA (the precursor step to a detailed ESIA), with the aim to narrow down the initial 50 km-wide Project corridor to a 2 km-wide corridor forming the basis for the PEIA and defining a number of viable alternatives. The alternatives assessment study for the western part was conducted between autumn 2010 and spring 2011.
In the Kavala mountains the selected base case also runs parallel to the DESFA pipeline while the alternative is located further north at a distance of about 1 km crossing a wildlife reserve and an area of higher elevation requiring increased construction effort. The base case route is therefore preferable.

In the Turf area the selected base case passes north of the turf area while the alternative corridor passes south. In comparison the preferred base case avoids major constraints such as protected areas, the declared archaeological site of Paggaio Mountain and a hospital currently under construction.

In the Provatas area the base case route passes in the north to consider a recommendation by stakeholders while the alternative would pass between the Provatas and Monoklisia settlements. In the Kamilokorfes area the selected base case is located south-west of Serres City, while the alternative, in parallel to the DESFA pipeline, would run north of Serres. The southern base case route is preferable due to the avoidance of protected areas and technical constraints such as slope instability.

For Greece West (Nea Mesimvria to the Greek/Albanian border) two main routing corridors, the base case (originally named Northern Alternative N₁) and the Southern Alternative S₀, were identified within a 50 km search corridor. In summary, the base case faces bigger challenges regarding the official planning zones, namely the interactions with the mining concession areas, but potentially fewer challenges in terms of cultural heritage impacts as there are less known cultural heritage sites.

The Southern Alternative S₀ faces fewer challenges with respect to official planning zones but potentially larger challenges with regards to cultural heritage as the density of known archaeological sites within this corridor is higher. This alternative would also cross the Axios Natura 2000 site and, in addition, a second Natura 2000 site (North Vourinos Mt & Mellia). Environmental and cultural heritage impacts are potentially larger for the Southern Alternative S₀, therefore it was determined that the base case is the preferred route.

Despite the route optimisations it is unavoidable that the pipeline crosses seven (7) Natura 2000 sites. The impacts in these protected areas will, however, be minimised by using trenchless crossing techniques (micro tunnelling or horizontal directional drilling) at river crossings. This will avoid impacts to the river ecology and the associated riparian vegetation. Results from
stakeholder engagement and the overall environmental and social impact assessment have led to the final base case route corridor.

*Figure 3-1* shows the main alternatives resulting from the evaluation of the routing options.

*Figure 3-1  Assessed Route Alternatives*

![Assessed Route Alternatives Diagram](image)

*Source: ASP (2013)*

3.1.2  Base case Route Description

The final refined pipeline route (the so-called ‘base case’) through Greece starts at the Greek/Turkish border near Kipoi and crosses Greece westwards. From Kilometer Point (KP) 0 – 359 (Kipoi to Nea Mesimvria), the route follows to a large extent the existing national pipeline operated by DESFA. This approach is in line with best practice industry standards regarding the principle of bundling with existing infrastructure to reduce negative impacts on the environment, society and cultural heritage such as fragmentation of habitats and landscape, decreasing the
potential of archaeological findings or minimizing impacts to livelihoods. Local re-routings have been assessed where the bundling would have created greater negative impacts than a re-route.

The base case corridor has a length of approximately 543 km starting with KP 0 at the Greek/Turkish border, near Kipoi, and reaching KP 543 near Ieropigi at the Greek/Albanian border.

From the Greek/Turkish border the base case corridor heads southwest for 45 km, up to the area north of Alexandroupoli. Here it heads northwest for 55 km, reaching the industrial area of Komotini and then turning to the west and continuing for 55 km, passing to the south of Xanthi. The corridor then turns to the southwest, reaching the Kavala area after 40 km. From Kavala it continues northwest for another 60 km, passing through the northern Paggaio foothills before reaching the area south of Alistrati. The corridor passes to the south of Serres, and then continues through the Serres Plains for 30 km. At this point, it again turns to the southwest, running for 75 km, north of Thessaloniki, to the settlement of Nea Mesimvria. For this eastern section, covering over 360 km, the base case corridor predominantly follows the existing DESFA pipeline over a distance of approximately 300 km.

From Nea Mesimvria, the base case corridor continues to the west for 50 km through the plains of Giannitsa and Skydras. At this point the corridor passes through the Vermio Mountains for 40 km and then turns northwards down onto the Eordaia Plain for 25 km. From here, just north of Ptolemaida, it runs westwards again for 35 km through the Askio Mountain range and down into the Kastoria region. The corridor skirts to the south of Kastoria Lake, before continuing for just over 30 km to the Greek/Albania border. For this western section, covering approximately 180 km, the base case corridor does not follow existing infrastructure and has been identified through an extensive route refinement process. This process considered technical, environmental, socioeconomic and cultural heritage constraints.

### 3.2 Compressor Station Alternatives and Preferred Sites

The pipeline system facilities in Greece will include 22 block valve stations along the route and one or two compressor stations depending on throughput.
For the initial capacity of 10 bcm/yr one compressor station in the broader area of Kipoi (GCS00) is foreseen. The 20 bcm/yr phase an additional compressor station in the broader area of Serres (GCS01) would be required.

For both compressor stations three local siting alternatives have been investigated and the main environmental, socioeconomic and cultural heritage aspects were identified and compared for a 1000 m buffer zone. Each site will be fenced and require a surface area of approximately 17 ha of which 10 ha are required for the installations, buildings or roads. Figure 3-2 and Figure 3-3 show the investigated alternative locations for GCS00 and GCS01 respectively.

All three alternative locations for GCS00 are located in an agricultural area without significant environmental, cultural or socioeconomic constraints. GCS00-B1 is the chosen base case location due to operational reasons by being located adjacent to the DESFA station. Following GCS00-B1 is the proposed GCS00 location.
The three identified alternative sites for GCS01 are also all located in agricultural areas, in proximity to residential areas and commercial developments. No significant environmental, cultural or socioeconomic constrains have been identified for any of them. Although all alternative locations are feasible, it is considered that GCS01-D presents technical advantages over the other two alternatives and therefore, GCS01-D is the proposed GCS01 location.
4 ENVIRONMENTAL AND SOCIOECONOMIC CHARACTERISTICS OF THE PROJECT AREA

4.1 Introduction

A ‘baseline’, i.e. the existing environmental, cultural heritage and socio-economic conditions along the preferred route prior to any project related physical activities, was established and detailed in the ESIA. This predominantly focused on a 500 m wide corridor for the environmental baseline and a 2 km wide corridor for the socio-economic baseline, along the entire length of the Base Case route – forming the so-called Study Area.

The baseline characteristics of the pipeline route, from Kipoi to the Greek/Albanian border are presented below according to the kilometre chainage (KP) for the environment and regions for the socioeconomic description.

4.2 Existing Physical and Biological Environment

4.2.1 Topography and Landscape

The most easterly section of the pipeline route (KP 0 - 40) comprises of a large flat region with a mean altitude below 150 masl that extends to the southwestern part of the Evros River basin. Northwest of Alexandroupoli, the route (KP 40 – 60) stretches up to the south-eastern extent of the Rhodopi mountain range, to an elevation of 500 masl, and into a more densely vegetated area.

Further to the west (KP 60 - 175), the route extends across the extensive, flat landscape of the lowlands of Evros and the Komotini – Xanthi plain. These flatlands contain the river systems of Bosbos, Aspropotamos, Xiropotamos and Xanthi (Kosynthos). From here, the pipeline route crosses the forested foothills of the Kavala Mountains (KP 175 – 190), reaching an elevation of 700 masl. It then runs north of the Paggera mountain range, through the cultivated, hilly landscape of the Filippoi and Serres plains (KP 190 – 300), with a maximum elevation of 130 masl. A dense network of irrigation channels extends across the Serres area. The pipeline route then passes
through the Kroussia mountain range (KP 300 – 330), at an elevation of around 550 masl, before descending into the low-lying Gallikos Plain (KP 330 – 360).

From here, the route crosses the Axios Plain (KP 360 – 425) at an average altitude of less than 200 masl. This area comprises of the downstream sections of four major river systems (the Gallikos, Axios, Loudias and Aliakmonas) which are used for irrigation and considered to be heavily modified. The route then passes across the forested slopes of the Vermio mountain range (KP 425 – 455) before descending into the Eordea Plateau / Ptolemaida Basin (KP 455 – 485), at an elevation of 400 – 800 masl. The landscape of this area is crossed by several tributaries of the Aliakmonas River and features some urban and industrial centres.

Continuing westwards, the pipeline route passes along the lower slopes of the Askion mountain range (KP 485 – 505), around the southern extent of Kastoria Lake, before ascending to higher elevations at the Greek/Albanian border (KP 505 - 543). The landscape in this area is covered with patches of cultivated land, grassland and mixed forest.

4.2.2 Vegetation

The 543 km pipeline route hosts a wide variety of flora including evergreen and deciduous forests, shrublands, riparian areas, grasslands, meadows, pastures and farmlands.

Between the settlements of Kipoi and Amfítriti (north of Alexandroupolis), from KP 00 to KP 43, the pipeline corridor covers an expansive flat region with an average elevation of 150 m, through which tributaries of the Evros River and other watercourses run and where the Loutros forest is located. Northwest of Alexandroupolis, the corridor runs along the south-eastern end of the Rhodopi Mountain, from KP 43 to KP 62, into a more mountainous and densely vegetated area reaching an elevation of 500 m. From KP 62 to 150 the pipeline corridor is covered almost entirely by cultivated fields. Wetland vegetation and grasslands appear in the area of the Filiouris, Aspropotamos and Xiropotamos (Kompsatos) Rivers.

Shrubby vegetation and clusters of plane trees (*Platanus orientalis*) are found at some locations, near Nestos River and foothills of the Kavala mountains. At the crossing of the Nestos River a riverside forest appears. The vegetation at this location includes galleries of willow (*Salix alba*) and poplar (*Populus alba*) (classified by the European Habitats Directive). West of the Nestos
River the pipeline corridor is predominantly covered by cultivated fields, from KP 155 to KP 177 leading to the Kavala Mountains, where arid shrub vegetation (*sclerophyllous plants*) and grasslands are present, whilst stands of deciduous species can be also found.

Following a direction from Kavala to Serres, from KP 194 to KP 294, the pipeline corridor again passes through an area dominated by large traditional cultivations separated by hedges and tree stands, while there are also areas of intensive cultivation and poplar plantations- part of the Serres agricultural plain. Along the Kroussia Mountains some natural areas covered by oak deciduous forests, shrublands and stands of riparian vegetation along the small streams are present.

Near Thessaloniki the pipeline corridor predominantly passes through cultivated areas, apart from a 24 km section that runs through the outskirts of the Koronia and Volvi Lakes National Park where areas of natural grasslands are present and a small section east of Gallikos River characterized mainly by scrublands, natural grasslands and stands of pines and oaks.

Since most of the area from Kipoi to Nea Mesimvria (KP 0 to 359) is intensely cultivated, important flora species are generally only expected in or close to the protected areas in the region. These are described in Section 4.2.4.

From Nea Messimvria to the Greek/Albanian border (KP 359 to KP 543) the pipeline corridor hosts a variety of vegetation formations from lowlands to montane areas, including evergreen and deciduous shrubland and forests, riparian forests, dry and wet grasslands and meadows.

Forest habitats found along this western section of the pipeline corridor include beech forests (*Fagus sylvatica*), mixed broadleaved forest dominated by oak (*Quercus sp.*) and coniferous forests dominated by pine (*Pinus nigra*). Additionally, riparian forests and galleries are found along rivers and streams throughout sections of the study area. Among a number of important plant species found in this study area, a total of 65 species are protected by Greek legislation (Presidential Decree 67/81). Among these, eleven are Greek endemics, 17 are Balkan endemics, five are Greek/Albanian endemics, two are Balkan-Anatolian endemics and one is Greek-Anatolian endemic. Moreover, two species are included in the Greek Red Data Book (*Centaurea charrelii* - critically endangered status, *Dactylorhiza incarnate* – vulnerable status). Further, two species are on the global IUCN Red List of Threatened Species¹ (*Juniperus excelsa, Platanus orientalis*), but these are common in the Greek flora.

¹ International Union for the Conservation of Nature
Naturally vegetated areas can be found close to heavily cultivated lands along the entire pipeline corridor. Agricultural practices in these areas minimize the likelihood of finding floral species of ecological interest. However, some Balkan endemic species of ecological interest and Greek endemic flora species, important for the Natura 2000 network, can be found. Habitat types according to the European Habitats Directive 92/43/EEC have also been recorded within the Project study area during field survey activities.

4.2.3 Wildlife

Despite 80% of the land crossed by the pipeline route being cultivated, the areas still host some species of conservation interest.

The grey wolf (*Canis lupus*) is known to occur throughout western and central Macedonia and eastern Macedonia and Thrace, at middle and high altitudes, wherever food is available. The total Greek population is estimated at 600 individuals or higher. Local populations are difficult to estimate as wolf packs have large ranges which extend to hundreds of kilometres and may cross the borders of Greece in several areas. The pipeline route passes through seven areas with known grey wolf (Loutros forest, Pelagia-Kirki area, Kavala, Kroussia and Vermio Mountains, around Kleisoura Pass and in the hills close to the Greek/Albanian border).

The presence of Jackal (*Canis aureus*) has been confirmed at the Greece-Turkey border area, and around Kompsatos, Nestos and Kosinthos River areas.

The brown bear (*Ursus arctos*) has a well-established population in the Grammos Mountain area with a maximum of 41 individuals. Their territories have expanded towards other mountains of western Macedonia since the end of the 1980s. The Vernon (Vitsi) and Siniatsiko (Askio) Mountains are part of the range where bears are present and are crossed by the pipeline around the Kleisoura pass.

Another important species of conservation interest is the European ground squirrel or souslik, (*Spermophilus citellus*). The species live in colonies and occurs in short-grass steppes, abandoned cultivations or grasslands, where they build complex underground tunnel systems. A total of 6 areas hosting colonies have been identified along the pipeline route.
A total of 91 bird species (most of them water fowl) recorded in the study area are listed in the Greek Red Data book, IUCN Red List and/or Bird Life International. The most important species occur in the major wetlands found within the wider proximity of the study area (Nestos, Evros and Axios Deltas, and Vegoritida, Petron, Chimaditis, and Kastoria lakes).

The hills and mountainous areas of Vermio Mountain and areas such as the Kleisoura Pass provide breeding habitat to raptors such as the Lanner Falcon (*Falco biarmicus*), while the forested areas host Black Storks (*Ciconia nigra*) and several species of woodpecker. However, the main forested area identified is the Loutros forest where many raptors species are known to breed, possibly also in the vicinity of the pipeline route. Farmland also hosts some important species, including Montague’s Harriers (*Circus pygargus*) and Lesser Kestrels (*Falco naumannii*) which are known both to breed in the Olympias – Galatea plateau. Riparian habitats crossed by the pipeline are also important breeding areas for bird species.

Information on freshwater fish species is scarce and mainly limited to the Aliakmonas, Nestos and Evros water basins, which are known to host up to 42 freshwater native fish species. Data gathered during the field survey (see *Figure 4-1*) revealed the presence of up to 16 Balkan endemic species, including 7 listed by the Habitats Directive (92/43/EEC) within the different rivers crossed by the pipeline route.

**4.2.4 Protected Sites and Conservation Areas**

The pipeline route crosses a number of protected sites and conservation areas as shown in *Figure 4-2*. The majority of these are located in the eastern section of the pipeline route, which follows largely the existing DESFA pipeline.
The pipeline route crosses seven EU designated Natura 2000 sites, which also enclose most of the Important Birds Areas (IBAs) although not officially protected by national legislation:

- Special Protection Area Notio Dasiko Symplegma Evrou for a length of approximately 13.6 km (SPA GR1110009)
- Special Area of Conservation Potamos Filiouris for a length of approximately 0.3 km (SAC GR1130006)
- Special Area of Conservation Limnes kai limnothalasses tis Thrakis – Evrteri perioxi kai paraktia zoni for a length of approximately 4.3 km (SAC GR1130009)
- Special Protection Area Delta Nestou kai limnothalasses Keramotis kai nisos Thasopoula for a length of approximately 4.3 km (SPA GR1150001)
- Special Area of Conservation Delta Nestou kai limnothalasses Keramotis – evrteri perioxi kai paraktia zoni for a length of approximately 5.3 km (SAC GR1150010). This protected area overlaps with the previous one (SPA GR1150001) for 1 km at the section where the pipeline is crossing.
- Special Protection Area Delta Axiou Loudia Aliakmona Alyki Kitrous (SPA GR1220010) and Special Area of Conservation Delta Axiou-Loudia-Aliakmona-Evryteri periochi Axioupolis for a length of approximately 1.4 km (SAC GR1220002). These two areas overlap in the area crossed by the pipeline.
Furthermore, the pipeline route crosses two National Parks, which may encompass more than one type of protected area. The route runs close to the northern border of both National Parks:

- National Park of East Macedonia – Thrace for approximately 42.5 km
- National Park of Koronia – Volvi for approximately 23.2 km

In addition, eight nationally designated Wildlife Refuge Areas are crossed, of which six are crossed by the existing DESFA pipeline route (shown in Figure 4-2).

4.3 Existing Socioeconomic Environment

The socioeconomic study area is defined as all settlements either partially or totally within a 2 km corridor (1 km either side of the pipeline route) running the length of the pipeline route. Where the pipeline corridor runs parallel to the existing DESFA pipeline network, the study area covers a 1 km corridor (500 m either side of the centre line). A thorough analysis of the study area was undertaken using data gathered from a desk-based evaluation of publicly available information and three field surveys in September-October 2011, January and May 2013.

The pipeline route passes through a predominantly rural landscape dominated by agricultural plains, with some mountainous areas and state owned or private forests. Land ownership is high with average land holdings of 4ha, although due to changes in laws and population increase, land is typically fragmented into 5 or 6 plots. The social study area crosses three (3) regions: Eastern Macedonia and Thrace, Central Macedonia and Western Macedonia and 31 municipalities based on the Kallikratis Plan\(^1\). The majority of settlements are small farming communities of fewer than 1,000 inhabitants with only 10 settlements (10%) reporting populations

\(^1\) Kallikratis Plan or more specifically 'New Architecture of Local and Decentralized Administration – Kallikratis Plan' is the code name for Greek Law 3852/2010. This law implemented an extensive reforming of the administrative division of Greece in 2011 with which the boundaries of the local administrative units, the election mechanism and the responsibilities of each unit were redefined.
of over 2,000. There are 9 medium to large population centres near the socioeconomic study area (2.5 – 11 km away), which are a focus for administration, commerce and employment for the study area population. Population numbers have fluctuated in the longer term and shown a decline in recent years, with some settlements losing inhabitants permanently or seasonally due to internal migration. Like much of Europe, the population within the study area is aging, with the majority of surveyed respondents over 46 years old and some settlements comprising of large numbers of people aged over 60. Women within the study area reported having equal legislative rights and access to health and education. However, interviews with women's groups found that, in the rural areas crossed by the pipeline route, society remains patriarchal with women’s roles strongly tied to the home. Women’s participation in the workforce is primarily within the informal sector with limited access to independent income sources.

The majority of the social study area population is ethnically Greek and followers of the Greek Orthodox religion. There are some areas, primarily in East Macedonia and Thrace that have significant numbers of minority groups including Greek Muslims, Pomaks and Roma. According to the socioeconomic study performed during the Main ESIA phase, the size of the minority population living in East Macedonia and Thrace is approximately 111,000 inhabitants, which is largely comprised of Greek Muslims or Pomaks. Secondary research and interviews with members of these minority groups found that Greek Muslims and Pomaks coexist with the Christian population and that they are fully integrated into Greek society. The exact number of Roma living within the social study area is not known, although some populations exist in various municipalities throughout the social study area. Roma are considered a vulnerable group as communities face several problems including high instances of child labour, low school attendance and problems with the law. In addition to the above-mentioned migrant populations, there are also economic migrants within the social study area from Albania and Bulgaria and either settled permanently or travel seasonally to work in Greece. Cases of discrimination or exclusion against this population were reportedly minor.

Many settlements reported having mixed economies, however, agricultural production is the dominant economic activity in all three regions and comprises of both annual and perennial crops with some animal husbandry. All forms of agricultural production are found in each of the three regions, but larger areas of intense permanent crop production can be seen in Central Macedonia. Mixed economies are found in or around the larger population centres where residents participate in trade, such as small shops and cafes, work in the public sector or the manufacturing industry. Industrial activity tends to be focused in areas of designated industrial
zones, although none are found within the social study area. In East Macedonia and Thrace, close to the city of Kavala, there are several settlements involved in mining and quarrying taking advantage of the natural reserves of metals, minerals and hydrocarbons.

Unemployment, especially in the under 25 population, is an issue throughout the study area and reported to be higher than the national average in all three regions. Incomes are lower in East Macedonia and Thrace with over half of the population on less than €900 per month and some municipalities recording large numbers of households on less than €700 a month. In Central Macedonia and West Macedonia incomes were recorded to be less than €1,400 a month by the majority of surveyed households, the only exception to this was in the municipality of Naousa (Central Macedonia) where over half of households reported an income of over €2,100 a month. Literary rates are high throughout the social study area (95%), however, there are some municipalities that recorded residents who are either illiterate or with no formal schooling. Secondary or tertiary level education was recorded in 10%-17% of the population with the highest levels found in municipalities in Central Macedonia (17%).

Education and health care facilities are facing issues with resourcing as a result of the economic crisis and reduction in spending as part of austerity measures following the economic crisis. Lifestyle diseases are a growing concern in the study area with cardiovascular disease is the leading cause of death throughout the study area, followed by cancer and accidents.

4.4 Existing Archaeology and Cultural Heritage

The cultural heritage and archaeological research of the base case route corridor through northern Greece between the Turkish and Albanian borders demonstrates that this region has favoured human occupation since early times. In part, this was due to the abundant resources of the region and intermediate climate between continental Europe and the Mediterranean. Additional attractive factors included a strategic location in one of the Balkan Peninsula's significant centres of production and population, including the basins of Kastoria, Florina, and Kozani, as well as the plain extending from Thessaloniki to Edessa and Veroia. Due to its central location as a southern access from Asia to Europe, Macedonia has been subject to constant population movements, resulting in a complex cultural history.
The desktop study of the base case route corridor identified over 200 sites within the 2 km wide Study Area. These range in date from Neolithic to Modern. The sites recorded include: archaeological sites, such as settlements, fortified sites, cemeteries and burial mounds; along with monuments, such as churches, monasteries, towers and traditional bridges. Many of these have a value for Intangible Cultural Heritage (ICH), i.e. a site, place or structure with spiritual or emotional importance to local communities that is not always evident from its physical characteristics. Field surveys were performed at selected sections of the pipeline corridor to verify the desktop findings and consult with the relevant authorities on site.

Throughout the area there are good examples of geological features of natural origin such as petrified wood deposits at Fylakto and Evros and caves with quaternary deposits up to 2 million years old in Alistrati, Serres. Other deposits with significant palaeo-faunal evidence are currently being investigated in riverine deposits in Drama. Palaeolithic and Mesolithic evidence is seen in a number of locations, although at present, there are no known records within the Study Area. Prehistoric occupation such as Neolithic settlements, are well represented in the area. Sometimes these are seen as single episodes such as Dispilio in Kastoria, and others in locations that continued to be occupied over many later periods as at Dikili Tash near Filippoi. There are numerous sites with evidence of burial through the Prehistoric period.

A gradual intensification of land use and the creation of urban centres is seen in the late prehistoric and Hellenistic settlements known through the area. Large settlements are found in the Study Area at Nea Komi and Pondolivado near Kavala, the famous towns of Filippoi and Pella and, potentially, in the Korissos area. These larger towns had associated architectural features such as walls, citadels and aqueducts. The Via Egnatia, a major road of the Roman period ran across the Balkan peninsular eventually reaching Constantinople, today’s Istanbul. It is found several times within the Study Area; it entered Pella from the west and ran on towards Thessaloniki, again crossing the Study Area as it makes its way towards Filippoi. Bridges are found in several areas, some of which are understood to be Roman in origin.

Across the whole of the Study Area, there are many churches and small chapels, perhaps becoming more frequent in the west after the Axios Plain. The majority of these have associated cemeteries. Traditional settlements are common with remains of buildings of Ottoman and later age. A number of military features have been recorded, such as the Fortress of Kato Gramatiko and fortifications at Chalkero near Kavala, associated with World War One, other features are noted in the border regions being of World War Two origin.
The landscape also changed dramatically over time. Pella was a sea port during most of its early existence, but now is 30 km away from the open sea. The city was gradually isolated by the slow drying of the former gulf, which created a large lake to the southwest of Pella (Lake Giannitsa). This area was not fully drained and reclaimed for agriculture until the 1920's. The presence of this large open area of water was one of the reasons why Via Egnatia approached Pella from the northwest and roads running south towards the Peloponnese were located some 20 km to the west in the area of Petria.

Filippoi developed in a strategic location between a large lake to the south and hills to the north. Via Egnatia was forced to take a northerly route from Thessaloniki to find a good crossing point and then ran east along the northern shore of the lake to Filippoi. Gradually over time, this area filled and became marshland before being drained and reclaimed in the recent past, but it is still an area of high ground water and soils with poor strength. Even today this area has influenced the route chosen for the Project with advice from stakeholders to stay out of the former lake bed.
5 STAKEHOLDER ENGAGEMENT

5.1 Stakeholder Consultation and Project Information Disclosure

Stakeholder\(^1\) engagement is a key element of the ESIA process. The purpose of stakeholder engagement is to allow for stakeholders to interact with the decision making process, express their views and influence mitigation and technical solutions to concerns voiced during the process. Stakeholder engagement is an inclusive and culturally appropriate process, which involves sharing information and knowledge, seeking to understand the concerns of others and building relationships based on collaboration. It allows stakeholders to understand the risks, impacts and opportunities of a project in order to achieve positive outcomes.

TAP AG is following the Greek ESIA requirements, which include public consultation and disclosure, and in addition the EBRD PR10 requirements on stakeholder engagement. For structuring the activities TAP AG has established a Stakeholder Engagement Plan (SEP).

The process of stakeholder engagement to support the TAP ESIA is being undertaken through six phases, as shown in Figure 5-1.

\(^1\) The SEP defines a stakeholder as ‘any individual or group who is potentially affected by a project or can themselves affect a project’.
Figure 5-1  Phases of Stakeholder Engagement Process during the ESIA

<table>
<thead>
<tr>
<th>TAP Greece West Section</th>
<th>TAP Greece East Section</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Phase 1- Pre-Scoping</strong></td>
<td><strong>Phase 1&amp;2- Route Verification</strong></td>
</tr>
<tr>
<td>Strategic engagement with government and key informant groups in order to provide overall information about the Project, gauge its viability and identify any key issues early.</td>
<td>High level strategic engagement with government and key informant groups, in order to provide information about the Project, gauge its viability and identify any key issues early.</td>
</tr>
<tr>
<td><strong>Phase 2 – Route Refinement</strong></td>
<td></td>
</tr>
<tr>
<td>Introduce the Project to key stakeholders including national, regional and local authorities and potentially affected communities, to identify any key issues and sensitivities such as sites of interest to be considered in route selection as well as identify any vulnerable groups and gather baseline information.</td>
<td></td>
</tr>
<tr>
<td><strong>Phase 3 – Scoping</strong></td>
<td><strong>Phase 3 – Scoping</strong></td>
</tr>
<tr>
<td>Revisit the stakeholders contacted during the Route Refinement phase at a national and regional level along with those along the chosen route in order to provide further detail on the project and generate feedback on the scope, approach, key issues and key stakeholders to be consulted.</td>
<td>Engage with key stakeholders such as national, regional and municipal communities, as well as NGOs and other interested parties, to inform them about the route selection and project design and to understand any issues which may inform the ESIA Terms of Reference and the development of mitigation measures for the Project.</td>
</tr>
<tr>
<td><strong>Phase 4 – Main ESIA Preparation Phase</strong></td>
<td></td>
</tr>
<tr>
<td>Maintain the relationships developed during the previous phases, and ensure all stakeholder issues have been identified. Revisit national and regional authorities and affected communities along the chosen pipeline route to provide a project update and an opportunity to comment, express any concerns and discuss issues. Also familiarise stakeholders with the grievance mechanism and provide information on the next stages of the Project.</td>
<td></td>
</tr>
<tr>
<td><strong>Phase 5 – ESIA Disclosure and Consultation</strong></td>
<td></td>
</tr>
<tr>
<td>Present stakeholders with the final Integrated ESIA report at the end of the ESIA process. Includes providing information on the project impacts and mitigation measures designed to minimise or, where possible, to enhance them.</td>
<td></td>
</tr>
<tr>
<td><strong>Phase 6 – Ongoing Engagement during Project Implementation</strong></td>
<td></td>
</tr>
<tr>
<td>Continue to engage with stakeholders throughout the Project lifetime in order to manage the relationship between TAP AG and stakeholders.</td>
<td></td>
</tr>
</tbody>
</table>

Source: ERM (2012) and ASP (2013)
TAP AG has been engaging with stakeholders in Greece since 2008. However, the application of the above mentioned SE phases, was adjusted in the East section (Kipoi-Nea Mesimvria) and the West section (Nea Mesimvria-Greek/Albanian border) of the Project route. In both cases, the aim of the stakeholder engagement process was the provision of information and the opportunity for all relevant authorities and stakeholders to comment or make suggestions about the Project and its impacts (see Figure 5-2). This was carried out within the specifications outlined by the EBRD standards and Greek legislation.

For the West section - Nea Mesimvria-Greek/Albanian border (184 km) - the Phases 1-4 have already been completed, while Phase 5 public disclosure and consultation on the results of the ESIA is upcoming. In Greece East the Base Case route of the pipeline follows, as much as possible, the route of the existing high pressure natural gas pipeline of DESFA (Bundling Infrastructure Principle). Therefore, Phase 1 (Pre-Scoping) and Phase 2 (Route Refinement) of the West section have been merged into one ‘route verification’ phase for the East section. Phases 2 (Scoping) and 3 (Main ESIA) followed exactly the same principles as in West section. This included engagement of national, regional and municipal stakeholders during Phase 2 to inform them about the route selection and design, while in Phase 3 engagement of the above mentioned stakeholders as well as local affected communities has been conducted to gather any concerns and discuss issues about the project.

The relevant Stakeholder Engagement Plan (SEP) developed for the East section takes into account Integrated ESIA Disclosure and Consultation activities for both sections (Greece West and Greece East), which correspond to Phase 4 and Phase 5 in Figure 5-1. Phase 5 of the East section refers to the Ongoing engagement activities (correspond to the Phase 6 respectively of Figure 5-1).
The stakeholder engagement performed in each section is as follows:

**Phase 1 - Pre-Scoping** (Greece West): the initial step in launching the TAP Project included high level strategic engagement with the Ministry of Environment in June 2008 and May 2010 in order to provide information about the Project, gauge its viability and identify any key issues early. These meetings were important in order to ensure understanding and future support throughout the Project.

During **Phase 2 - Route Refinement** (Greece West and Greece East): the stakeholder engagement process for Greece West included consultation with 12 national level authorities, 8 regional, 14 municipalities, 20 settlement authorities and 3 NGOs. The outcomes informed the route refinement exercise (as described in Section 3). For Greece East the route verification process had similar objectives during this phase as it introduced the Project to key stakeholders in addition to refining the route. In Greece East this phase saw the engagement with eight (8) national, sixty seven (67) regional and three (3) municipal level authorities. After an administrative reform that entered into force in January 2011 and is referred to as Kallikratis, Greek public administration was reorganised under two main level: regions and municipalities. The intermediate administrative level between regions and municipalities, that was called prefectures, was repealed by the reform.

**Phase 3 - Scoping** (Greece West and Greece East): scoping disclosure and consultation was carried out in June/July 2011 and December 2012 for the West and East section respectively. For Greece West it involved revisiting previous stakeholders and consultation of 11 municipalities crossed by the 2 km corridor of the proposed pipeline route. For Greece East the Scoping phase was used to introduce the project to high-level national, regional and municipal stakeholders. The aim was to provide details regarding the Project to stakeholders and generate feedback on the scope, approach, key issues and other key stakeholders to be consulted during the ESIA.

**Phase 4 – Main ESIA Preparation Phase** (Greece West and Greece East): The objective of this phase of stakeholder engagement was to complement earlier scoping engagement in order to ensure that stakeholders at local level including affected communities had an opportunity to learn about the Project, ask questions and raise concerns. The engagement was also used by the Project team to gain information on important local particularities to be considered in the assessment of impacts and development of mitigation measures. This phase of engagement took place in September - October 2011 and January and May 2013 and included presentations as well as discussion. The mechanism for community members to provide further views and comments to the project at any time was also explained.
Key comments raised during stakeholder engagement were related to:

- **Impact on Land, Properties and Livelihoods and Compensation:** Impacts to land based livelihoods and the compensation, that impacted landowners or land users might receive, were a key area of concern, especially in Serres, Kavala, Maronia-Sepes, Pella, Skydra, Naousa and Eordea where there is a high level of agricultural productivity. Additionally, concerns regarding potential depreciation of land value and restrictions to building were raised. Legacy issues regarding unsatisfactory compensation, particularly with regard to the Egnatia highway construction and the PPC lignite mines land take, also contributed to concerns of the local landowners towards the TAP Project (see below).

- **Project details:** A range of questions were posed about the project and its technical elements as well as implementation aspects and timeline. Stakeholders sought information about the details of the Project including depth of pipeline, construction methodology and the exact route. Other questions related to the routing and location of BVSs.

- **Project impacts and their mitigation:** Reinstatement of land was also a key area of concern especially in areas of high agricultural productivity and fertile soil. Forest degradation, noise and disturbance, potential contamination of water resources, disruption to access routes, interaction with local development areas, cultural heritage and impacts to forestry were common areas of interest.

- **Project Benefits:** Many stakeholders asked questions regarding the benefits that they might receive from the Project, in particular, how revenues levied from the Project would be distributed down to the local communities; and investments made by TAP AG. The possibility of access to gas and employment were seen as benefits. It was suggested that access to gas would improve the quality of life by providing a cheaper source of energy for heating, as well as to reduce pressure on forests for fuel wood. Employment is currently a prominent issue with approximately one third of the 15-24 year olds being unemployed and questions were raised regarding the number of employment opportunities, plus the type of jobs available through the Project.

- **Health and Safety:** There was some concern over public health and safety implications of the gas pipeline, especially with regard to the pressure of gas and how the BVSs would prevent gas explosions and leaks. Stakeholders were also concerned about how the pipeline would be managed in case of an emergency.

- **Role of the Government:** Stakeholders are keen to remain informed about the Project and be able to provide further views as the Project develops. A general scepticism regarding proper management of compensation issues and impact mitigation was expressed. The current economic situation is also contributing to the general feeling of anxiety and negativity among the local public. Additionally, stakeholders expressed concerns that local people would not feel the benefit of the treasury increase at a national level.
The evaluation of the consultation process indicates that stakeholders were generally satisfied with the consultation process and were able to ask questions adequately. Nonetheless, stakeholders were keen to be provided with more detail regarding the exact route and specific land plots that would be affected by the Project in order to establish if they would be compensated.

In addition to local level consultation, supplementary meetings were held with statutory stakeholders: In April 2012 additional meetings were held with regional traffic authorities and the police to discuss the traffic assessment of the potential interaction of the TAP Project with traffic movements along the western parts of the route. Further, in May 2012 and November 2012 field visits of experts from regional archaeological agencies (Ephorates) was arranged to support their appraisal of the route in the scope of the PEIA.

**Phase 5 - ESIA Disclosure and Consultation:** More detailed information will be disclosed during the next phase of engagement, which involves dissemination and presentation of the final ESIA report to all stakeholders as well as the public in general. This will provide communities with more clarity about the Project, particularly in relation to the pipeline route, loss of land and other impacts as well as mitigation measures and opportunities. Comments raised by stakeholders during the ESIA disclosure and consultation phase will be documented as an *Addendum* to the ESIA along with the Project Response how the Project has taken these (and comments previously received) into account. This Phase is scheduled for September – November 2013.

**Phase 6 – Ongoing Engagement:** TAP AG will continue to undertake stakeholder engagement activities throughout Project development and implementation. The project will also monitor and evaluate outreach effectiveness for further improvement of the process as needed. During Project construction, TAP AG will inform stakeholders about construction activities through community bulletins, posters, booklets, the Project website, media announcements and other means of communication and information dissemination. TAP AG will be in close contact with the local communities via *Community Liaison Officers* (CLOs) who will also follow-up on any grievances that may occur (see *Section 5.2*). Also during Project operation, TAP AG will keep stakeholders informed on planned activities (e.g. pipeline maintenance or station venting) and will proactively provide information on pipeline safety and emergency response by leaflets and information events. Regarding the envisaged Community Investment Programme, TAP AG will also organise community meetings as required.
5.2 Grievance Mechanism

TAP AG has established a two tier grievance mechanism to be aware of and respond to stakeholder concerns as well as to facilitate resolutions for reasonable grievances. The Grievance Mechanism is part of the broader process of stakeholder engagement as well as quality and compliance assurance and aims to sustain and enhance the mutual trust between TAP AG and the populations along the pipeline corridor. The grievance mechanism investigates all cases when someone is of the view that TAP AG, its staff, contractors and/or sub-contractors has potentially violated rights, harmed someone or caused any damage. The Grievance Mechanism can be accessed through TAP AG’s website, email, SMS, mail, TAP AG’s local office in the three regions crossed by the TAP as well as the country office in Athens or through a dedicated in-country phone number.

Grievances can be filed by individuals, groups, companies, common interest groups etc. All grievances are registered, acknowledged in writing within 7 calendar days, and responded to within 30 calendar days. While TAP AG aims to find mutually acceptable solutions, if an aggrieved person is not satisfied with the response, she/he can request that a mediator conducts an independent review and if even this doesn’t lead to acceptable solutions, resort to justice at any stage in the resolution process.

TAP AG assures that those who file grievances are not viewed as “trouble makers,” but as partners as TAP AG is interested in settling issues without causing any hard feelings. While this is not always possible, TAP AG will make every effort to keep grievances restricted to facts and will keep individual grievances confidential. In order to inform authorities and the public about common grievances, the outcome of the investigations and the results of corrective actions, TAP AG will produce an annual summary report and publish it via its webpage.
6 ANTIPOCIPATED IMPACTS AND RISKS, AND FORESEEN MANAGEMENT MEASURES

6.1 Scope of the Assessment and Studies undertaken

Based on the pertinent regulatory requirements, the Project is subject to an Environmental Social Impact Assessment (ESIA) as part of the permitting procedure in Greece.

In addition to the Greek standards TAP AG has selected the Performance Requirements (PR) of the European Bank for Reconstruction and Development (EBRD) to serve as the benchmark to ensure that adverse impacts and risks to people, their rights, livelihoods, culture and environment are avoided or, where avoidance is not possible, minimised, mitigated, offset and/or compensated and to identify and adopt opportunities to enhance the environmental and social performance of the project. This approach also provides for conformance with European Union (EU) Directives and further with the requirements of the Performance Standards (PS) of the International Finance Corporation (IFC), the Performance Requirements (PR) of the EBRD and other international project finance institutions (IFIs) who refer to these standards (e.g. Equator Principles). TAP AG, are committed to fulfil the above principles and the requirements of the PRs and have set this out in a policy document on ESIA for the TAP Project.¹

Through the ESIA process, TAP AG identifies, addresses, and manages all social, environmental and cultural heritage impacts, risks and opportunities in a systematic and comprehensive manner. The ESIA considers the three main phases of the Project, i.e. Construction and Pre-commissioning phase, Operational and Maintenance phase; and Decommissioning and also includes the consideration of transboundary impacts to neighbouring countries Turkey and Albania.

The assessment was informed by a number of studies and supporting information, including a Hydrostatic Test Concept, a Logistics Concept, a Noise Propagation, Air Dispersion Modeling and studies on geohazards (such as land stability, seismicity, etc.) and geotechnical conditions. The assessment of impacts on designated protected areas and sites of conservation interest was informed by five (5) Appropriate Assessments (see Annex 8). The assessment of socioeconomic impacts and risks is further informed by a Human Rights Impact Assessment.

The impact assessment used a commonly accepted, internationally practiced ESIA methodology. Based on the nature of the predicted impacts and the evaluation of impact significance, mitigation and management measures were identified and further actions specified. The impact assessment results are summarised in the following sections for the construction and operation phase. However, the majority of impacts originate from the construction phase. Potential impacts resulting from the decommissioning phase are presented at the end of the section. Risks from non-routine operation scenarios and their mitigation were assessed based on risk assessment studies.

6.2 Physical Environment - Impacts and Mitigation

6.2.1 Ambient Air Quality and Climate

**Construction and Pre-commissioning Phase**

Project construction may lead to local nuisances from dust generated by earthworks (i.e. working strip preparation and trenching) and construction traffic. Standard mitigation measures such as dust suppression by water spraying will be applied where dust generating activities like earthworks or transport on unpaved roads take place in the immediate vicinity of settlements. Despite the long duration of works within the compressor station construction site, the nearest settlements are over 1 km away and unlikely to be affected by dust.

**Operation and Maintenance Phase**

Project operations, notably the operations of the compressor stations are not anticipated to result in significant impacts on the air shed along the pipeline route which is characterised as relatively unpolluted, as expected for these predominantly rural regions.

The two compressor stations (GCS00 and GCS01) will be fuelled with natural gas. The results of the air dispersion models show that the operation of the compressor stations does not lead to any critical increase in short or long term concentrations of NOx at sensitive receptors in the relevant air sheds when compared to EU air quality limit values.

---

1 The significance of impacts is evaluated based on the importance of the receptor, its sensitivity towards Project specific activities and the characteristics of the impact, including considerations on mitigation and reversibility.
The main contributors of greenhouse gas emissions (GHG) are the compressor stations. GHG emissions will be around 170,000 t/yr of CO$_2$ for the 10 bcm/yr phase. At a later stage and considering a worst case, emissions may increase for the 20 bcm/yr case to 959,000 t/yr of CO$_2$. These operational emissions are relatively low when compared to other conventional thermal power generation, due to the use of natural gas. The operation of both compressor stations in the 20 bcm/yr case would account for approximately 0.8% of the country’s total GHG emissions (compared against 2010 estimates).

6.2.2 Acoustic Environment

Construction and Pre-commissioning Phase

Project construction is likely to result in local noise disturbance from normal construction activities and machinery on those settlements located in the immediate vicinity (<200 m) of the construction sites. No significant impact (noise or vibration) is expected on residential properties from blasting, hammering and trenchless construction activities as these activities will take place along relatively remote sections of the pipeline route. Suitable mitigation will be used at the few locations where households have been identified in proximity to these activities. Standard mitigation measures, such as limiting construction activities to daytime hours, will be applied in general.

Operation and Maintenance Phase:

During operation the only regular source of noise expected are the compressor stations. Noise modelling results show that noise levels in the vicinity of settlements will be lower than 40 dB(A), which despite being audible, is below levels recommended by the WHO to protect against sleep disturbance. For both sites operational noise levels will also be within the Greek statutory limits and would also not result in increase of background noise levels of more than 3 dB(A), which is set as a limit by IFC.
6.2.3 Water Resources (Groundwater and Surface Waters)

**Construction and Pre-commissioning Phase**

The highest potential for direct impacts on surface waters will be at the locations where the pipeline route crosses water courses. It is foreseen that the Evros, Aggitis, Nestos, Strymonas, Xiropotamos, Filiouris, Axios and Vardarovasi rivers will be crossed utilising a trenchless method, while the technology to cross the Aliakmonas and the Grammatiko rivers is still under evaluation and subject to geotechnical feasibility. On smaller size water courses, dry open cut methods will be used during periods of low flow and technical measures be implemented to minimise sediment dispersion. A *Water Course Crossing Plan* will be established for each crossing and include specifications for minimising sediment dispersion and impacts on river ecology including banks and riverine habitats.

The route crosses some sections where high groundwater tables will likely be encountered. A *Water Management Plan* will be established to identify and manage groundwater pumping needs and to manage surface runoff. Excessive groundwater pumping for dewatering of the trench during construction will be avoided and state-of-the-art mitigation techniques used (e.g. pumped groundwater will be re-infiltrated in the vicinity). These techniques, together with the fact that the trench will be open only for a short time (in the order of a few weeks), will minimize impacts on vegetation in the vicinity that is dependent on high ground water levels; minimize drying of soils; and avoid short term fluctuation in shallow groundwater levels that may affect archaeological heritage or building foundations.

Large pipeline construction sites have the potential for uncontrolled site run-off and accidental spills of fuels, lubricants and other water endangering substances. Such potential sources of impact can be largely avoided by site run-off management, wastewater treatment, waste management, proper storage and handling of water endangering substances, i.e. good housekeeping practice construction management by the EPC contractor. A *Spill Contingency Plan* to respond to any spill or unintentional discharge of untreated wastewater or waste will be established. Special caution to prevent silting or spills will be applied near locations where the shallow aquifer or surface water is used for local water supplies.

The largest quantities of freshwater needs (max. 550,000 m³) are related to the hydrotesting of the pipeline to ensure the pipeline meets the operational pressure requirements. This water will be taken from local water courses.
Based on the *Hydrostatic Testing Concept* a detailed *Hydrostatic Test Plan* will be developed by TAP AG. Mitigations measures identified in the impact assessment include the re-use of hydrotesting water to the extent possible for consecutive pipeline sections, discharge only after settling of suspended solids and avoiding times of peak floods as well as minimising river channel erosion. Maximum water abstraction limits and discharge issues will be agreed with the relevant authorities.

**Operation and Maintenance Phase:**
Water consumption during pipeline and compressor station operations is considered insignificant. Water consumption at Compressor Stations during the construction period is estimated at 13 m$^3$/h and is planned to be partly supplied by the municipal network in coordination with the respective Authorities. Therefore, no conflict over water use for irrigation, public water supply or similar is anticipated. Storm water run-off from the compressor station sites, will be collected and sent via sediment traps and oil separators before discharge.

The potential for accidental spills of polluting substances (i.e. fuel, lubricants) is unlikely as no regular handling of large quantities of such substances is foreseen and proper storage and housekeeping of lubricants, cleaning agents etc. will reduce the risks. Sanitary waste water from the compressor station will be treated by compact treatment plants on site.

### 6.2.4 Subsurface and Soil Resources

**Construction and Pre-commissioning Phase:**
Permanent changes of ground surface and loss of soil will take place at the compressor station GCS00 site (and at later stage in the site of GCS01) which is presently agricultural fields. Site preparation and installation of the compressor station GCS00 will result in leveling of ground surface of total about 17 ha where natural soil and its functions will be lost. At each compressor station about 10 ha will be subject to permanent surface sealing where buildings and installations will be located. Surface loss for the BVSs totals to 1.55 ha including a 3 m wide vegetation strip (each BVS 18 x 39 m). Some additional soil will be lost due to the upgrade of approximately 30 km of existing roads where these are to be widened. Surplus fertile topsoil from these activities will be used for landscaping.
The removal and storage of topsoil, subsoil and any potential bed rock material will be managed to facilitate the remediation stage. Preconstruction ‘condition’ surveys will be undertaken to allow construction sites to be reinstated to their original state, including surface contours.

Soils will be modified by the working strip on roughly 2,000 ha along the entire 543 km pipeline length. The construction activities (mainly removal of vegetation and trenching) carried out along the working strip can lead to soil erosion and compaction.

Soil compaction will generally occur during most of the construction activities involving heavy machinery, especially when the soil is wet. Approximately 220 km of the route were identified, where the risk for soil compaction is particularly high. In these areas, construction will be limited to dry periods and deep ploughing will be applied immediately following construction.

There are also sections (totalling approximately 133 km), where the soil properties and topography indicate a risk for soil erosion.

To avoid or reduce erosion, established mitigation methods will be applied during construction and reinstatement. These include appropriate storage of fertile topsoil separately from less productive sub soils and soils along working strip are anticipated to return to previous agricultural productivity after reinstatement and re-vegetation.

Large construction sites have a potential for soil pollution through accidental spills of fuels and lubricant or improper disposal of waste and wastewater. Such potential sources of impact will, however, be largely avoided by wastewater treatment, waste management, proper storage and storage of polluting substances. A Spill Contingency and Response Plan to prevent and respond to any spill will be implemented.

Except for some route sections with elevated nitrate concentrations from agricultural activities, the pipeline route is not passing through any known contaminated land. In case contaminated soil is encountered, it will be excavated and disposed off according to national waste regulations as hazardous waste.

*Operations and Maintenance Phase*

During operation there are no relevant activities that may create any significant impacts to soils. Pipeline route maintenance involves only occasional route inspection by vehicles. Reinstated areas of agricultural land can be used with ploughing up the soil to 30 cm depth.
6.2.5 Landscape and Visual Amenity

**Construction and Pre-commissioning Phase**

The totally 543 km long pipeline section in Greece will be buried in the ground and will therefore as a feature itself not be visible. Construction activities, especially the working strip itself will be visible during several months of construction. They will create temporary impacts primarily related to the visual appearance of the works, and resulting in fragmentation of the landscape and habitats. Impacts will be greater in sensitive landscapes such as forested areas and narrow valleys, where a reduced working strip will be adopted where practicable.

The installation of the pipeline through more mountainous regions, i.e. Vermio Mountain, will require 7 sections of modification to the natural topography, totalling 21 km along the entire pipeline route. A minimum working strip of 18 m will be used during construction and spare material will be disposed as close as possible to the construction site while ensuring that visual impacts are minimised.

The adoption of trenchless construction techniques to cross some rivers, such as the rivers Evros, Nestos, Strimonas, Aggitis, Xiropotamos, Filiouris, Axios and Vardarovasi, will contribute to avoid impacting the continuity of the landscape features affected, as loosing riparian forest at the crossing points.

The construction related campsites and pipe yards will temporarily impact on the landscape value in neighbouring villages and roads. However, siting of these facilities considers visual impacts.

**Operations and Maintenance Phase**

Landscape impacts during the operations phase will be related to the permanent above-ground structures, as the compressor stations GCS00 and GCS01 and the BVSs as well, and further to the maintenance of the 8m wide pipeline protection strip.

Most prominently the compressor station GCS00 with a building height of about 20 m and 5 stacks of about 30 m and a 70 m high vent each will be visible. According to the view shed analysis undertaken, the installations will remain partially visible from the distance including from Peplos and Tavri villages which are at distances of approximately 1.2 km.
The adoption of vegetation screens composed of trees around and in the vicinity of the compressor and BVSs stations. The use of material and colours that help the structures blend with the landscape and the adoption of specific designed lighting together with the location on an agricultural landscape will help reducing the visual impact and landscape disturbance of the structure.

The foreseen approximately 22 BVSs along the route are relatively small sized features with mainly underground installations and therefore, no significant impacts on the landscape are predicted.

Typically, the pipeline route will be integrated into the landscape within a few years after site restoration. Still the pipeline route will remain visible in the landscape as a narrow corridor where it crosses woody vegetation and permanent plantations such as orchards and vineyards, as the pipeline protection strip of 8 m width must be kept free from woody vegetation. This corridor would mainly be visible from a distance, in particular where the pipeline route is running along wooded slopes. Where the pipeline runs along elevated areas, the surface will have to be levelled allowing pipelaying works on a limited but flat working strip of 18m minimum width. This may require disposal of surplus material that is not suitable for trench filling. Surplus material will be properly deposited in suitable slopes and landscaped. This flat strip is likely to be of permanent character in order to provide access for later inspections or maintenance works. It is assumed that the visual impact from these modifications will be not significant for views from settlements in the vicinity.

6.3 Biological Environment – Impacts and Mitigation

6.3.1 Vegetation and Habitat

Construction and Pre-commissioning Phase
The pipeline working strip will require a total of roughly 2,000 ha of land along its 543 km length; 80% of which is highly modified and fragmented agricultural lands. The restoration of these sections will be relatively easy after the temporary construction work activities. Certain key areas have however been identified along the route in which areas of high ecological value are present. The total loss of Greek and EU listed habitats from the working strip footprint amounts to about
376 ha (i.e. 18% of the working strip). Additionally, habitat loss will occur in areas required for the permanent and temporary facilities, such as the compressor stations, BVS, pipe yards, construction camps and roads to be upgraded.

In many places along the pipeline route vegetation will be allowed to re-establish after construction works are complete. However, only annual crops or low vegetation will be allowed within the 8 m pipeline protection strip to protect pipeline integrity and allow inspection access throughout operation.

In case protected and endemic species are identified within the working strip, transplanting of these will be considered. Loss of natural and semi-natural vegetation will be mitigated by habitat restoration or replacement, i.e. replanting the temporary affected footprints with regional plant species and seeds. These measures will be detailed in the Site Restoration Plan.

Where technically feasible, a trenchless technique at watercourse crossing locations with priority habitat will be used to avoid any direct impacts. Impacts on riparian forest habitats where open-cut techniques will be reduced through the adoption of a reduced working strip.

**Operation and Maintenance Phase**
The main impact on vegetation and habitats during operation is related to the maintenance of the 8 m pipeline protection strip which involves periodic clearing of deep-rooting vegetation. In order to avoid disturbance to vegetation and habitat during operation, the inspection and maintenance schedule will consider sensitive fauna periods, i.e. bird nesting or bear breeding.

6.3.2 Wildlife

**Construction and Pre-commissioning Phase**
The pipeline route traverses a range of wildlife habitats, i.e. mammals and birds. The presence of workers and machinery, noise and vibration from activities (in particular along sections where hammering and blasting has to take place) has considerable potential to disturb certain species, especially in the more remote areas. This will therefore be minimised by avoiding sensitive times, such as breeding / reproduction or wintering / hibernation periods for construction at relevant pipeline sections. Furthermore, all construction works are likely to be undertaken during daylight hours.
The more remote parts of the pipeline route contain habitats suitable for large mammals, such as jackal, brown bear and grey wolf. Areas of concern for grey wolf and jackal are Kavala, Kroussia and close to Loutros forest in the east. Areas of concern for grey wolf and brown bear are Vermio and Kleisoura passes and the area towards the Albanian border in the west. It is therefore foreseen to reduce the working strip in forest habitats to the extent possible along these sections and to avoid construction works during sensitive periods, such as brown bear denning and rearing seasons.

On pipeline route sections with potentially important breeding bird habitats, bird breeding will be discouraged by installing plastic bands (e.g. warning tape) that flutter in the wind, before breeding season starts i.e. before 1st March. Birds will then avoid breeding on and along the construction strip, and when the pipeline construction starts no breeding success at this location will be at risk. In case the preconstruction bird surveys will identify nests located within 200 m of the working strip and construction restriction will be applied within 25 m from the nest during breeding as a general mitigation measure.

Special attention will be paid to the Loutros forest (KP 29 – 32) considering that the area is protected due to its raptor diversity and the protected Montague’s Harrier that has been observed in the area around Mesopotamia between KP 532 and 544. Construction in such sensitive bird areas will take place outside the breeding season to the extent possible.

The baseline has identified several sections of the pipeline route where on agricultural and meadows, evidence of colonies of the European Ground Squirrel (*Spermophilus citellus*) are present. This species is endemic to central and southern Europe. In order to avoid mortality of colony populations during working strip preparation and trenching, at relevant sections along the route, animals will be deterred from the working strip by shallow ploughing after the winter in the year before construction. In case colonies are identified in the pre-construction survey appropriate translocation measures will be developed.

Construction activities along the working strip and associated traffic on the access routes may result in the mortality of some small mammal, reptile and amphibian individuals. However, due to the temporary nature of the activities along the pipeline spreads, no threat to populations is anticipated.
**Operation and Maintenance Phase**

The main impact on biodiversity during operation will be from the maintenance of the pipeline protective strip which involves periodic clearing of deep-rooting vegetation. In order to avoid fauna disturbance during operation, the inspection and maintenance schedule will need to consider sensitive fauna periods, i.e. bird nesting or bear breeding.

A *Biodiversity Action Plan* will be adopted together with proper restoration of the working strip.

6.3.3 Riverine Ecology

**Construction and Pre-commissioning Phase**

The pipeline crosses a large number of streams and major watercourses along the 543 km route. At these crossing points construction activities have the potential to disturb and impact riverine ecology. Where in-channel works will be undertaken any release of suspended sediments will have the potential to impact freshwater ecology, as it can lead to direct fish and macro-invertebrate mortality, as well as to medium term fauna disturbance through modification of the habitats. However, the magnitude of the impact will depend on the riverbed structure, the season that the construction works will be performed, the current ecological status of the river and the crossing technique used during construction for each watercourse case.

Impacts on flora and fauna will be reduced by using trenchless crossing techniques (e.g. horizontal directional drilling). This is foreseen for the Evros, Aggitis, Nestos, Strymonas, Xiropotamos, Filouri, Axios and Vardarovasi rivers, while the technology to cross the Aliakmonas and the Grammatiko rivers is still under evaluation and subject to geotechnical feasibility.

Where technically not feasible, open-cut crossing techniques applying measures to minimise sediment dispersion and turbidity plumes in the water flow will be used prioritising periods of the year when river discharge is low. Environmental protection and mitigation measures for each river crossing will be detailed in the *Watercourse Crossing Plan*.

The abstraction, and subsequent discharge, of water for hydrotesting activities can lead to the mortality of small fishes, eggs and macro-invertebrates as well as, if undertaken in spring or summer, disturbance to spawning fish species. Further, abstraction during periods of low flow
may result in depleted base flows downstream and conversely discharge during periods of high flow may result in increased scour, erosion and turbidity. Therefore, abstraction and discharge rates will be established within the naturally occurring range of average lean and storm water flows. In order to minimise the potential for adverse effects, it is foreseen to make extractions only from watercourses that have an average flow rate of over 3 m³/s and to agree maximum abstraction rates with the authorities in charge of the water body to avoid water use conflicts or impacts on the riverine ecology. A detailed Hydrostatic Test Plan will be developed by TAP AG based on the Hydrostatic Testing Concept. Mitigation measures, such as, the use of fine mesh on the abstraction piping system, will help to overcome potential impacts on riverine ecology.

TAP AG will require from the EPC contractor that the implementation of ecological mitigation measures will be supervised by a team of Ecological Clerk of Works (ECoW).

**Operation and Maintenance Phase**

Since the pipeline is permanently buried underground, impacts to riverine ecology during operation and maintenance phase are not foreseen.

6.3.4 Protected Sites and Conservation Areas

**Construction and Pre-commissioning Phase**

There are a number of protected areas crossed by the pipeline route (i.e. Natura 2000 sites, National Parks and Wildlife Refuges). Important habitats along rivers will be avoided due to the use of trenchless crossing techniques.

The Filouris, Kompsatos, Nestos and Axios Rivers will be crossed using a trenchless technique to avoid any impact on the riverine and riparian habitats of these Natura 2000 sites. The Appropriate Assessments undertaken demonstrate the Project will not adversely affect qualifying criteria or the conservation objectives of the Natura 2000 sites and will also not adversely impact on the conservation status of habitats and species.

Regarding habitats the most significant impact within protected area occurs in Flamouria-Grammatiko Wildlife Refuge as European classified habitats are crossed. However, the small surface area affected and the implementation of mitigation measures, such as a reduced working strip along habitats of interest, minimizes the magnitude of the impact.
In the eastern section the Loutros forest will experience some impacts. However, as the pipeline route bundles with the existing DESFA gas pipeline, impacts are reduced as additional vegetation clearance is minimal.

**Operation and Maintenance Phase**

Impacts to protected areas are not anticipated during the operation and maintenance phase except during inspection and maintenance activities.

### 6.4 Socioeconomic Environment – Impacts and Mitigation

For the socioeconomic environment impacts as well as opportunities and benefits have been identified and assessed.

#### 6.4.1 Economy, Employment and Income

**Construction and Pre-commissioning Phase**

In general, construction activities for the Project will generate some, although limited in time, economic benefits paid by the Project in-country.

A study by the Foundation for Economic and Industrial Research (IOBE)\(^1\) to assess the economic benefits of the Project within Greece estimated a construction workforce of 2,700 for the Project in Greece for the main construction phase, including the pigging station at Serres\(^2\). A number of 600 people of this workforce will be working on the compressor station GCS00. For the pigging station construction, a number of 100 people will be occupied in the site of GCS01, while at later stage where the compressor station GCS01 will be fully constructed a number of 350-400 persons will be occupied. The estimated duration of work is approximately 36 months for each pipeline spread (depending upon difficulty of terrain) and 24 months for the compressor station GCS00 at Kipoi.

---

\(^1\) The Foundation for Economic and Industrial Research (IOBE) – *Economic Benefit Study* (2013).

\(^2\) For the phase of 20 bcm/yr, when the GCS01 will be constructed at Serres, only about 100-150 people will be needed over a few months of time.
Subject to TAP AG’s tendering strategy, it is likely that one or more Engineering, Procurement and Construction (EPC) contractors and a number of local subcontractors will carry out the works, which means the workforce is likely be composed of both foreigners and Greek nationals. Construction will require to a large extent a trained and specialized workforce. It is likely, therefore, that demand for unskilled local or regional workforce along the route will be relatively low. Also, given the short timeframe for the pipeline construction phase there will be limited possibility for unskilled workers to develop other skills on the job. However, as the construction duration of the compressor stations will be longer, it is expected that there will be more opportunities for on-the-job training and learning for the workforce on these components.

TAP AG will encourage contractors to source goods and services from local suppliers and to provide opportunities for local hiring. In the course of Project preparation, TAP AG is undertaking a Supply Side Analysis for local content development to promote purchasing and recruiting from within Greece and the regions where the Project is being constructed. The findings of this analysis will inform Project targets to be set out in the Local Content Development Plan.

Hiring of workforce and sourcing of materials will be managed by the primary contractors. These will be required to meet TAP AG’s Corporate Social Responsibility (CSR) requirements set out in the TAP AG policies and the best practice implementation guidance documents of EBRD regarding workers management, accommodation and rights.

Construction workers will be accommodated in a number of camps that are spread along the route and at the stationary construction sites (8 camps; depending on the outcomes of further detailing of construction spreads, additional camps may be established). Camps will be fully serviced. Materials and supplies will likely be sourced at a regional or national level. Populated areas close to construction camps will likely benefit more from employment and local spending impacts than regions that are only passed by the pipeline route. Also workers in their free time will likely create more demand in local markets, shops and bars/restaurants during the construction period. However, temporary increase of local business is short term in nature and not anticipated to be in general significant (It may be higher for the vicinity of static construction site of the compressor stations, due to the long-term presence of a workforce).

**Operation and Maintenance Phase**

The IOBE has estimated as part of their study that over the lifetime of the Project the Greek Treasury will benefit from an amount of approximately €1.2 billion.
The permanent workforce of TAP AG for pipeline system and station operation is estimated to be less than 200 employees; most of these will be highly qualified specialist. In addition, contractors will be involved for facility maintenance and security.

6.4.2 Land and Livelihoods

Construction and Pre-commissioning Phase

TAP is giving a high focus on land use and ownership issues.

Pipeline construction requires a temporary land take of roughly total 2,000 ha for the working strip, pipe yards and camps, etc of which 1,660 ha are agricultural lands (i.e. about 80% of the working strip of which approximately 440 ha is agricultural lands and pastures 1,154 ha irrigated agriculture and 66 ha fruit trees, olive groves and vineyards).

Following completion of construction, reinstatement and planting along the pipeline route will be undertaken in accordance with a Site Reinstatement Plan. This will aim at restoring the environment to preconstruction conditions as far as possible. The pre-construction situation will be surveyed and recorded as baseline for compensation. Reinstatement measures will be agreed with the land owners / users and the local administration. Erosion protection measures will be applied as required, land drainage will be reinstated and affected irrigation systems and local roads and tracks will be repaired if damaged during construction.

In order to address land related issues and in particular compensation, TAP AG has developed the Land and Easement Acquisition Strategy and the Draft Land Access Plan. The project will require easements, which means right of way without ownership, in order to build and maintain the pipeline. This will place some restrictions on future land use through safety measures designed to ensure that the pipeline is fully secure. This includes a permanent Pipeline Protection Strip (PPS) of 8 m width where no planting of trees or deep rooting permanent crops will be allowed. Agricultural works with annual crops can be carried out without problems after the pipeline has been laid, as the minimum cover of the pipeline will not be less than 1 m. Fruit trees etc. can be replanted in the working strip during reinstatement, but the PPS must be kept free.

Further, land use will be restricted by the required safety zones, which means restricting construction of buildings within 20 m distance of the pipeline (safety zone). Between 20 and 200 m from the pipeline (enlarged safety zone) only single buildings can be built. Planned
settlement development should not take place within these safety zones. Due to planning regulations allowing landholders to build on land over 4 ha, in addition to existing local and regional development plans, this causes actual restrictions in several locations along the route, which require further coordination between the Project and municipalities.

The landowners will be compensated for losses and damages incurred during construction. This includes, amongst others, loss of structures (e.g. greenhouses, irrigation equipment), permanent crops (e.g. apple trees) and loss of harvest, or any damage to buildings, etc. Compensation is further considered to cover for restrictions that will affect their lands due to pipeline integrity protection and public safety reasons (PPS and safety zone).

Compensation for land take will be carried out according to Greek regulations and EBRD’s PR5. TAP AG will establish a Land and Easement Acquisition Plan and details about compensation will be communicated with landowners/users. Agreements on land purchase and easement rights will be made well in advance of construction start.

TAP will respect the livelihoods of the population in areas crossed by the pipeline. Since the agriculture structure in the region along the route frequently consists of small holdings which are of significance for household incomes and foodstuff self-supply, actual livelihood impacts will need to be further addressed after a complete survey of the route. Further activities of local people that herd animals or collect forest produce are likely to be temporarily affected, however mostly for a short time until the pipeline is laid and construction has moved on.

TAP AG is developing a Livelihood Restoration Framework (LRF), which will include an Entitlement Matrix defining the compensation needed to assure that livelihoods and standards of living of all affected people are restored to levels they will have achieved in a non-TAP scenario and that the living conditions and livelihoods of vulnerable groups are improved. Entitlements for affected persons will be communicated before the project construction commences. Entitlements will be defined in accordance with EBRD’s PR5. A summary of the LRF will be made available to the public in order to communicate clearly the compensation process.

**Operation and Maintenance Phase**

The Project will require permanent land take for the above ground installations, i.e. GCS00, GCS01 and the BVSs. Overall, the permanent land take for each compressor station totals approximately 17 ha and for each BVS 0.07 ha. This land take mainly affects agricultural land
and the present landowners and users will be compensated at replacement value (market value plus any transaction cost). Landowners and users affected by this land take will be fully compensated prior to construction in line with the LRF outlined above.

6.4.3 Infrastructure, Utilities and Public Services

**Construction and Pre-commissioning Phase**

The pipeline route, on its 543 km length through Greece, will inevitably cross a number of infrastructure and utilities. This includes about 1443 transportation infrastructure features of different categories including 14 highways, 59 major roads, approximately 159 secondary roads and 13 railway crossings. Crossing activities will lead to temporary inconvenience such as delays and detours for road users. This is of particular importance to remote settlements and their accessibility in case of a local emergency and for local people who rely on a single road to bring their produce to market. In addition to roads, numerous public utility lines will need to be crossed such as piped water, sewer lines, and electricity and telecommunication cables. Further, the route will be crossing areas with irrigated lands, mainly in the plains of Komotini, Xanthi, Kavala, Drama, Serres, Thessaloniki, Giannitsa and Eordea. Thus, the pipeline construction will disrupt both irrigation and drainage systems by temporarily affecting their function, which could impact on the income and livelihoods of local farmers relying on irrigation.

For all infrastructure crossings, documented *Crossing Agreements* will be made with the public or private owners and works will be carried out in consultation with local municipalities and regional agencies in charge. Public notice of construction activities and implications will be made available locally. *Community Liaison Officers* will be present at work fronts to ensure that impacts from planned disruptions are minimised and that any unplanned disruptions are properly managed. A *Grievance Mechanism* will be in place with rapid response schedule and access of affected stakeholders to a compensation process in case any unplanned disruption results in loss of livelihoods.

*Road infrastructure:* In line with international best pipeline construction practice, major roads, such as the highways, national and regional main roads and railway lines will be crossed using trenchless methods. This will avoid any immediate impact or traffic disruption on the infrastructure at the crossing location. Secondary roads (e.g. municipal, local, forest, private roads) and other carriage ways and tracks will be crossed by open cut as a standard technique.
Such crossings of smaller roads can typically be accomplished within a short time so that road passage at these locations usually will be interrupted for no longer than 1–3 days. Temporary diversions (typically, short temporary gravel road next to the crossing section) will be established where no reasonable alternative local access exists such as those roadways that serve as the only settlement access or regular service e.g. of local buses, access to agricultural lands etc. to ensure uninterrupted accessibility of settlements. After the pipeline is installed at the crossing, all damage to public or private roads will be repaired and the conditions prior to pipeline construction will be reinstated in agreement with local authorities and infrastructure owners.

Irrigation and Drainage systems: TAP AG will establish via surveys an understanding of local irrigation systems and their water supply (including boreholes, pump wells and other structures such as pump houses), times when water is needed for irrigation, which quantities and which network and irrigated area (outreach of supply of an affected irrigation feeder /supplied area) as these will be affected when the system is cut by the pipeline trench. Based on this, detailed planning will include measures to provide water supply bypasses and ensure continued irrigation flow during pipeline construction and consequent rehabilitation of irrigation systems. The same approach will apply to the drainage / flooding channels.

Utility lines: Crossing of third party underground utility supply lines, e.g. water pipes and underground electricity cables, or sewage discharge pipes will be crossed by established construction methods. Short term interruptions of typically a few hours will occur and the affected stakeholders and local population will be informed ahead of construction by local announcements accordingly. This will be especially important with regard to disruption of irrigation systems and public road access to settlements and agricultural areas.

Benefit Enhancement Measures: Besides the above temporary disruption of infrastructures, Project implementation will also help to improve regional infrastructures. In the eastern part from Kipoi to Nea Messimvria the pipeline is placed parallel to the existing DESFA pipeline to a large extent. Therefore, the access roads to be used are available and in good condition due to the previous construction activities of DESFA’s pipeline. From Nea Mesimvria westwards to the Greek/Albanian border about 27 km of existing roads and tracks will be widened and upgraded to gravel road standard. Such upgraded access roads, will be established early in the construction phase. These upgraded roads have the potential for providing some local access improvements in more remote areas.
**Operation and Maintenance Phase**

Project implementation will assist in the improvement of regional infrastructure and aims to maintain access roads throughout the operation and maintenance phase. With regard to other infrastructure such as water, telecommunications, sewage, waste and possibly health facilities might be improved to support construction activities. TAP AG is committed to continue working with government and local communities to achieve sustainable benefits for local settlements through the hand-over of these. TAP AG will develop an *Infrastructures and Utilities Management Plan* to maximise the use of project infrastructure with a view on community needs. The *Plan* will be developed in close coordination with local utilities companies, authorities at the regional and local level and communities to ensure the appropriateness and sustainability of investment and will also be published and undergo a consultation process with affected communities.

With regard to making gas locally available, the design of the TAP system technically allows it to provide gas to the Greek network but TAP AG is not a local gas supplier. However, if necessary, tie-in points for transfer into the national system would be assessed during the next phase of engineering in consultation with the Greek government.

6.4.4 Community Health and Safety

**Construction and Pre-commissioning Phase**

A large infrastructure project like the TAP bears the potential for a number of public health and safety risks for the communities along the pipeline route and around the compressor station. Key risks during construction relate, amongst others, to construction workforce - community interactions, spread of communicable diseases, increased accident risks caused by the substantial construction logistics and transports, by construction site trespassing, competition for access to health care, strain on local resources and environmental change.

Depending on the outcomes of the construction tendering, parts of the peak 2,700 persons workforce could originate from both Greece and abroad TAP AG will undertake a number of international best practise management measures to address the various public health, safety and security risks involved with the presence of a large workforce and the construction activities. Contractors will be required to comply with strict requirements and safeguards. This includes e.g. establishing a *Workers Code of Conduct* (including alcohol policy, forbidding illegal activities including t consumption of illegal substances) and mandatory awareness training (including
health issues) for workers as part of their induction, voluntary health screening of workers and provision of health facilities in the camps (primary health care and basic first aid).

In order to minimise hindrance, delays and traffic risks, TAP AG will develop a Traffic Management Plan based on the detailed logistics. This plan will be consulted with regional and local administration and agencies including traffic police.

A Grievance Mechanism will be available to local population and the Project’s Community Liaison Officers (CLO) will be on site to address any community health, safety and security issues raised immediately. The Project will provide health care for any member of the community injured as a result of Project activities.

TAP AG will undertake a capacity/needs assessment of equipment and personnel of hospitals along the route and in Thessaloniki to determine if facilities have sufficient resources and equipment to deal with emergencies (e.g., construction accidents). Agreements will be entered into with suitable hospitals to provide health care in emergency situations. These agreements will include provision of additional equipment or training for staff if required by TAP AG.

TAP AG will develop Emergency Response Plans (ERP) taking into account access to health care, major incidences, multiple casualty events and pandemics. These should be developed in consultation with national emergency providers and local health care facilities and will cover all contractors and subcontractors as well as consideration of the local community.

Operation and Maintenance Phase

Public Health and Safety during operation has been considered in the design of the facilities and the risk assessments undertaken. The Project includes built-in safety features according to established European standards and norms for pipeline systems. In order to address the handling of residual risk associated with non-routine events during operation, TAP AG will develop an Emergency Response Plan (ERP) that will specify the actions required in case of an incident.

The ERP for operation will be developed according to Greek and EU requirements and international industry standards and best practice. The ERP will be consulted with the competent authorities, emergency services/civil defence and the municipality administrations along the
pipeline route and around the compressor stations. Based on consultations with relevant stakeholders, TAP AG will investigate the capacity of statutory local and regional emergency response providers to participate in emergency response activities. TAP AG will provide necessary training, engage in the organisation of drills and exercises, and if needed, TAP AG will also provide for necessary improvements to equipment e.g. of local fire brigades/civil defence units. Households in communities in the vicinity will receive information via leaflets, which advise how to behave in case of a pipeline leak or incident.

The Project installations will be guarded by security personal which will either be TAP staff directly, or supplied by a security company. The compressor station will be permanently guarded, while the pipeline route will be regularly patrolled. TAP AG is committed to address the topic of facility security and potential implications for public security according to national Greek requirements and in accordance with the Voluntary Principles on Security and Human Rights (VPSHR) which are considered international best practice in this field.

6.4.5 Community Cohesion

Large infrastructure projects like the TAP Project bear the social risk that community members or whole communities feel potentially disadvantaged when there are different individual perceptions about the distribution of benefits and burdens during project implementation. This may lead to frictions and impact on community cohesion. Consultation outcomes during ESIA preparation have shown that strong community expectations towards the Project exist, in particular with regards to employment during construction and operation, as well as other potential community benefits.

Project implementation will result in a temporary planned influx of workforce to the project area composed of up to 2,700 workers\(^1\). Based on experience from similar pipeline projects, it is estimated that 20% to 30% of this workforce will be Greek unskilled workers. Therefore, only a small percentage of the workforce will be actually hired locally from the project area. Workers will mostly be housed in self-contained camps and will be subject to a Code of Conduct (CoC) with regard to their behaviour and conduct towards local people. In addition there is the potential that

\(^1\) Pipeline construction is estimated to require 700 workers over a period of 24 months and the compressor stations will require an additional 300-350 for GCS00 for 10 bcm/yr phase. Since GCS01 in the initial 10 bcm/yr phase will be a pigging station only, the fitting of the compressors for the 20 BCM/yr case will require a smaller workforce of 100 –150 people at a later stage.
opportunity seekers for jobs and provision of goods and services will influx to the area, mainly in vicinity of the construction camps, potentially competing with local job seekers and suppliers.

Potential community cohesion issues will be proactively addressed by TAP AG through a set of measures which include the following main elements:

- TAP AG via its contractors will apply proactive recruitment and sourcing goods locally to provide opportunities in the local context. A large scale influx and thus competition with local population is considered unlikely, as the Project has a relatively short construction phase.
- Land issues will be managed through the Land and Easement Acquisition Framework which creates transparent and equal management of impacts for communities and affected landowners/users. Should livelihoods be affected, impacts will be mitigated through a Livelihood Restoration Plan.
- Further, TAP AG has committed through its policy on Corporate Social Responsibility to optimize the benefits that may be brought by the Project through infrastructure enhancement and local content and through the delivery of a Social and Environmental Investment Program (SEIP). Implementation of the SEIP will aim to distribute benefits in a transparent and fair way and with equal opportunities for the communities in sharing benefits. The SEIP will be developed in consultation with the communities and this will take into account vulnerable and marginalized groups in the population.
- TAP AG will implement a Grievance Mechanism to address individual and community concerns related to project impacts, in particular during construction and reinstatement activities.

6.4.6 Traffic and Transportation

*Construction and Pre-commissioning Phase*

The preliminary Logistics Concept indicates that road traffic generated by the construction activities will be substantial and this will add to existing traffic.

Road conditions and capacity of the road network in the regions where the pipeline passes is generally good. A key element of the regional road network is the Egnatia highway and its vertical (north-south) axes. Consultations with regional road administration and traffic police undertaken
in the course of the ESIA preparation have not identified particular critical hotspots. However, reasons were reported to explain the relatively large number of accidents on rural roads. This includes, amongst others, seasonally more dangerous traffic conditions when transportation of large volumes of local agricultural produce, such as fruits, crops and vegetables, takes place in summer and long straight road segments allow drivers to increase speed and undertake risky overtaking manoeuvres.

Traffic baseline counts undertaken and construction traffic prognosis for construction logistics for key routes and traffic nodes suggest that daily road users offside from the main road network will be likely confronted with delays over the construction period mainly caused by the slow moving heavy load traffic, such as the line pipe trailer trucks on logistics routes. This will likely increase overtaking actions by road users and thus traffic accident risk in addition to the above reasons. Construction traffic, particularly on remote local roads, may also present a hazard to pedestrians, cyclists and livestock that will be less used to frequent and heavy vehicle movements. This will also be the case where logistic routes cannot avoid passage through settlements in more remote regions.

In order to minimise hindrance, delays and traffic risks, TAP AG will develop a Traffic Management Plan based on the detailed logistics. This plan will be consulted with regional and local administration and agencies including traffic police.

**Operation and Maintenance Phase**
During Operation of the pipeline system, there will be only a few maintenance and patrol vehicles in regular operation. Therefore no relevant traffic impacts will occur.

6.4.7 Worker Management and Rights

**Construction and Pre-commissioning Phase**
The construction workforce for the TAP Project in Greece is a substantial number estimated at 2,700 for the main construction phase. Depending on the tendering outcomes, it is possible that workers may come from different regions of the world and different cultural backgrounds, and with different skill levels as required. Such complex situations bear a number of social risks. TAP AG will include social clauses in the EPC contract regarding fair treatment of workers, a safe work site environment, and decent conditions of accommodation and supply with food. These
conditions will relate to TAP AG policies and relevant best practice recommendations of EBRD and IFC. TAP AG will require the EPC contractor to inform workers about their rights and set-up a workers grievance mechanism and undertake surveys and focus group feedback interviews for early detection of unsatisfactory situations. TAP AG will undertake compliance audits at the camps and worksites to check compliance with contractually required standards. TAP AG will set up a construction supervisory team that includes, amongst others, HSE officers, HR and CSR specialists.

Further, TAP AG will request the EPC contractor to undertake due diligence check-up on working conditions (including HSE, social conditions) of production sites of foreseen major supply items for the project (such as the line pipes, fill and bedding materials) and to ensure that materials supplied are produced under save and fair working conditions that satisfy TAP AG’s social and HSE requirements.

**Operation and Maintenance Phase**

The staff required for operation of the pipeline system in Greece will be less than 100 people, mainly working at the compressor stations. TAP AG’s operational staff will be employed according to TAP AG’s employment policies which will be in line with Greek and EU regulations regarding conditions of work. Staff will receive all required training to work in a safe environment. Any contractors maintaining the stations, patrolling the route or providing security of the installations will be contractually required to apply with TAP AG’s social and HSE requirements.

6.4.8 Cultural Heritage

**Construction and Pre-commissioning Phase**

The extensive process for route selection and optimisation for the pipeline route and the site selection for the BVSs and other Project components has avoided known cultural heritage as far as possible. However, a number of cultural heritage resources are located in the vicinity of the Project footprint. In addition to the sites identified within the Project footprint, some identified archaeological sites may extend into the Project footprint and could produce archaeological finds during ground-disturbing activities such as trenching. Based on current information, at least 31 areas of archaeological interest will be physically impacted to some degree, including potentially two in facility areas. This figure is mostly composed of locations where there is thought to be a high potential of buried features.
A pre-construction programme of work will be undertaken to understand more thoroughly the nature of features that may be affected. This will include a re-examination of some evidence and use of additional sources such as aerial photographs from the 1950’s that contain evidence of landscape changes since that time. This will be of most value in areas of concern such as Korissos and the landscape south of Pella.

Potential sites intersecting the Project footprint will be investigated further prior to construction. This may be either using a form of geophysical survey, or intrusive subsurface testing, or a combination of both. Depending on the precise significance of any evidence, which in most cases is yet to be determined, archaeological resources would be excavated and recorded. This would be in accordance with Greek law and to international standards for the preservation of cultural heritage.

For each location, TAP AG will prepare and agree with the Ministry of Culture, a Cultural Heritage Management Plan. This will contain a method of construction to show how damage can be minimised. For example, the Justinian Wall in Nestos will be crossed by a trenchless technique, and in other areas, a reduced working width may be utilised to reduce damage or avoid specific features, which may also have additional protective fencing. The Cultural Heritage Management Plan will include a written scheme of investigation that details how any specific archaeological recording work is to be conducted showing the aims and objectives of the work, techniques to be used and staff identified.

TAP AG will also engage with stakeholders for monuments and sites with Intangible Cultural Heritage value (i.e. the Chapel of Aghios Markos and the Church of the Assumption – see Figure 6-1 to understand and be able to address user access issues and identify the days and times in which construction activities should be restricted (for example, popular visitation days, religious services, holidays, celebrations, etc.).

Figure 6-1  The Church of the Assumption near Ptolemaida
Construction activities will be planned to avoid access issues
The Project will implement a *Chance Finds Procedure* that details the process to be followed in case an archaeological find is made during construction. The management of any finds will be handled according to Greek national requirements and EBRD PR8 requirements.

For the built heritage, such as monuments or churches located close to the working strip, work sites and logistics roads; particularly when they are in the vicinity of sections where blasting and hammering will be employed, there is a risk of collapse. These will be examined by experts before construction and assessed for the need for temporary supports to protect structural integrity. This will be provided as necessary.

The condition of the monuments, buildings and structures will be recorded by experts both before and after construction. In case Project-related damage to built heritage should occur, TAP AG will arrange for repair by conservation experts in coordination with the authorities.

The Project as a whole will lead to an overall increase in the understanding of the range of sites and changes to the landscape over time for a transect across the whole of Northern Greece. This will not only include areas where there is a high level of information but also other areas where there has been less intensive work in the past.

*Operation and Maintenance Phase*

During operation, no physical impacts to cultural heritage are anticipated. Route patrolling and station maintenance schedules will take into consideration the use of intangible cultural heritage by the local people.

### 6.5 Decommissioning Impacts

Decommissioning of the TAP pipeline system will take place at a time far in the future. Therefore, impacts of this Project phase are assessed based on the following assumptions: It cannot be foreseen today which decommissioning approaches will be taken at the time of decommissioning. Impacts will obviously depend on the *state-of-the-art* decommissioning approach and available dismantling techniques at that time. Depending on the approach and technologies available at decommissioning stage, the onshore pipeline may either stay in the ground or will be taken out partly or completely. Common international practice today, however with not many precedence
examples being available, is to leave an abandoned pipeline in the ground (abandonment-in-place). In this case the pipeline will be pigged, purged and secured against structural collapse to avoid ground subsidence which could potentially lead to impacts and risks regarding subsequent land use. If the pipeline would be removed from the ground, e.g. to recover the pipe steel, activities will be similar to the construction stage but in reverse order. It is assumed that is such case similar type of equipment, machinery and vehicles will be used for decommissioning and similar impacts will occur which will need to be addressed by potentially similar mitigation.

The workforce required for compressor station decommissioning will be likely less than required for construction. Workforce required for pipeline decommissioning depends on the decommissioning approach. If the pipeline is left in the ground, only a small number will be required, if it is recovered, workforce may be similar as for construction. Beneficial effects on local employment and local businesses cannot be reasonably predicted from today’s perspective but will likely be less than those for construction.

Any decommissioning activities will be subject to permitting requirements applicable at that time and subject to consultation with affected owners and stakeholders of affected properties and structures. A Pipeline Abandonment Plan (PAP) that covers all relevant items will be prepared by TAG AG before any decommissioning works. Management of social risks regarding workers and the public will be undertaken similar to construction and in any case to European social standards applicable at the time of decommissioning.
6.6 Non Regular Operation and Unforeseen Events

The pipeline system will be transporting natural gas, which is highly flammable. TAP AG will therefore implement the Project according to established European and international standards to provide safe operation of the system and minimise risks associated with the nature of gas. Due to the high levels of European and international safety standards and established state-of-the-art technology, transportation of gas today is considered very safe. This is also supported by the European Gas Pipeline Incident Group (EGIG)\(^1\) that collects and analyses long term statistical pipeline incident data such as failure frequencies and causes of incidents. Comparing TAP’s technical design parameters with the EGIG statistics shows that the failure frequency of a pipeline with similar characteristics, as the TAP Project, is close to zero.

During the development of the pipeline and its associated infrastructure, TAP AG has sought to avoid, and minimise risks from non-routine events through pipeline routing and through the technical design of the system and its components. This has considered Greek national requirements, European Union standards, best international industry practice and the requirements of EBRD’s PR3 (Pollution Prevention) and PR4 (Community Health Safety and Security) and relevant IFC EHS Guidelines. Through these appraisals and assessments, state-of-the-art measures have been identified and incorporated into the Project. These include pipeline design according to proven design standard EN1594 and the Greek High Pressure Natural Gas Transmission System Regulation, pipeline safety distances to settlements and population, pipeline integrity protection systems as well as leak detection systems. Furthermore, regular maintenance and inspection will be undertaken. To handle the residual risk during operation an Emergency Response Plan will be established according to Greek and EU requirements and international industry standards and best practice in consultation with the competent authorities, emergency services/civil defence and the municipality administrations along the pipeline route.

In the further course of planning TAP AG will undertake a full Quantitative Risk Assessment (QRA) to inform final routing and design, and especially will consider sections where settlement density is higher. Depending on the outcomes of the detailed QRA, measures to reduce the likelihood of pipeline failure will be developed, in order to further reduce the pipeline’s susceptibility to external threats.

---

\(^1\)EGIG is a co-operation between a group of fifteen major gas transmission system operators in Western Europe to gather data on the unintentional releases of gas in their pipeline transmission systems.
Other non-routine events, such as accidental spills of fuels, lubricants, waste or other water endangering substances will be minimised by good housekeeping practice during construction management. A *Pollution Prevention Plan* and *Spill Prevention and Response Plan* will establish response mechanisms to minimise the impacts of such spills to water and soil.

### 6.7 Cumulative Impacts

Cumulative impacts may arise from the combination of activities associated with the TAP Project together with other third party developments or projects in the same area of influence and at the same time of implementation or in the reasonably foreseeable future.

Following the bundling principle with existing infrastructure will lead to a parallel alignment of the TAP Project with an existing natural gas pipeline of DESFA over a length of approximately 300 km. Operations for this pipeline started in 2000 for the section Nea Mesimvria – Komotini and in 2007 for the section from the Greek/Turkish border to Komotini. Potential implications regarding construction of the Project and simultaneous operations of the two pipelines will be subject to further studies.

40 future planned projects have been identified near the pipeline route, of which 10 have an implementation timeline to coincide with the construction phase of the TAP Project. TAP’s operational phase is not considered to create significant cumulative impacts due to the small operational workforce and nature of activities (predominantly maintenance and inspection). Operations will therefore not have an effect on increased combined residual impacts.

Given the sequential nature of pipeline construction, the overlapping periods of real construction activities of two projects at the same time is generally considered of limited duration. For the compressor station sites no other projects have been identified in the vicinity.

The 10 projects include waste and waste water treatment plants, hospital development, railway and power transmission line construction, sewage networks, an irrigation dam and a wind farm. Potential cumulative impacts may arise from construction traffic, noise and dust emissions, pressure on mineral resources (aggregates and pipeline bedding material) and use of water resources.
As no sensitive receptors, i.e. residential buildings, have been identified within a distance of 1 km from the construction site, noise and dust emissions from combined construction site effects are unlikely. In case of nearby construction sites landscape or visual amenity disturbance may be experienced by residents on a temporary basis. Furthermore, cumulative traffic increase could occur on local roads in areas near the construction sites but this combined effect will be managed by the Traffic Management Plan. No combined residual habitat impacts are expected once the mitigation measures for habitats are implemented. Special attention, however, will be given to the bear habitats near the Greek/Albanian border to minimise disturbance during construction. All residual impacts, including cumulative ones, will be controlled by TAP AG through a set of defined mitigation measures, the implementation of these will be managed through the Environmental and Social Management and Monitoring Plan (ESMMP).

### 6.8 Transboundary Impacts

The transboundary area within Greece where impacts may affect populations or habitats in Albania is restricted to the area where the pipeline crosses the border south of the village of Ieropigi at the Greek/Albanian border.

The key impacts during the construction phase of the Project are related to the disturbance of wildlife, especially the brown bear (*Ursus arctos*) and the grey wolf (*Canis lupus*). As the most sensitive time is the breeding season, restrictions will apply to the timing of construction activities avoiding any works between mid-March and early August. During operation only impacts from unlikely non-routine events are identified, however the probability of this to occur is very low.

The transboundary area where impacts may affect population of habitats in Turkey is related to the area where the pipeline crosses the Greek/Turkish border and the operation of the Compressor Station GCS00. In addition to the disturbance of wildlife (especially the golden jackal and the European ground squirrel), potential transboundary impacts to Turkey during construction are addressed by using trenchless crossing methods of the Evros River and a site specific Hydrostatic Test Plan. This will avoid impacts to the river itself and the related protected area of the Evros Delta, a protected area of international importance (Natura 2000 site and Ramsar site).

During operations the main potential source of transboundary impacts to Turkey is the Compressor Station (GCS00) located approximately 3.2 km from the border. However, air
dispersion and noise propagation modelling have shown that no significant transboundary effects are anticipated. Impacts from non-routine events have been identified but these are unlikely. Mitigation measures identified throughout the ESIA are applicable also for the transboundary effects. With the implementation of these measures no transboundary impacts to Albania nor Turkey are expected during construction, operation or decommissioning of the TAP Project.
7 ENVIRONMENTAL AND SOCIAL MANAGEMENT AND MONITORING

As a result of the impact and risk assessment process an Environmental and Social Management and Monitoring Plan (ESMMP) is being compiled. This provides a framework for the implementation of the measures identified in the assessment to avoid, reduce, compensate or offset adverse impacts and to minimise and manage risks from Project activities that may cause harm or nuisance on the environment, the construction workforce, operational staff or the local population. Where possible, measures are included to enhance positive effects of Project implementation.

Actions defined in the ESMMP relate to the various management plans and procedures identified and specified in the ESIA.

The ESMMP contains more detailed information on the foreseen environmental and social management and monitoring arrangements, the roles and responsibilities of TAP AG and its contractors for implementing these measures, and provisions for monitoring to assess the effectiveness of measures.

Table 7-1 provides an overview of the main management plans that TAP AG will put forward to the EPC contractor for construction and for TAP AG’s management of the Project.

<table>
<thead>
<tr>
<th>Topic / Title</th>
<th>Purpose / Objective</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction and Pre-commissioning</td>
<td></td>
</tr>
<tr>
<td><strong>ENVIRONMENTAL</strong></td>
<td></td>
</tr>
<tr>
<td>Aggregates Management Plan (AMP)</td>
<td>Provides recommended best practice procedures needed to ensure adequate management of aggregate material (including sand, gravel, crushed stone) throughout construction.</td>
</tr>
<tr>
<td>Biodiversity Action Plan (BAP)</td>
<td>Deals with the management of impacts on the terrestrial and freshwater environment, the implementation of mitigation and compensation measures and offsets; the BAP measures during construction are supervised on site by Ecological Clerk of Works to be part of construction supervisory management structure.</td>
</tr>
<tr>
<td>Erosion and Sediments Control Plan (ESCP)</td>
<td>Aims to minimise erosion at construction sites, to avoid water pollution by sediment plumes from uncontrolled site runoff and to manage and monitor long-term site stability / erosion at watercourse crossings.</td>
</tr>
<tr>
<td>Hazardous Materials Management Procedure (HMMP)</td>
<td>Defines how TAP AG and contractors will select, handle, store and dispose of the chemicals in order to prevent damage to people and the environment.</td>
</tr>
</tbody>
</table>
### Project Title:
Trans Adriatic Pipeline – TAP

### Document Title:
Integrated ESIA Greece

**SECTION 0 – Non Technical Summary**

<table>
<thead>
<tr>
<th>Topic / Title</th>
<th>Purpose / Objective</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hydrostatic Test Plan (HP)</strong></td>
<td>Defines the hydrostatic test water intake and discharge points and methods to avoid impacts on aquatic ecology, river bed and banks, and any user conflicts.</td>
</tr>
<tr>
<td><strong>Landscape Management Plan (LMP)</strong></td>
<td>Details landscaping and restoration works along the pipeline route, in conjunction with the Site Reinstatement Plan.</td>
</tr>
<tr>
<td><strong>Pollution Prevention Plan (PPP)</strong></td>
<td>Details (onshore) working site good practice to avoid / minimise pollution risk during construction (including handling of potentially hazardous materials, product specific practices etc). To be developed in conjunction with the Spill Prevention and Response Plan, Hazardous Materials Management Procedure and Waste Management Plan.</td>
</tr>
<tr>
<td><strong>Site Reinstatement Plan (SRP)</strong></td>
<td>Deals with the general reinstatement of lands along the pipeline route to be undertaken following completion of construction.</td>
</tr>
<tr>
<td><strong>Spill Prevention and Response Plan (SPRP)</strong></td>
<td>Provides for preventing spills of oil and lubricants, cleaning agents etc. and for clean-up of any accidental spills that may occur.</td>
</tr>
<tr>
<td><strong>Waste Management Plan (WMP)</strong></td>
<td>Deals with the handling and proper disposal of wastes and waste water generated during construction including wastes from construction camps.</td>
</tr>
<tr>
<td><strong>Watercourse Crossing Plan (WCP)</strong></td>
<td>Sets out the details of the construction methods and environmental protection measures, such as sediment dispersion reduction, for each water course crossing.</td>
</tr>
<tr>
<td><strong>Water Management Plan (WMP)</strong></td>
<td>Established to monitor and minimise Project water use during construction (in conjunction with the Hydrostatic Test Plan) and manage groundwater pumping needs and construction site surface runoff.</td>
</tr>
</tbody>
</table>

**SOCIAL**

<table>
<thead>
<tr>
<th>Topic / Title</th>
<th>Purpose / Objective</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Community Health Management Plan (CHMP)</strong></td>
<td>Manages local public health, safety and security issues during construction.</td>
</tr>
<tr>
<td><strong>Cultural Heritage Management Plan (including Chance Finds Procedure)</strong></td>
<td>Sets out the construction phase requirements for dealing with known cultural heritage and chance finds.</td>
</tr>
<tr>
<td><strong>Grievance Mechanism</strong></td>
<td>Provides a documented process to deal with any suggestions or complaints of the population affected by the Project.</td>
</tr>
<tr>
<td><strong>Infrastructure and Utilities Management Plan (IUMP)</strong></td>
<td>Deals with minimising of roads and utility interruption during construction.</td>
</tr>
<tr>
<td><strong>Land Easement and Acquisition Strategy (LEAS) and Land Access Plan (LAP)</strong></td>
<td>Deals with the management of temporary and permanent acquisition of easement rights for the pipeline and land for above ground installations and road access (in conjunction with the Livelihoods Restoration Framework).</td>
</tr>
<tr>
<td><strong>Livelihoods Restoration Framework (LRF) and detailed Livelihood Restoration Plan (LRP)</strong></td>
<td>Deals with compensation and special assistance for situations where temporary construction land take and permanent easement or acquisition for the pipeline and permanent access roads leads to severance for plot owners or users.</td>
</tr>
<tr>
<td><strong>Local Content Development Plan (LCDP)</strong></td>
<td>Deals with measures to enhance participation of local businesses in the procurement of goods and services to the Project, and to enhance the job opportunities for Albanian and local (Project region) workforce.</td>
</tr>
<tr>
<td><strong>Social and Environmental Investment (SEI) Plan</strong></td>
<td>Deals with enhancement of positive project effects and sharing of benefits with local communities e.g. by provision of infrastructure.</td>
</tr>
<tr>
<td><strong>Stakeholder Engagement Plan (SEP)</strong></td>
<td>Describes the public consultation and disclosure activities in the ESIA Process and during project implementation.</td>
</tr>
<tr>
<td><strong>Traffic Management Plan (TMP)</strong></td>
<td>Sets out measures to manage construction traffic on the public road network and on construction sites, in order to minimise risk of accidents.</td>
</tr>
<tr>
<td><strong>Workers Management Plan (WMP) (including Workers Code of Conduct)</strong></td>
<td>Deals with the management of construction workforce-related social issues, such as conditions of work, accommodation and transport, code of conduct etc.</td>
</tr>
</tbody>
</table>
### Operation and Maintenance

<table>
<thead>
<tr>
<th>Topic / Title</th>
<th>Purpose / Objective</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emergency Response Plans (ERP)</td>
<td>Regulates the emergency response in the event of spills, fire, accidents, earthquakes and floods and includes also all kind of training for staff and contractors and third party emergency responders.</td>
</tr>
<tr>
<td>Decommissioning</td>
<td></td>
</tr>
<tr>
<td>Pipeline Abandonment Plan (PAP)</td>
<td>At the time when it becomes relevant, this plan will specify in sub-plans the measures to deal with environmental and social impacts and risks associated with decommissioning, abandonment and/or dismantling of pipeline and associated installations.</td>
</tr>
</tbody>
</table>

Compiled by ERM (2012)

These plans, related sub-plans and implementation procedures will be detailed in the further stages of Project preparation.
For Inquiries please contact:

Trans Adriatic Pipeline AG
– Greece (Branch Office)
21st Floor, Athens Tower,
2-4 Messogion Ave.,11527
Athens, Greece
Phone: + 30 210 7454613
Fax: + 30 210 7454300
e-mail: esia-comments@tap-ag.com
TAP Greece Overview Map
Sources: Esri, DeLorme, NAVTEQ, TomTom, Intermap, incrementP Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, and the GIS User Community