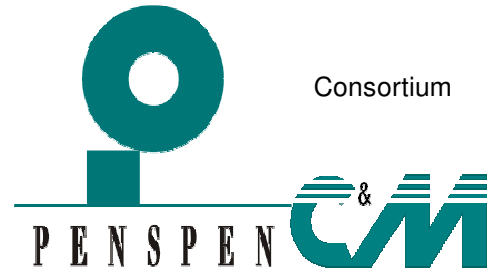


“ICGB” AD

FEED & EIA for Natural Gas Interconnector Greece – Bulgaria (IGB) Project

Environmental Impact Assessment (EIA) Report on the IGB Investment Proposal - Non-Technical Summary



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REVISION AND AUTHORISATION RECORD

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1. Introduction

ICGB AD is a company set up and existing under Bulgarian law and hereafter known as the CONTRACTING ENTITY. The CONTRACTING ENTITY awarded the consortium of Penspen Ltd and C&M Engineering SA, known hereafter as the CONTRACTOR with the Front End Engineering Design (FEED) and Environmental Impact Assessment (EIA) for a proposed 28” diameter high pressure gas pipeline, called the “Gas Interconnector, Greece – Bulgaria” (IGB).

The IGB buried pipeline will transport natural gas over the border between Greece and Bulgaria, connecting the existing Komotini Facility in Greece with an existing gas pipeline near the Bulgarian town of Stara Zagora. The proposed pipeline will measure a total distance of approximately 181.3kms, (30.5kms in Greece and 150.8kms in Bulgaria).

The design of this bi-directional pipeline system shall be in accordance with the internationally recognised codes of practice: EN1594 and ASME B31.8, and also in conjunction with Bulgarian Ordinances, for the safe transportation of 3bcm/yr of gas initially, with the provision for the future expansion up to a maximum technical capacity of 5bcm/yr. The project also includes the construction of the associated Above Ground Installations (AGIs).

1.1 Purpose of Document

The purpose of this document is to provide an English translation of the EIA non technical summary which has already been submitted to ICGB in Bulgarian, and which has also already been submitted to the appropriate authorities for their approval, by ICGB.

2. Definitions and Abbreviations

CONTRACTING ENTITY: ICGB AD

CONTRACTOR: The Consortium formed by “Penspen Ltd and C & M Engineering SA”

SUPPLIER: Supplier of Equipment or Materials

Throughout this document the following terminology is used:

“must”: signifies a legal or statutory requirement

“shall”: signifies a requirement made mandatory by this specification

“may”: signifies a feature, which is discretionary in the context in which it is applied

“will”: signifies a feature which the CONTRACTOR / SUPPLIERS may assume to be already present.

**Appendix A Environmental Impact Assessment (EIA) Report on the IGB
Investment Proposal - Non-Technical Summary**

**Environmental Impact
Assessment (EIA)
REPORT**

ON THE INVESTMENT PROPOSAL

**GAS INTERCONNECTOR
GREECE-BULGARIA**

NON-TECHNICAL SUMMARY



Sofia, September 2012

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ABBREVIATIONS

AMS	Automated Measuring Station
EASRBD	East Aegean Sea River Basin Directorate
BDS	Bulgarian State Standard
GMS	Gas Metering Station
GRS	Gas Regulation Station
SHC	State Health Control
EU	European Union
PS	Protected NATURA 2000 Site
PA	Protected Areas
LSP	Law on Spatial Planning
IP	Investment Proposal
IUCN	International Union for Conservation of Nature
BV	Block Valve
CS	Compressor Station
MH	Ministry of Health
MoEW	Ministry of Environment and Water
IGB	Gas Interconnector Greece-Bulgaria
NCPHA	National Center of Public Health and Analyses
NGTS	National Gas Transmission System
EIA	Environment Impact Assessment
IBA	Important Bird Areas
SWB	Surface Water Bodies
MPC	Maximum Permissible Concentration
CPA	Crop Protection Agents
PS	Pigging Station
RBMP	River Basin Management Plan
RIEW	Regional Inspectorate of Environment and Water
RHI/RIPCPH	Regional Health Inspectorate (former Regional Inspectorate for the Preservation and Control of Public Health)
CV	Cut-off Valve
BVS	Block Valve Station
CPS	Cathodic Protection System
CAW	Construction and Assembly Works
HA	Hourly Average
TPP	Thermal Power Plant
FAO	Food and Agriculture Organization
PM ₁₀	Particulate Matter
SPZ	Sanitary Protection Zone

INTRODUCTION

Brief presentation of the Investment Proposal and the need for preparation of an EIA

The need for preparation of an Environment Impact Assessment (EIA) Report occurs as a result of the implementation of an Investment Proposal for the construction of the Gas Interconnector Greece-Bulgaria.

The drawing up of an EIA Report for the Investment Proposal for the Gas Interconnector Greece-Bulgaria aims to:

1. identify the impact that the Investment Proposal may have on the environment, population and health;
2. analyze, clarify and assess the impact on the components and factors of the environment, population and human health during construction, operation and decommissioning of the project;
3. support the consultation process between the Contracting Authority, competent authorities and public with relation to the implementation of the Investment Proposal;
4. provide the necessary data for taking a decision on the EIA by a competent body.

The EIA is developed in accordance with Chapter VI of the Law on Environmental Protection, Ordinance on conditions and procedures for assessing the environmental impact, Decision No 23-PR/2010 by the Ministry of Environment and Water on evaluation of the need for an EIA, letters of ref. No OVOS 1268 No 48-00-831 dd 27.07.2010 and ref. No 26-00-3031 dd 20.10.2010 by the MoEW, and Guidelines of the MoEW for environment impact assessment of investment proposals.

In 2010 notices were prepared and given to the MoEW, other interested authorities as the Ministry of Culture, Executive Forest Agency, Ministry of Agriculture and Foods, and the concerned municipalities, communes and city/town councils, and SoS for an EIA for the Investment Proposal under the name Gas Interconnector Greece - Bulgaria and under the name Construction of Gas Pipeline Komotini (Greece) Dimitrovgrad - Stara Zagora (Bulgaria).

In 2012 the Council of Ministers of the Republic of Bulgaria announced by its Decision No 452 of June 7 that the Gas Interconnector Greece - Bulgaria in the section which will be built on the territory of Bulgaria is a national priority project. Therefore, the name of the Investment Proposal was changed in all reports to read as in the Decision of the Council of Ministers, that is, Gas Interconnector Greece - Bulgaria. And the name of the Investment Proposal in the title of the Supplemented Scope of Services for the EIA, the report on the EIA and in this Non-Technical Summary was changed accordingly.

Details of the Contracting Entity of this project

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Details of the company which developed the EIA Report:

This EIA report is developed by POVVIK AD under a contract signed between POVVIK AD and PENSPEN Ltd. in accordance with a contract between ICGB AD and Consortium PENSPEN Ltd and C&M Engineering SA.

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Relation to other existing / planned investment proposals

The Investment Proposal is intended to join the existing transmission networks in Greece and Bulgaria. The purpose of the connection between the Investment Proposal and the National Gas Transmission System (NGTS) is to supply the quantity of natural gas for consumption in Bulgaria.

1. ANNOTATION OF THE INVESTMENT PROPOSAL FOR CONSTRUCTION, ACTIVITIES AND TECHNOLOGIES

1.1. General information about the Investment Proposal and location

The purpose of the Gas Interconnector Greece - Bulgaria investment proposal is to transfer natural gas from Komotini, Greece to Stara Zagora, Bulgaria and connect the gas transmission systems of the two countries. The prepared FEED proposed a pipeline diameter of 28" (711 mm) to allow the transfer of 3.0 bcm/yr without building a compressor station or 5.0 bcm/yr if a compressor station is built. During elaboration of the design it was decided to increase the diameter to 32" (813 mm) to improve the hydraulic characteristics of the pipeline and to increase its capacity.

The pipeline allows for reverse flow from Bulgaria to Greece to ease out any supply problems in the transit line to Greece and has provisions to connect with new sources should the Nabucco transit pipeline be built.

The pipeline has been designed in two alternative routes - eastern and western route passing through the area of 3 regions (Kardjahli, Haskovo and Stara Zagora) and 10 municipalities (Kardjahli, Dzhebel, Kirkovo, Krumovgrad, Momchilgrad Haskovo, Dimitrograd, Stambolovo, Stara Zagora and Opan). The proposed routes under the Investment Proposal do not fall within protected natural areas, but are within protected NATURA 2000 sites. Therefore a direct interference is expected and a Appropriate Assessment was prepared accordingly.

The construction zone necessary for implementation of the investment proposal at the western route is of width 30m. This width will be maintained along almost the entire route, with a few exceptions at the western route: in the forest area near the town of Kirkovo where it is reduced to 20m and the area on the north bank of the River Maritza (the section where the pipe is buried in trench, but is of double size), where the construction zone is increased to 60 m.

Easement zones for maintenance and repair of the pipeline and its facilities during the operation are of width 30 m, that is, 15 m on both sides of the centre axis of the pipeline in accordance with Ordinance No 16 almost along the entire route of the pipeline. Exceptions to

above easement limits are made only in the following small sections:

- in the area of the town of Kirkovo easement is reduced to 20m, as the route passes through an old forest with valuable plant and animal species requiring reduction of the easement zone for their conservation.
- in the area around the Maritza River – from the northern Block Valve BV4A/PS6 up to the southern BV4A/PS5 where in the section above the Horizontal Directional Drilling (HDD) the easement for crossing under the river is increased up to 90 m, while in the section of the buried pipeline where the pipe size is doubled, the easement is increased up to 60 m.

To complete construction works given that the length of the western route on Bulgarian territory is 150.57 km, 476.36 ha are required, of which 405.73 ha are farm land and 51.79 ha are forest land. To complete construction works given that the length of the eastern route on Bulgarian territory is 145.67 km, 455.76 ha are required, of which 331.6 ha are farm land and 114.44 ha are forest land. Populated areas located nearby are affected by the Investment Proposal.

A layout is included in *Appendix 1* which shows the location of the proposed investment proposal and populates areas in the region.

1.2. Characteristics of the Investment Proposal

Western route of the pipeline

The pipeline is divided into process sections of length 30 km by Block Valve (BV) stations which are constructed above ground. The first Block Valve (BV1) is on Greek territory, the remaining Block Valves and other above ground installations are described below:

- From the Border to BV2 Velikdenche – Km 0+00 to Km 25+400
- BV2 Velikdenche to BV 3 Kardjahli – Km 25+400 to Km 50+000
- BV3 Kardjahli to BV3A Mandra - Km 50+00 to Km 79+00
- BV3A Mandra to BV4 Haskovo – Km 79+00 to Km 96+500
- BV4 Haskovo to Dimitrovgrad Station – Km 96+50 to Km 116+900
- Dimitrovgrad Station to BV6 Trakia – Km 116+900 to Km 129+400
- BV6 Trakia to PS2 Stara Zagora – Km 129+400 to Km 150+200

Eastern route of the pipeline

- From the Border to BV2 Mamitia – Km 0+00 to Km 24+700
- BV2 Mamitia to BV3 Patnikovo – Km 24+700 to Km 59+750
- BV3 Patnikovo to BV4 Stamboliyski – Km 59+750 to Km 88+100
- BV4 Stamboliyski to joining point with the western route -Km 88+100 to Km 95+400

Above Ground Installations

According to the Investment Proposal the following above ground installations shall be constructed:

- Block Valves (BV) Type 1 - 5 block valves type 1 (BV2, BV3A, BV4, BV6 and BV7)
- Block Valves (BV) Type 2 - block valve and pigging station
- Block Valves (BV) Type 3 - block valve, AGRS and gas offtake facility at Kardjahli (western route only) – at BV3 Kardjahli
- Block Valves (BV) Type 4 – Dimitrovgrad Station - AGRS and gas offtake facility at Dimitrovgrad at BV5 Dimitrovgrad

- Block Valves (BV) Type 5 - block valve, AGRS and gas offtake facility at Patnikovo (eastern route only)
- Gas Regulation, Gas Metering and Pigging Station
- O&M Centre at Haskovo.

There will be an interface between the Greek and Bulgarian sections of the IGB pipeline at the Greek-Bulgarian border, but no block valves and other facilities are proposed at this point.

Temporary construction sites

Temporary facilities necessary for the construction of the pipeline and above ground installations shall be deployed on the temporary construction sites. It is very likely that the construction of the gas pipeline in Bulgaria will be divided under several contracts which will lead to a corresponding increase in the number of temporary facilities. One possible alternative is to divide the western route (of length 150.57 km), if selected for implementation, at **BV3A** Mandra, Km 79.0. In such case, there will be a southern section of 77.50 km, including all mountainous areas and four above ground installations to be constructed, and a northern section of 71 km and seven above ground installations, and a Centre for Operation and Maintenance of the pipeline. The eastern route will require 2 times more construction work in mountainous terrain and crossing four times more forested areas. The separation into a northern and southern section can possibly take place at **BV3** Patnikovo. Thus, the southern section will be 60 km long and will include four under ground installations, and the northern section will be 85 km long with seven above ground installations, and an O&M Centre.

Pipes can be supplied from around the world by sea, road, railway, or combinations thereof. Pipe storage - guarded sites will be constructed to accommodate these large quantities of pipes. A total of 5 pipe storage sites for each route are proposed to be constructed in Bulgaria (western route – 2 for the southern and 3 for the northern section; eastern route - 2 for the southern and 3 for the northern section). The dimensions of the four storage sites (at Momchilgrad, Kardjahli, Haskovo, Dimitrovgrad for the western route and at Momchilgrad, Chayka, Haskovo, Dimitrovgrad for the eastern route) are 180 m by 60 m, and the fifth storage site for pipes and other construction materials (proposed to be a permanent facility) has dimensions of 200 m by 250m. The latter intended for the western route is located south of Haskovo at Manastir, for the eastern route at **BV3** Patnikovo.

Field offices, locker rooms and workshops are a central part of the construction zone. They will accommodate the management, maintenance, supply and cleaning teams. Ideally, these will be located on a flat, preferably former industrial sites.

Main technological processes

The following are the main components of the pipeline:

1. Transmission gas pipeline of 32" (813 mm) diameter and total length of 182.14 km for the western route, of which 150.57 km on Bulgarian territory, and total length of 177.24 km for the eastern route, of which 145.67 km on Bulgarian territory.
2. Gas offtakes of the transmission gas pipeline to Kardjahli and Dimitrovgrad.
3. Interface with the national gas transmission infrastructure
4. Launching and receiving stations for cleaning and inspection operations (Pigging Stations)
5. Gas Metering Stations at the pipeline inlet and outlet
6. Linear Block Valves (BV) – a total of 11 BVs are proposed for each of both alternatives of the whole pipeline, of which one is on Greek territory and the

remaining on Bulgarian territory. The pipeline is divided by the BVs into process sections of length 20 - 30 km.

7. Cathodic Protection Stations (with external power supply LV)
8. A bypass pipe by the HDD method will be laid under the Studen Kladenets Dam at its crossing near Kardjahli at the western route (the dam can be alternatively crossed by laying the pipe at its bottom), and also under the River Maritza at the common route.
9. Main fiber optic cable line for process and telecommunications links of Gas Interconnector Greece – Bulgaria.
10. External infrastructure interfaces for all site components of the pipeline (road; power supply; water supply and sewerage; telecommunications).

Main raw materials and utilities

Natural gas and other energy sources

The natural gas which will be transferred at the rate from 1.0 to 5.0 bmc / yr is produced in countries of the Caspian Sea region and the Middle East.

Fuels, mostly diesel fuel, will be used by the construction machinery during construction works. The electricity required for welding works at the pipeline route will be provided by diesel generators and from the national electricity grid at the main storage sites.

During operation electricity will be used to run the valves of the BVs, instrumentation and cathodic protection.

1.2.1. Infrastructure – existing and required new one

Roads - Access to the work area usually takes place by crossing of roads, but in some places the distance might be too long and then it would be necessary to construct temporary road on private land. Permanent roads to provide access and temporary roads to transport materials and equipment to the construction zone and sites will be constructed.

Water supply and sewerage - After completion of construction and before proceeding with operation the pipeline will be subjected to hydrostatic test. The purpose of this test is to check pipe integrity, and particularly weld joints by filling sections of the pipe with water, running it under pressure and checking for leaks and related pressure reduction.

1. Water quantities will be used on the sites with facilities for preparation of concrete mixes, and drinking/domestic and industrial needs in the temporary construction camps.

2. During operation of the gas transmission pipeline and its facilities only water for domestic needs will be used by the service personnel because the technological processes do not involve water consumption.

Energy utilities – The estimated consumption of electrical power during construction of the field offices will be in the range of 10 to 15 kW or about 250 kWh per day. The remaining electricity required for construction works will be provided by diesel generators. Operation using power management taps into crane assemblies, instrumentation, etc., cathodic protection, and also a center for operation and maintenance of the pipeline. During operation electricity will be used to run the valves of the BVs, instrumentation, etc., cathodic protection, and the O&M Centre.

Risk of accidents and measures to prevent and respond to incidents and unforeseen events - All activities shall be conducted in accordance with the Bulgarian legislation and good business practices to ensure protection of the health of workers and population, and environmental protection.

1.3. Implementation of the Investment Proposal

The main document regulating the design, construction and operation of the Investment Proposal is *ORDINANCE on the construction and safe operation of gas transmission and distribution pipelines and facilities, installations and instrumentation for natural gas, (Letter of the Council of Ministers No 171 of 16.07.2004, published in the State Gazette, No 67, 02.08.2004).*

Construction - The main construction works are: earthworks - removal of topsoil and its temporary deposit within the construction zone, digging for formation of trench for laying of pipeline and areas for PSs, GMSs, AGRSs and linear BVs, backfilling of trench, reinstatement of work site areas; complex construction works – mostly weldings at crossing of water reservoirs, roads and railways; erection works – mostly weldings on the pipeline to BDS EN 12732, BDS EN 287-1+A1, BDS EN 288-1+A1 and technological instructions; protection of the pipeline against corrosion; erection of the equipment of the pipeline facilities; pipeline airtightness and strength test to BDS EN 12327, BDS EN 1594, BDS EN 12186. Construction works are carried out within a construction strip zone of 30 m width, with a few exceptions for the western route (20 m in the forest at Kirkovo and 60 m at the northern bank of the River Maritza) and sites of the facilities, and also within the construction zone of the outer infrastructure links of all site components of the pipeline (road, electrical power, water supply and sewerage, telecommunications).

The pipeline will be constructed by applying proven methods developed on the basis of experience gained in the construction of other pipelines. The project will be implemented in one phase and the pipeline can be divided into northern and southern section and works for then will be carried out simultaneously. Construction will be carried out within the limits of the work area which will "move" along the pipeline route at an average rate of about 1 km per day. The rate of movement of the work area depends on the nature of the terrain, presence of "special areas" and other factors. Within the work area the activities for construction of the pipeline ranging from survey and setting out of the route to terrain reinstatement / land reclamation will be carried out. The average length of the work area is expected to be about 15 km.

In general, the construction of the pipeline will be in the following order:

- Preparation of the work area – Before starting construction work for the pipeline and after geodetic survey of the terrain and setting, requirements for provision of access and temporary use of the terrain will be coordinated with the respective owners and occupants;
- Fencing off the work area - Before starting construction work the work width will be fenced off with temporary fencing after appropriate coordination with the land occupants and owners;
- Preparation of the terrain and removal of the topsoil – Topsoil is moved from the work width and stored on the one side not to be mixed with remaining soil or damaged from compaction;
- Arrangement of the pipes – The pipes of lengths of 12 to 18 meters are first delivered to the pipe storage area and then transferred to the work width where placed on wooden sleepers or special bedding in a line parallel to the pipeline trench;
- Welding and covering of the joints – The pipes are welded with each other to obtain continuous pipeline and weld joints are subject to X-ray inspection, metal surfaces at the pipe ends are cleaned and coated, and the coating is electronically tested along the entire length;
- Excavation of a trench and laying of the pipe – The trench depth is such that after burial of the pipe the minimum cover over it will be 1.1 m. Where roads, railways,

special areas and other obstacles are crossed, the depth of laying the pipe (and the cover over it) may be greater. In some places trench drainage may be required. The pipeline is laid in the trench using special machinery taking care not to disturb the pipe coating. After pipe laying, the trench is backfilled with the excavated material and carefully compacted;

- Cleaning, measuring and testing of the pipeline - The pipeline is cleaned inside by a cleaning pig traveling inside the pipe driven by pressurized water or air. The cleaning pig is also used to detect discrepancies, if any, which are removed as necessary. Then the pipeline is hydrostatically tested. In a hydrostatic test a pipeline section is sealed off, filled with water and pressure inside increased to a preset value higher than that at which the pipeline will be operated;
- Reinstatement of the terrain – Reinstatement includes restoration of the topsoil removed and planting of vegetation, and normally takes place in the year of construction of the pipeline, unless weather conditions are unfavourable. Reinstatement can include deep plowing and loosening of soil if it has been severely compacted, then spreading of the topsoil stored. Banks, walls, fences and others located within the work width are reinstated. Markers are installed at predetermined places to indicate the pipeline and test points for cathodic protection. Most often, they are located at the borders of the land plots so as not to interfere with farm activities. Finally, temporary fences along the work width are removed, unless occupants choose to retain them until vegetation is fully restored. In sensitive areas, reinstatement works might be modified depending on specific conditions;
- Surmounting of obstacles - The fastest way to surmount obstacles is by an open trench. For small roads where traffic disruption is less and there are no sensitive ecological zones, surmounting is by digging of an open trench across the road. Then a pipe is laid in the trench, excavation is backfilled and road pavement restored. The road is not completely closed during construction and normally a temporary steel bridge is installed over the trench for passing of motor vehicles. In crossing of small rivers by an open trench, the river course is blocked by an embankment and water is transferred from the upper course to the lower course by pumps. This method, however, is not applicable to large rivers. Instead, horizontal drilling (for short distances) or horizontal directional drilling (HDD) allowing to surmount obstacles at distances of over 1 km is used.

Commissioning – The commissioning of the gas transmission pipeline will be carried out in compliance with the general provisions of the *ORDINANCE on the construction and safe operation of gas transmission and distribution pipelines and facilities, installations and instrumentation for natural gas, (Letter of the Council of Ministers No 171 of 16.07.2004, published in the State Gazette, No 67, 02.08.2004)* and BDS EN 12327. Operation of the pipeline and its facilities will be carried out in accordance with Chapter Eight of the above Ordinance. At normal operation of the proposed project the natural gas transferred in Bulgaria will be from 1.0 to 5.0 bcm /yr. The estimated commissioning deadline of the project is 2014. The operating personnel is estimated at about 32 persons. The expected operational lifetime of the pipeline is 40 years.

Decommissioning - Bulgarian and European standards do not cover permanent decommissioning of gas transmission lines and their facilities. In this regard and in compliance with the provisions of BDS EN 123 27 after shutdown and emptying of the gas transmission network and facilities of natural gas, structures and equipment will be dismantled and sites closed according to the general rules of safety engineering.

2. ALTERNATIVE LOCATIONS AND TECHNOLOGIES AND GROUNDS FOR SELECTION CONSIDERING THE ENVIRONMENTAL IMPACT, INCLUSIVE OF “ZERO ALTERNATIVE”

Alternative Zero (existing situation)

Alternative Zero is the existing situation, that is, if the Investment Proposal is not implemented and this is the existing network of supply of natural gas from Russia through Romania for consumption in Bulgaria and transit to Turkey, Greece and Macedonia, and its related technological processes and infrastructure.

Alternative 1

Alternative 1 is associated with the implementation of the Investment Proposal. Its advantage is that it connects the NGTS to a new source of natural gas and provides an opportunity for transit of gas to neighboring countries. In addition to the direct economic benefits associated with the implementation of the project, it strengthens the role of Bulgaria as an energy hub in the Balkans. With regard to the technological scheme for transmission of natural gas, including the considered processes and infrastructure, the investment proposal has no alternative. The proposed technological scheme is the standard choice for overland natural gas transmission. Given the selection of appropriate equipment enabling effective management and control, and compliance with all requirements for safe operation and environmental protection, it can be classified as the best available technique.

There are different technical solutions (alternatives) with regard to the route of the gas transmission pipeline, number, type and location of service facilities, and Alternative 1 proposes two alternative locations for the route – western route and eastern route. Also considered are two sub-alternatives for the western route to cross the Studen Kladenets Dam: by horizontal directional drilling (HDD) under the dam bottom or by excavating a trench across the dam bottom (Open Cut).

Alternative locations of the Investment Proposal – assessment and comparison

3. The results of the comparative assessment are convincing that the western route is of medium **risk** as compared with the **high risk** of the eastern route. Apparently, the environmental impacts of the western route will be much smaller as shown below:

- The eastern route is 5 km shorter than the western, but with the additional 22.7 km pipeline offtake (outside the scope of this Scope of Services) to Kardjahli, the initial advantage is lost;
- A gas offtake of length 400m will be necessary at Dimitrovgrad, but it is required for both alternative routes and therefore it is not a decisive factor in this assessment (outside the scope of this Scope of Services);
- The eastern route crosses over two times more mountainous terrain than the western route - 76.4 km to 28.46 km for the western route;
- The percentage of the Protected NATURA 2000 Sites crossed by the eastern route is 8.6% as compared to 4.47% for the western route, and this value is further increased if the Kardjahli offtake is added, as 6.5% of its total length of 22.7 km also passes through Protected NATURA 2000 Sites;
- In terms of woodland crossed by the routes, the eastern route crosses 26.5 km (18.2%), while the western route involves only 7.44 km (4.9%). Diversion pipeline to Kardjahli adds 5.8 km (25.5%) to the figures for eastern route. The Kardjahli offtake adds another 5.8 km (25.5%) to the figures of the eastern route.

- Access to public roads in the eastern route is very limited and poorly maintained for the southern half of the eastern route from the point of its convergence with the western route. Therefore, it may require temporary haulage roads to be built into mountainous terrains which could take months before the construction of the pipeline can start. Land used for this purpose has to be reinstated later.
- The eastern route offers few level sites sufficiently large enough to set up pipe storages and site offices. The eastern route will probably need to use the same areas proposed for the western route, and then involve a 20 km drive to reach the eastern route “spread”.
- Equally difficult is the haulage of pipes on the few very winding mountain roads to the eastern route in its southern section. If 18m long pipes are purchased then lorries must have steering wheels on the rear axel to negotiate around the twists and turns on these roads, and even then they can cause damage to the roads.
- The western route is served by a single railway to Dimitrovgrad, Haskovo, Kardzhali, Momchilgrad and Podkova, located only a few kilometres from the proposed pipe unloading and storage places, whereas the eastern route has to make use of the same pipe storage sites, but the pipes have to be hauled at much greater distances to reach the work areas.
- With such a large percentage of the eastern route in mountain areas in excess of the western route, the eastern route is at greater risk of adverse weather conditions. The clouds can descend rapidly down and mist can occur within just one hour. This is a very worrying factor in terms of safety of construction works.
- The only advantage that the eastern route has over the western route is that it has 26 fewer major crossings even when the Kardzhali offtake crossings are added. Also, it has only one shared HDD crossing at the River Maritza near Dimitrovgrad. The western route has a challenging 1,500m HDD crossing of the Studen Kladenets Dam (part of the Arda River network). However, the eastern route does include a 70m open cut crossing of the Arda River near Rabovo that lies within a SPA under the Birds Directive.
- It is likely that the engineering design may be awarded under several separate contracts so that construction can be completed in one season. In this case, there will be several teams, about 250 men each, during the peak months from the beginning of March to end of June. The accommodation of so many people will be without problems in Momchilgrad, Kardzhali, Haskovo and Dimitrovgrad, as far as the western route and the northern section of the eastern route are concerned, but the southern part of the eastern route will experience big problems unless workers are transported from Momchilgrad and Kardzhali which will cut down the day working time. The villages in the mountains just do not have the capacity to accommodate such a large number of workers.
- The maximum measured slope of the terrain of the western route of the pipeline is 16.91° (30,4%) at Km 5 +930, and of the eastern route is 19.34° (35.1%) at Km 6 +140. Thus, the requirements to avoid pipeline sections of downhill or uphill slopes greater than 35° and lateral earth mass of great length and maximum slope of 45°, set forth by the Contracting Entity in the SoS for the EIA are fulfilled.

4. From the data described and the above findings it is obvious that the western route is the preferred alternative of the designers for the next phase of this Investment Proposal.

3. Description and analysis of components and factors of the environment and material and cultural heritage that will be significantly affected by the project and interaction thereof

3.1. Atmospheric air and atmosphere

Weather and climate

Both alternatives of the route of the Gas Interconnector Greece-Bulgaria fall within two continental climate sub-zones - the Transitional-Continental and Continental-Mediterranean.

The northern section of the pipeline belongs to the climate area of the Eastern Middle Bulgaria of the Transitional-Continental climate sub-zone. A main feature of this climate area is that there is yet a summer maximum of the precipitation, but in combination with milder winter conditions compared with the moderate continental area of the country.

The pipeline route passes through two areas of the Continental-Mediterranean climate sub-zone - the climatic area of the Rhodopes river valleys and the Brannishko-Dervenski climate area. A main feature of this climate sub-zone is the occurrence of an autumn-winter maximum of the precipitation, dry, hot and very sunny warm part of the year.

Both alternatives of the project are characterized by a common climate background. However, it should be noted that the eastern alternative passes through a more complex and forested terrain which will result in some less favourable microclimate differences compared to the western alternative.

Ambient air quality

The data used for the analysis of air pollution in the vicinity of the pipeline are taken from RIEW of Stara Zagora and RIEW of Haskovo. Air pollution is present only in big cities and their industrial areas adjacent to the pipeline route. There are no major sources of pollution and violations of sanitary regulations in the other areas.

The pipeline route passes through rural areas, with the exception of Momchilgrad, Kardzhali, Haskovo, Stara Zagora and Dimitrovgrad. Therefore, the levels of air pollution in the project area are generally very low. Emissions of sulfur and nitrogen oxides are present locally as a result of burning coal and wood for heating in winter.

In the region of Stara Zagora some exceedances of sulfur and nitrogen oxides over the permissible limits, mainly during the heating period, have been registered.

In Dimitrovgrad the main pollutant is fine particulate matter, but also hydrogen sulfide and sulfur dioxide. A tendency towards improved air quality in terms of sulfur dioxide is reported as a result of measures taken to change the quality and quantity of fuel used by Maritza East 3 TPP near Dimitrovgrad and construction of flue gas desulphurization plants in Maritza East Complex near Stara Zagora.

In Haskovo violations were found only in terms of fine particulate matter and then during the winter months.

In Kardzhali also were measured violations in terms of fine particulate matter, and the highest and most of abnormal values were recorded during the winter months as a result of the use of solid fuels in households and typical season conditions - no wind, occurrence of fogs and temperature inversions. Exceedances of the average annual rates for lead and cadmium in ambient air were recorded.

3.2. Water

Surface water

According to the Bulgarian division in river regions, the two alternative pipeline routes will pass through the East Aegean region of basin management, which covers the central parts of Southern Bulgaria. The River Basin Management Plan (RBMP) is an essential tool for water management at the basin level and achieving the objectives of the Directive. For the analysis of the EIA report on the construction of the Gas Interconnector Greece-Bulgaria two main basins, crossed by the pipeline route, the River Arda Basin and the River Maritza Basin, are considered.

Water bodies, major rivers and their larger or smaller tributaries crossed by the two alternative pipeline routes are shown in **Appendix 4.1** of the EIA report.

The following water bodies of the drainage basins of the River Arda and River Maritza in the area of the pipeline route are identified as being of poor chemical indicators: *eastern route - 3 water bodies and western route – 2 water bodies.*

The water bodies of the drainage basins of the River Arda and the River Maritza in the area of the pipeline route are not of so poor environmental indicators. The following are identified as being of poor ecological performance: *eastern route - 9 water bodies and western route - 8 water bodies.*

In connection with the construction and operation of the project, the following permits related to water are required:

- Permit for use of all rivers to be crossed by the open cut method or the horizontal drilling method.
- Permit for water intaking from water sources for hydrostatic test purposes.
- Permit for use of water resources into which used water from hydrostatic testing, horizontal directional drilling, drainage from trenches and sites will be discharged.

Underground water

Hydrogeological conditions within the limits of the project are dependent on crevice, karst and porous groundwater into which 48 groundwater bodies are identified on the territory of the East Aegean Sea River Basin Directorate. Of these, some parts of eight groundwater bodies, which are identified as "drinking water protected areas", fall within the limits of the alternative pipeline routes. And of these, four underground water bodies are polluted and endangered by pollution caused by nitrates from agricultural sources. In the opinion of the EASRBD, "there are no sanitary protection zones set up around water sources for drinking and domestic water supply within the submitted pipeline route, neither any such being in the process of consideration" (Letter No RD-11-158 of 27.10.2011 by EASRBD).

3.3. Earth's subsurface and mineral diversity

In view of water management considerations, in Bulgaria the pipeline route is located within the territory of one sea and river basin water management region – the East Aegean region with a head office in Plovdiv.

The proposed pipeline routes on Bulgarian territory in terms of structure and sequence from south to north fall within the Eastern part of the Rila-Rhodopes massif, with the Harmanli block at its northern periphery and the Maritza Fault zone and the Upper Trakia Depression of the Sredna Gora zone - morphotectonic structural zone within the Alpine folded system.

The variety of geological and physiographic conditions determine the presence of various groundwater by type, character, and occurrence.

It appears that the pipeline will be implemented on many lithostratigraphic units that make up the geological environment within the scope of the forthcoming construction activity. These are classified as earth and rock soils as follows: *construction soils of*

Quaternary age, Neogene age, Paleogene age, and construction soils of Paleozoic and Precambrian age. The physical and mechanical properties of these construction soils present diverse and complex geological engineering conditions, but they will not obstruct the construction of the pipeline and its facilities.

The following have more significant development in the project area:

- *weathering* in the near-surface zone of the Precambrian, Paleozoic, Paleogene and Neogene volcanogenic and sedimentary rocks. The most prominent products of the weathering processes are the rock formations in the shape of mushrooms sculpted in Paleogene rhyolite tuffs – the Stone Mushrooms nature landmark;

- *erosion-accumulation processes and events* contributing to development of both areal and linear erosion, and the transfer and accumulation of the washed material;

Karst processes and phenomena are present in the Paleogene calcareous sediments in the Maritza Fault zone, but they are not of relevance to the pipeline.

Gravitational processes and phenomena of a significant range are not manifested.

Seismicity - According to Ordinance No 2 of 23.07.2007 on design of buildings and structures in seismic zones, the proposed pipeline routes under the Investment Proposal fall into three seismic zones: *first zone of seismic degree VII, second zone of seismic degree VIII, and third zone of seismic degree IX.* Buildings and facilities along the pipeline route shall be designed with a seismic coefficient $K_c = 0.10$ in a zone of seismic degree VII (first zone), $K_c = 0.15$ in a zone of seismic degree VIII (second zone), and $K_c = 0.27$ in a zone of seismic degree IX (third zone).

Deposits of ores and minerals - According to information from the Natural Resources and Concessions Directorate, Ministry of Regional Development and Public Works, there are 49 deposits of ores and minerals within the limits of the pipeline, described in the enclosed List of Details about Deposits of Ores and Minerals within the Limits of the IGB Project. Only six deposits of ores and minerals along the western route and five deposits of ores and minerals along the eastern route are of relevance to the pipeline. Routing has been accordingly adjusted to pass around such deposits of ores and minerals.

3.4. Soils

Soil differences are presented according to the Bulgarian Classification and the International Classification of FAO.

Seven major soil types: shallow (Leptosol), smolnitzi (Vertisols), metamorphic (Cambisols), lessivated (Luvisols), alluvial (Fluvisols), planosols (Planosols) and diluvial (Calluvisols)* fall within the limits of the pipeline route.

Shallow soils (Leptosols) - Shallow soils integrate profiles of very poor development, having only one horizon lying directly on hard rock. These soils are among the most widespread in Bulgaria and are formed on all hard rocks, and at this their profile always has the typical signs of immaturity. Considerable areas of this type of soil, shared between the two main subtypes - rankeri (Umbric Leptosols, Lpu) and rendzini (Rendzic Leptosols, LPk), fall within the limits of the pipeline route.

Smolnitzi (Vertisols) - Smolnitzi are a typical soil type for the poorly drained lowlands and valley fields of Central and Southern Bulgaria. Soils from two major subtypes of the FAO classification- Eutric, Vertisol, VRe and Calcic Vertisols, VRk fall within the limits of the pipeline route. According to the Bulgarian soil classification the following soils belong to this type - chernozem-smolnitzi, typical chernozem-smolnitzi, calcareous chernozem-smolnitzi and leached chernozem-smolnitzi.

Metamorphic soils (Cambisols) - Several types of maroon soils according to the Bulgarian Classification – typical maroon soils with or without erosion, typical maroon soils – smolnitzi-like and leached maroon soils fall within the limits of the pipeline route. The most typical properties of these soils are: reddish-brown colour, relatively shallow depth (60 - 70 cm) of the profile, shallow located carbonate-rich subsoil, of weak textural differentiation.

Lessivated soils (Luvisols) - The following representatives of the lessivated soils: Albic Luvisols, LVa, represented, according to the Bulgarian Classification, by highly leached to low podzolized maroon soils; Chromic Luvisols, LVx represented by medium leached maroon soils; Vertic Luvisols, LVv represented by medium leached maroon, smolnitzi-like soils fall within the limits of the pipeline route. Lessivated soils are found mostly in the agricultural areas and nearly any crops are grown on them depending on environmental considerations. Varied topography and irrational cultivation, however, resulted in a strong and widespread development of erosion - 28.3% of their total area.

Alluvial soils (Fluvisols) - This type of soil are formed on the alluvial sediments (in some places mixed with diluvial deposits) of rivers, covered more or less with vegetation and periodically enriched with new sedimentary materials. They are in the initial phase of soil formation and have only a humus A horizon in various stages of development, under which lie layers of alluvial river sand and / or gravel of various thickness and arrangement. Alluvial soils in the considered section of the pipeline route will be classified as Eutric, FLe (alluvial-diluvial and alluvial-meadow), Dystric, FLd (alluvial).

Planosols (Planosols) – Only one subtype under the FAO Classification –Eutric Planosols, PLe, and to which are referred maroon-podzolized, non-eroded gleyic soils under the Bulgarian Classification, falls within the limits of the pipeline route. Planosols are soils with eluvial E horizon and water impermeable B_t horizon below it. They are subject to annual periodic surface waterlogging (stagnation of rain water) and high drought. These properties rank planosols among the least fertile soils in Bulgaria.

Diluvial soils (Calluvisols)* - The name of these soils is defined entirely by the origin of the soil forming materials. More gravelled and coarse sized soils are formed in the upper part of the alluvial cones and trains near the base of the slope surfaces. With the increase of the distance from the place of occurrence where diluvial soil turns into material of a smaller particle size and greater humidity, primary diluvial soils have developed humus horizon. The soils found within the limits of the pipeline route belong to diluvial, dystric soils (Dystric, CLd) and diluvial - meadow soils (Gleyic Colluvisols, CLg). They occupy a minor part of the pipeline route. *Diluvial soils do not find place in the classification of FAO.*

3.5. Landscape

According to the physiographic regions of Bulgaria the pipeline route passes through the regional landscape structure of the Osogovo-Rhodopes zone with the Eastern Rhodopes area and the Krayshtensko-Tundzha landscape zone with the landscape area of the Upper Thracian Plain.

The Eastern Rhodopes region is characterized mainly by low mountainous and hilly terrain, and significantly increasing altitude from north to south. The River Arda takes the central position in it, spreading along the parallel with a series of valley extensions and short gorges. Morpho-hydrographic and physiographic features of this region determine its division into four subregions: Haskovo, Ardino, Varbishko-Krumovishka, and Gyumyudzhinsko-Maglenishka. Both alternatives of the pipeline route pass through these four subregions.

Key factors for the contemporary topography formation are climate, geological base and rivers. The pipeline route passes through the drainage basin of the River Arda and crosses the Rivers Lozengradska, Kazalach, Varbitsa, Krumovitsa, Arda and their tributaries, and

also the basin drainage of the River Maritza and crosses the Rivers Biserska, Yurukdere, Balaklidere, Haskovska, Uzundzhovska, Maritza, Merichlerska, Martinka, Arpadere, Eledzhik, Mustanova, Dundarliya, Rakitnitsa, Bedechka, Azmaka and their tributaries.

The morphostructural analysis of the topography of the area showed that the contemporary topography forming processes were more important and played a bigger role. They modelled the previous primary morphological structural shapes and formed the present topography.

In terms of morphohydrography the two alternative pipelines (eastern and western) enter the territory of Bulgaria at the Rhodopes ridge at 905 m altitude. The route topography is a variegated mix of plains, low and medium-high mountains and valleys.

The proposed western route of the pipeline and its facilities will pass through varied landscape, including mountainous landscapes to the south which turn into rolling plains and agricultural landscapes to the north, cut by river valleys and ravines. There are several dams and ponds, and a resting complex along the pipeline route. The pipeline will cross the Studen Kladenets Dam which is located southeast of the city of Kardjahli.

Near the village of Uzundzhovo eastern route of the pipeline passes through typical mountain landscapes of densely forested ridges, with a few lowerings between them. Landscapes turn into rolling plains and agricultural land in the area after the convergence of the two alternative routes.

A morphological description of the two alternative pipeline routes and map of the landscape groups are included in **Appendix 7.1** of the EIA report.

A map and a table of the landscape groups through which the alternative routes of the pipeline will pass are included in **Appendix 7.2** of the EIA report.

The main landscape groups according to the Classification Pattern of Landscapes in Bulgaria (Petrov. P, 1997). in the southern parts and along the two pipeline routes are the mountain landscapes:

- Landscapes of low mountain forests on xerophyte shrub forests on andesites and rhyolites with comparatively low extent of agricultural utilization;
- Landscapes of low mountain forest xerophyte shrub forests on Mesozoic and Palaeogene loamy sediments with comparatively low extent of agricultural utilization;
- Fewer are found in the northern parts of both alternatives:
- The landscape group of the marsh meadow alluvial lowlands with comparatively low extent of agricultural utilization of the lowland class of landscapes
- The landscape group of the steppe meadow and woodland steppe meadow inter-mountain lowlands on loose Quaternary sediments with high extent of agricultural utilization of the inter-mountain class of landscapes

The landscape group of the forested inter-mountain lowlands on massive and metamorphic rocks with comparatively low extent of agricultural utilization which are found only around Kardjahli at the western route and on limited areas near the village of Kravevo at the eastern route has the smallest participation.

Landscapes within the area of the two alternatives can be divided in the following types: *meadow landscapes, rocky landscapes, forest landscapes, water landscapes, agricultural landscapes, anthropogenic landscapes, communication landscapes.* Anthropogenic factors which are of paramount importance for the project implementation will cause changes in the rocks and terrain, land expropriation and destruction of natural meadow vegetation which is preserved in its primeval state only on land unsuitable for cultivation.

3.6. Flora and fauna, protected areas

3.6.1. Flora

According to the geobotanical zoning the pipeline route falls in European deciduous forest area. Both pipeline route alternatives will cross the Macedonian-Thracian province, Upper Thracian and Eastern Rhodope districts.

Upper Thracian district covers varied terrain with various vegetation. Floral elements in the county are also diverse. The most numerous are Balkan endemics group of Macedonian and Thracian floral elements (48 floral elements). Of these, 11 species are endemic to Bulgaria and 37 species are Balkan endemics. The group of the Illyrian Balkan endemics is represented by 10 species. The group of steppe floral elements is relatively large (13 species). Mediterranean elements are represented by 4 species and 3 species are euxeinos floral elements. This district is divided into six floristic regions, as the pipeline alternatives pass through two of them:

- **Stara Zagora district** features one of the driest forests on the southern slopes of the Sarnena gora and Stara planina mountain, consisting of the most xerothermic species - mainly pubescent oak and *Q. virgiliana*. All forests are strongly influenced by human activity and are degraded and turned into bushes hornbeam or completely destroyed. In the North East region there are communities of *Pistacia turpentine* as well (*Pistacia terebinthus*).
- **Rhodope-foothill area** for the most part is built of limestone covered by xerothermic vegetation dominated by pubescens and *Q. virgiliana* and secondary communities of hornbeam. Grass vegetation is dominated by secondary belizma and other species. The area is characterized by involvement of endemic species *Tekirska tekirae* (*Gypsophylla tekirae*).

Eastern Rhodope district The district is rich with floral elements, the largest number of Macedonian-Thracian (37 species), of which 26 species are Balkan and 9 - Bulgarian endemics. There are relatively numerous Mediterranean species (12 pieces), and less represented are the Illyrian (3 species), steppe (3 species) and Euxine (2 species) floral elements. This district is divided into three floristic regions, as the pipeline alternatives pass through all three of them:

- **Haskovo district** is dominated by farm lands and only a small part is occupied by xerothermal forests dominated by oak, pubescens and *Q. virgiliana*, mixed forest of oaks and other trees, and in many places in the forests hornbeam is seen. In forest degradation xerothermal grass ecosystems are formed of beard, belizma, bulbosa and ephemeral plants. In this region, among other elements occur: *Barbarea longirostris* in the group of Illyrian Balkan endemic, from Macedonian-Thracian Balkan endemics – *Moehringia grisebachii*, *degenii* sainfoin (*Onobrychis degenii*), Rhodope medick (*Medicago rhodopaea*), black lollipop (*Nonea pallens*), Serbian woundwort (*Stachys serbica*), and from the Mediterranean elements - Bondev alfalfa (*Medicago bondevii*), *Merendera attica*.
- **Krumovgrad district** is characterized by xerothermal oak and oak-cerris forests and xeromesophytic durmast and mixed durmast-hornbeam forests, as a part of the durmast forests consist of eastern oak. In the southern part of the region there are also forests of Moesian beech spread, and in some places there are individual trees and groups of trees of Eastern beech. In the beech forests somewhere evergreen relict shrub and small tree - common holly (*Ilex aquifolium*) are met. Only in this region there are rare species like Thracian oak (*Q. thracica*), Yurushka mullein (*Verbascum humile ssp. Juruk*). Only here

for now were identified the species *Eriolobus trilobata*, *Arbutus unedo* and *A. andrachnae*.

- **Kardzali district** is dominated by xeromesophytic forest formations of oak, hornbeam and mixed forests, and also mesophytic forests of Moesian beech. Less common are spread the xerothermal forests mainly oak. In places there are primeval forests of pine, and in Zhulti dyal there are birch forests.

Tables with information about the potential distribution of plant species that can be found on the East and West route in the project area for "Interconnection Pipeline Greece - Bulgaria" and that have significant conservation status and a Table with potential natural habitat, which may be distributed along both routes in the project area for "Interconnection Pipeline Greece - Bulgaria" are represented in **Appendix 8.2** of the EIA report.

Field monitoring was carried out initially in the autumn of 2011, outside the plant growth season, and exploration of the rest of the route and the determination of specific plant species and habitats that occur along was carried out during the next season – spring of 2012.

The Appropriate Assessment Report, which is an appendix to the EIA Report, includes description and brief characterization of the specific habitats identified on the terrain during the visual examination of the route.

The Western route of the pipeline passes through the territory of forestry Haskovo, Djebel, Kirkovo Kardzhali, Stara Zagora Momchilgrad and the Eastern route - in Haskovo, Kirkovo, Madan, Momchilgrad, Stara Zagora. Forest lands that will be affected by the project can be determined after the final selection of the pipeline route.

Agricultural lands are occupied mainly by crop species and natural vegetation is preserved only in the common lands between fields. These ecosystems are occupied by man-plant associations, which are under strong anthropogenic influence with a high degree of tolerance and lack of unique floristic elements. Within this biocenosis that have relatively low biocenotic value the dominant communities were formed by species modest to direct anthropogenic influence - typical representatives of the ruderal vegetation.

3.6.2. Fauna

- Below are details of the fauna in the project area, which are the result of the terrain surveys carried out in the period October-November 2011 and March-June 2012 along the routes and the surrounding areas.

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3.6.2.1. Birds

During fieldwork in the fall of 2011, transects were carried out in separate sections of the Investment proposal area (mainly the Eastern route), passing through the protected areas of "Protected NATURA 2000 Site" - PS "Krumovitsa" (BG0002012), PS "Bridge Arda" (BG0002071), PS "Studen kladenets" (BG0002013), PS "Zlato pole" (BG0002103). Due to inadequate time for field monitoring, study of the rest of the route was made during the next season - spring and summer of 2012. The identified species with brief details about habitats, frequency of occurrence and their conservation status are shown in Appendix 9.1 of the EIA.

During fieldwork in 2012, including transects covering the entire project route, including the two alternatives, a total number of 107 species of birds were identified along the racetrack or in the immediate vicinity. 103 bird species were recorded along the route outside SPAs of the National Ecological Network. Within the SPAs, although the route crosses a small part of their territories, there are 38 species of birds identified. Species that are subject to protection in SPAs "Krumovitsa", "Studen kladenets", "Bridge Arda" and "Zlato pole" are detailed in the Appropriate Assessment Report, which is an integral part of

the EIA Report. Outside SPAs, of all 103 species that are found along the project route and its immediate vicinity, two of them are globally endangered - Imperial Eagle and Roller.

3.6.2.2. Mammals

A total of 45 mammal species (excluding bats) have been established along the project route. Seven of these species are listed in Annex 2 of Directive 92/43 of the EU Habitats. A total of 13 species of mammals identified are protected by the BDA and 9 species are listed in the Red Book of Bulgaria.

The identified mammal species with short data about the habitats, frequency of occurrence and possible threats, as well as the status of protected species are listed in Appendix 9.1 of the EIA. Wealth of teriofauna along both routes can be assessed as high. To a great extent this applies for the Eastern Rhodopes. The Western alternative of the route passes through fewer habitats of mammals with conservation significance compared to the Eastern alternative, and the diversity there is less (no species like red deer, fallow deer, etc.), so it is preferable for the pipeline construction. The number of identified species of conservation significance in both alternatives of the route is quite high. For a part of the conservation species significantly higher rates of population density in the eastern route compared to the West were found, such as the European otter and wolf.

3.6.2.3. Reptiles

During the field study potential fields of reptiles are mapped along the entire Western and Eastern route of the proposed pipeline. Small natural and artificial standing dams, springs, small rivers, dry stony slopes overgrown with thorn and juniper, loose oak groves and others were studied. Particular attention was paid to the optimal habitat of tortoises within the scope of the pipeline. All the available literature sources on the herpetofauna of the region were also studied.

Totally 25 reptile species were found in the area, which is crossed by both alternative routes of the pipeline in result of the literature data review and of the field surveys performed. 5 of these species are included in Annex 2 of Directive 92/43 EU. 24 species are protected under Bulgarian legislation. The Red Book of Bulgaria includes 7 species. Reptilian species that will be affected in the project are given in Annex 9.1 of the EIA. In general, the area of the project is characterized by very high species richness of reptiles and large number of many species. The number of protected species also can be assessed as very high both domestically and in Europe. These findings apply mainly to those parts of the two routes that fall in the Eastern Rhodopes (to the South of the Maritsa River).

3.6.2.4. Amphibians

During the field study potential fields of amphibians are mapped along the proposed route of the pipeline. Small natural and artificial dams, springs, streams and wet meadows, ravines, water, mud puddles, ditches, water, forests and others wetlands were studied. All available literature on amphibians in the area of research was studied.

Totally, within the area of crossing of the two pipeline route alternatives 12 species of amphibians were identified. Of these three species are listed in Annex 2 of Directive 92/43 of the EU Habitats. A total of 10 species are protected under the Biodiversity Act. Amphibian species that will be affected in one way or another during the project implementation are indicated in Annex 9.1 of the EIA. Amphibian fauna of the region could be assessed as rich, by finding about two thirds of the amphibian species in Bulgaria. The amphibian species composition along the Western and the Eastern route was not significantly different, nor was there a significant difference in the number of species having major conservation significance.

3.6.2.5. *Terrestrial invertebrates*

As a result of the fieldwork and literature data about fields near the routes species taxa of the following systematic groups - Odonata (Dragonflies), Orthoptera (Orthoptera), Coleoptera (beetles), Neuroptera (neuropterous) and Lepidoptera (Butterflies) were found as follows:

1. Along the Eastern route: 25 species of conservation value, 15 of which are included in Annexes II and IV of Directive 92/43 of EU.

2. Along the Western route: 13 species of conservation value, 9 of which are included in Annexes II and IV of Directive 92/43 of EU.

Within the route mapping is done for the favorable habitats of these and some more terrestrial invertebrates species and is likely to set a variable degree of their impact on these shown in Annex 9.1 of the EIA. The study establishes a greater diversity of communities of terrestrial invertebrates within the Eastern alternative of the route.

3.6.2.6. *Bats*

During the field study no natural and artificial underground shelters were found out. Preliminary analysis of habitat conditions in the area of the proposed route shows that potentially affected by the project will be mainly forest bat species and a part of these considered as synantropic - a total of 11 species of bats, all of which have a conservation status under the Bulgarian and international legislation (as described in Appendix 9.1 to the EIA). The field research carried out on bat community within the pipeline scope in 2011 and 2012 showed that the area of the Eastern route crosses several times larger forest areas than those within the West route, which provide shelter and favorable living conditions for the bat *Barbastella barbastellus* and Bechstein's bat (*Myotis bechsteini*). Both are subject to the protection of the national network of protected areas Natura 2000. From this perspective, a reasonable alternative is to implement the Western alternative of the route, which will maintain the current favorable status of forest habitats in the vast area from the border area to KV2 Mamitya - km 0 to km 24 +00 +70.

3.6.2.7. *Fish*

The route of the project for the construction of an interconnector IGB Bulgaria - Greece crosses several large (Maritsa, Arda and Varbitsa) and smaller rivers and streams (Azmaka, Sazliyka, Harmanli, Haskovo, Perperok, Djebelska, Arabadzhiyska etc.). They all belong to Ecoregion 7 East Aegean basin, but refer to different river types, characterized by a specific fauna. During the initial review of the route for the purpose of this assessment some of the affected water basins were visited. Fish species that have been identified and are expected to be affected to a certain extent in the project were given in *Appendix 9.1* to the EIA report.

3.6.2.8. *Aquatic invertebrates*

In the field study for evaluation purposes four types of rivers were differentiated (which will be crossed by the pipeline route): R5: HILLY TYPE IN ECOREGION 7 - Lozensgrad, Arabadzhiyska, Djebelska rivers; R12: LARGE LOWLAND RIVERS IN ECOREGION 7 - Maritsa River; R13: SMALL AND MEDIUM AEGEAN LOWLAND RIVERS - rivers Sazliyka, Azmaka, Arch, Martinka, Haskovo, Harmanliiska; R14: SUB-MEDITERRANEAN SMALL AND MEDIUM RIVERS (specific river type for the Eastern Rhodopes, including mainly intermittent rivers with strong seasonal variations of runoff) - includes the rivers Krumovitsa, Perperok and tributary system Varbitsa. Nine points of intersection of the reservoirs with the pipeline route were visited, taking into account that

potentially affected by the project will be mainly hydrobionthic species inhabiting dams, for which crossing / drilling by the technology "open cut crossing" is envisaged .

3.6.3. Protected natural areas

Both alternative pipeline routes, reviewed and evaluated in the EIA Report, go beyond the boundaries of the existing protected areas, and do not cross protected areas classified under the Protected Areas Act (PAA).

In connection with the Notification of investment proposal to build the pipeline prepared and sent to Ministry of Environment and Water in 2010, Decision № ПП -23/2010 of the Ministry of Environment and Water is received to assess the need for an EIA performance, where it was found that the Western alternative of the pipeline route does not pass through protected areas under the Protected Areas Act (PAA), but the Eastern alternative affects two protected areas: "Ribino "declared by Order № ПД 583/2.11.2000 and " Golemia sipey "declared by Order № ПД 471/2001. By this reason, in the audit of the route eligibility done by the MoEW, with respect to the modes defined by orders for designation of protected areas and the protected areas, it was found that the implementation of the "Eastern alternative" of the route is unacceptable for the designation by the orders of protected areas regimes for "RIBINO" and "GOLEMIA SIPEY." "Western alternative" of the pipeline route is eligible to implement and does not conflict with the regime of protected areas for the conservation of wild bird's regime regulating activities in them.

Passing through two protected areas imposed updating of the Eastern route alternative of the pipeline to circumvent the two protected areas at about 1 km far, by preparing new Notifications and sending them to the MoEW and the affected municipalities. In MoEW verification of the eligibility of the updated alternative of the Eastern route was carried out and by letter ref. № EIA -1268 and № 48-00-831/27.07.2010 from MoEW it is stated that the updated Eastern alternative is permissible to implement and does not contradict to the regime of protected areas for the conservation of wild birds regime regulating the activities there.

In the prepared in 2010 Assignment scope and content of the EIA report the Eastern updated alternative is considered that does not affect protected areas. According to the letter № 26-00-3031/20.10.2010 of the Ministry of Environment and Waters regarding Assignment scope of EIA for the investment proposal "Construction of a pipeline Komotini (Greece) - Dimitrovgrad - Stara Zagora (Bulgaria)", it was found out that the area of the project does not fall within the protected areas under the Protected Areas Act, but through five protected areas for the conservation of natural habitats and wild flora and fauna and through two zones for conservation of wild birds, in result of which the decision of the competent authority was a report to be prepared assessing the degree of impact on protected areas, as an Annex to the EIA report.

3.6.4. Protected sites

Protected sites under the Directive for Habitats 92/43/EEC

Protected site "Rhodopes – Eastern" BG0001032 - Both alternative pipeline routes cross the protected site; basically this is valid for the Eastern route. The Western route passes only in the periphery of the protected site and the Eastern route passes through the protected site and crosses many more areas.

Protected site "Ostar kamak" BG0001034 - Both alternative pipeline routes cross a very small part of the protected site in the valley of Harmanlijska river.

Protected site "Maritsa Rriver" BG0000578 - Both alternative pipeline routes gather in a common route and cross Maritsa river between Dimitrovgrad and Brod village.

Protected site “Martinka river” BG0000442 - After the two routes connection the merged pipeline route crosses the protected site between the villages of Radievo and Goliamo Asenovo.

Protected site “Sazlijka river” BG0000425 - United route of the two alternatives, crosses the site between the villages Badeshte and Pamukchii, the length of the section in the area, through which the pipeline passes, is no more than 140 to 150 meters.

Protected sites under Directive 79/409/EEC on the conservation of wild birds

Protected site “Krumovitsa” BG0002012 - Eastern route of the pipeline passes peripherally along the western edge of the site and the Western route passes far from the site and does not in any way affect it.

Protected site “Bridge Arda” BG0002071 - Eastern route of the pipeline passes peripherally along the western edge of the site and the Western route passes far from the site and does not in any way affect it.

Protected site “Studen kladenets” BG0002013 – Both alternatives of the pipeline route cross the protected site, as Eastern route crosses it in the Eastern edge passing mainly through pastures and forests. The Western route crosses the protected site in the Western edge across Studen Kladenets dam.

In **Appendix 2** of the non-technical summary the map of the investment proposal is shown adjacent to protected areas and Natura 2000 protected sites.

3.7. Cultural Heritage

Cultural value is intangible or tangible evidence of human presence and activity, natural feature or phenomenon that is important for the individual, community or society and has a scientific or cultural value. (Art. 7, para. 1 of PST), as well as such that has a scientific or cultural value and is important for Bulgarian Orthodox Church and other denominations registered. (Art. 7, para. 2 PST). Cultural values are also fragments of archaeological or other items that are in destroyed condition, form a small part of the authentic integrity of the object, have lost considerably their character, do not have significant cultural, scientific or artistic value and can be defined as the mass material. They are not subject to identification, but are included in museum science auxiliary fund if necessary. (Art. 7, para. 3 PST)

The proposed project affects areas of the Eastern Rhodopes and the Upper Tracian Valley. The route is located outside the boundaries of Regulatory settlements. In the project construction works within this particular area, there is a risk of compromising the integrity of the territories mostly and only of the archaeological sites of cultural heritage, which can lead to partial or complete destruction.

As a result of the collection and processing of information it was found that there are registered a number of archaeological cultural property values. After the field searches in November 2011 and April-May 2012, the archaeological team of "POVVIK" JSC have signed up unknown so far archaeological sites. Their characteristics differ (mounds, villages, single houses, shrines, sacred places, forts and fortified watchtowers, forts-shelters, flat and mound necropolises, individual mounds, etc.) and relate their dating to the periods from prehistory to Middle Ages and Renaissance. The discovery of previously unknown archaeological till now immovable cultural property is an important contribution to the study of this part of the cultural heritage of Bulgaria

Archaeological cultural property values registered along the route that directly or partially can be affected by the pipeline Komotini (Greece) - Stara Zagora or being located adjacent to its route are generally a total of 107, 54 of which on the Western route, 24 on the Eastern and 29 along the common route that are detailed in section 3.7 of the EIA Report. A

layout with inserted established sites of cultural heritage along the routes of the pipeline is given in *Appendix 10* of the EIA report.

3.8. Population and Health

Potentially affected population to be health protected in relation to the implementation of the project is determined based on residents and / or resident people in settlements close to the route and the facilities to it – the affected settlements at a distance of 2000 m are 63 and the population - 191,107 inhabitants.

For the considered project population near the route will be affected only temporary and at a low health risk during construction. During operation the population close to the pipeline areas will be benefited from this acquisition and in fact this population is affected positively.

The majority of the population in the areas that we analyze lives in urban areas, particularly in the regional centers. In some municipalities the population lives in villages only - these are Kirkovo Municipality and Opan Municipality. For other municipalities – Krumovgrad, Momchilgrad and Jebel rural prevails.

In the affected regions there are many young people, especially in Kardzhali, but the population has low educational level and high unemployment rate. In 2010 in all three areas - Kardzhali, Haskovo and Stara Zagora there is a negative mechanical growth, respectively - 1,043 people - 1,668 people - 1,701 people.

The ethnic structure of the population in the pipeline adjacent municipalities and settlements shows that the Bulgarian population predominates in the districts of Haskovo and Stara Zagora, respectively, 79.4% and 86.2%. In the region of Kardzhali there is a significant superiority of Turkish ethnic group - 66.1%. The most Roma are in Stara Zagora, they are least in Kardzhali - only 0.9%. In the districts considered there almost are no other communities - about 0.5% of residents define themselves in this group - such as Armenians, Greeks, Jews and other nationalities.

This means that the route of the pipeline "Komotini - Stara Zagora" will pass as in areas with predominantly Bulgarian population and in areas populated mainly by Turkish population.

The data show a relatively high birth rate in 2010 for the country - 10.0, slightly higher for the district of Kardzhali - 10.4 and Stara Zagora – 10.2 and lower for Haskovo - 9.4. Mortality rate is the lowest in the Kardzhali region - 11.1 compared to 14.6 for the country, which is quite a significant difference. In Haskovo and Stara Zagora mortality rate is higher than the national average. Accordingly, the best trend of the indicator population growth was noted in the Kardzhali region only -0,7 ‰. In Haskovo and Stara Zagora natural growth is significantly lower (higher negative values) and worse than the country average.

The highest morbidity in the three areas, approaching the average for the country, is in Stara Zagora. This is true both for morbidity and for specific diseases, such as cancer. Kardjali has a significant, double lower incidence of malignancy compared to the national average, which can be due to undiagnosed diseases for various reasons.

Generally, the best demographic and health indicators are in the settlements in the Kardzhali region, followed by Haskovo and Stara Zagora.

The data about population health status in the analyzed areas can not identify the considered areas, in which the route of the pipeline is intended to go, as a risk to human health - for the majority of the area health indicators are better than average in the country. Investment proposal for construction of a pipeline connection Komotini - Stara Zagora can improve the lifestyle and living conditions, and can improve the environment, making the project compatible with the current state of the population, community structures, health risk.

4. Description, analysis and evaluation of the likely significant impacts on population and environment

4.1. As a result of hazardous emissions during construction and operation, waste generation (discussed by individual components and factors of the environment);

4.1.1. Sources of emissions and waste;

4.1.1.1. Sources of emissions during construction

Atmospheric air pollution and waste gases generation

During construction, due to excavation and transportation activities of excavated land masses there will be an increase in the atmospheric dust and lifting dust from the temporary roads built. This will lead to some short-term changes in the microclimate within the area of the site and in the air quality within the adjacent to the working sites urban areas or protected areas. It is expected the dust emissions to be the primary pollutant during the construction works, and for them relevant measures will be provided for to mitigate the impact on the environment and particularly on air quality.

Emissions of hazardous substances from the used machinery and transportation vehicles will depend largely on the age and type of machines and their maintenance, load capacity, and the quality, quantity and type of fuel. This will be taken in accordance with the standards not only in the country but according to industry best practices.

Eastern alternative of the pipeline route is more unfavorable in terms of air pollution due to the greater length and complexity of the terrain, which will lead to more air pollution. It has to be mentioned that for the most part it passes through protected areas vulnerable to high levels of dust and waste gases. For these reasons, it is better to choose the western alternative of the route.

According to MoEW letter no. EIA - 249/10.09.2012 this section is supplemented, as emissions from area sources are calculated (which are practically all sources during construction) by calculating the expected concentrations of PM₁₀ and NO₂ in them.

After that mathematical modeling is done of air pollution from fugitive emissions in the atmosphere, emitted during the pipeline construction - only for the sections of the pipeline that are problematic in terms of clean air protection (near the towns of Haskovo, Dimitrograd and Kardzhali that is impaired under QAA benchmark particulate matter (PM₁₀). Upon determination of the emissions from area sources impact summing the resulting concentrations of pollutants is made with those from organized sources of emissions. Modeling is presented in Appendix 3.3 of the EIA Report - Mathematical modeling of air pollution from fugitive air emissions generated during construction of the pipeline, the results of which are described in section 4.2.1.2.1. of EIA Report.

Water pollution and waste water generation

The main potential contaminants to surface water may occur during construction as a result of the following activities:

- Generated wastewater from the two temporary camps for constructors
- Hydro testing the pipeline to test its strength
- When crossing large rivers and small streams and gullies in an open way
- Draining water from the area of the excavation for pipe laying
- Excavation of trench and laying the pipe

Risky energy pollution - noise, vibration, hazardous radiation - light, heat, radiation

Construction of the "Interconnection Greece - Bulgaria" is not a source of harmful physical factors such as light, heat radiation or electromagnetic radiation. Construction equipment is a source of noise and vibration within the construction site. The average noise level in sites of this type is over 85 dBA. Workers within the construction site are required to wear PPE (earmuffs).

Noise in the course of construction could result from the following activities:

- Heavy trucks traffic (carrying pipes, equipment, etc..) in the area of construction and the nearest roads;
- Use of heavy equipment for excavation of earth and laying the pipes (along the pipeline). Works proceed during the daytime from 08.00 h. to 17.00 h.

Increased noise levels can be expected for the **population** (compared to normal) during the day only in villages that are located near the construction site. Impact is regional, temporary, without a serious cumulative effect. Transit of heavy transport vehicles, as well as performing construction works increases the noise background by no more than 14% only for the time that is determined by the equipment installation technology.

At a distance of 100 m from the site the transport noise levels (calculated by the investor) increase from 0.1 to 1.4 percent compared to the existing road noise, which is negligible cumulative effect on population

During the construction emissions of **ionizing radiation** are not expected in the absence of such radiation sources.

Non-ionizing radiations are emitted during the execution of welding in the course of the pipeline installation. These include low-frequency magnetic fields and UV radiation, which have an adverse effect on the health of welders.

Other non-ionizing radiation is not expected to be within the working site. All communication systems are planned to be based on fiber.

4.1.1.2. Sources of emissions during operation

Atmospheric air pollution and waste gases generation

During the operation if properly assembled there are no sources of air pollution. At pipeline prophylactic air pollution formation is not expected either. Emissions of substances into the atmosphere can be obtained only by failures accompanied by fire. In such cases, different pollutants will be emitted in the atmosphere as a result of the combustion process depending on the type of the burning materials and current weather conditions.

Water pollution and waste water generation

The main and auxiliary operation processes in the operation of "Interconnection Greece - Bulgaria" are not sources of industrial wastewater. On site of the facilities used in the operation of the pipeline domestic wastewater from personnel will be generated in minor amounts (the staff supporting the operation of the pipeline is envisaged to be about 40 persons).

During operation wastewater generation by the main technological process is not expected.

Risky energy pollution – expected noise, vibration, hazardous radiation - light, heat, radiation

Emissions of noise, vibration, hazardous radiation or non-ionizing radiation are not expected according to the description of the investment project. Transit of transport vehicles in the pipeline vicinity will be very rare, basically for inspection and in repair and

maintenance conditions.

During operation no adverse impact is expected by the physical factors noise, vibration, radiation or non-ionizing radiation.

4.1.1.3. Waste sources

During construction

During construction for the investment proposal domestic, industrial, construction and harmful waste will be generated.

Domestic waste - it will be generated by the workers employed during the construction and by the activities related to the temporary use of the sites. It is envisaged the domestic waste to be collected separately in special vessels designated for that purpose and transferred and removed by licensed companies for further treatment.

Industrial waste - it will be generated during the pipeline and block valve stations (BVS) construction along the route. They will be collected and stored in specially designated for this purpose vessels and will be transmitted to another certified company for further treatment.

Construction waste – it will be collected and stored temporarily at special sites assigned for the purpose and will be transmitted to another certified company for re-use.

Hazardous waste - it will be generated during machine operation, at use of different raw materials and during construction work performance. Storage in marked metal containers is provided for, on special concrete surfaces assigned for the purpose and impermeable sites, indoors.

The impacts of the generated waste are expected to be negative, direct and indirect, temporary and of short duration - during construction. Cumulative impact of the waste generated during construction of the investment project for the pipeline Interconnector Greece – Bulgaria is not expected.

During operation

During operation of the investment proposal for pipeline Interconnector Greece – Bulgaria it is expected negligible quantities of waste to be generated - domestic and industrial; therefore, no impacts are expected from them

During emergencies

Emergency events may arise in cases of failures - process break / damage, spills, explosions and fires, as well as in result of natural disasters (such as earthquakes, floods), etc. Depending on the occurring emergencies various in type and quantities wastes could be expected, due to which negative, direct, medium durable and durable, permanent and temporary effects are expected. Cumulative impacts are not expected.

4.2. Analysis and assessment of the expected impact on the environment, material and cultural heritage

4.2.1. Atmospheric air and atmosphere

4.2.1.1. Meteorological and climatic conditions

During construction – The construction technology envisaged for the project will lead to an increase of the dust in the air within the construction work area, which in turn would cause some microclimatic changes in the area of construction, and in adverse weather conditions it

can spread to about 500m and more around the route. In this respect the recommended measures will have to be followed in order to mitigate the impact. Raising the level of waste gases will be caused by the machine operation, which at observing the industry best practices should not violate the hygiene requirements for atmospheric air quality in the nearby villages for these pollutants.

Generally, considering short duration of the effect, the amounts of dust from construction works and waste gases from the transport vehicles engines and other equipment will not affect the local climatic conditions. Changes in the nature of crusty surface are not in that scale that would lead to climate change in the region.

During operation – During operation no changes in the crusty surface nature and atmospheric air quality will take place, therefore, there will be no changes in the local climatic conditions.

During emergencies - Depending on the duration of the emergency event, the impact will be of various sizes. In short term situation it is not expected the climatic conditions to change. During long term incidents the individual pollutants could affect the values of meteorological elements in the area. The magnitude of this effect depends on the duration of the current situation and the amount of pollutants discharged.

4.2.1.2. Air Quality

During construction - medium level of impact is expected. It is expected to be negative, direct, temporary and short term, within the construction sites. There could be cumulation only on the highways, but given that the vehicles comply with the standards, the traffic will not increase enough to cause distortion of sanitary hygiene standards in terms of air quality. The analysis made of the air pollution mathematical modeling by the fugitive emissions in the atmosphere, emitted during the pipeline construction (according to MoEW's letter Outg. № EIA - 249/10.09.2012) it was found out that: the impact of PM₁₀ and NO₂ in the construction lane and immediately around it (as their maximum concentration is much lower than the corresponding rates) and **the pipeline construction do not lead to deterioration of air quality in the surrounding countryside, including the cities of Dimitrograd, Haskovo and Kardzhali.**

During operation – impact on air quality is not expected, as in normal operation mode there are no sources of pollutants in the atmosphere. At the same time the project realization will reduce emissions of hazardous greenhouse gases, because it will bring about reduction of conventional heavy fuel use.

During emergencies – The emergency events can be divided in two types:

- Pipe leakages – during pipe mounting by observing to the standards leakage occurrence is not expected, and if any, the gas is not considered a pollutant, as it is light and rises at high altitude. In such cases there will be no impact on the atmospheric air quality.
- Explosions and fires during emergencies – in such situations, in addition to nitrogen dioxide and steam, other typical combustion pollutants will be released in the atmosphere too, which will depend on the scale and the type of the affected by the fire materials. In this case there will be a high impact rate; it will be direct, considerable, negative, cumulative, the duration and the scale will depend on the duration of the emergency event.

4.2.2. Water

4.2.2.1. Surface water

During construction

During construction impacts on surface water will be the same kind in both alternatives. As an extent the effects, considering the number of crossings large rivers, small streams and gullies in the construction of the pipeline, are almost the same for both alternatives and will have almost the same negative impact on the component "water". When comparing the ecological status of water bodies for both alternatives it can be concluded that water bodies affected by the Eastern alternative have a worse environmental potential.

- *Impact assessment – in treatment of waste water from the temporary camps for constructors*

Waste water from the temporary camps for construction workers – If meeting the individual emission norms prescribed the impact of this activity on surface water would be low, controllable, local, direct, temporary and reversible upon completion of construction works.

- *Impact assessment – at crossing rivers and Studen kladenets dam*
1. *Crossings in an open way*

Further to the Maritsa River, the rivers along the route will be crossed following this method. From an environmental point of view the open way crossings of watercourses may cause changes in the morphology of the river banks and deterioration of surface water quality. **Activities for crossing bodies of water in an open way:** Weaning of river water, draining water from the area of excavation, digging the trench and laying the pipe, backfill and erosion of the banks. During construction, there may be negative effects expected from river crossings in an open way. Crossings will be realized during the dry periods of the year and in the shortest possible time. The impact will be local, around the intersection of river water bodies with a constant flow. Negative impact on the river bed and banks is assessed as low, controlled, short-term and reversible. During construction, the natural flow regime will temporarily change when crossing water body with perennial flow. Increased turbidity is expected for the river water in the area below the point of intersection of a river during the excavation and backfill the trench and laying the pipe section. Given the duration of construction, methods of crossing and rehabilitation measures for the impaired area, the impact on water quality is assessed as minor, controllable, reversible and short.

2. *Crossing by the method of controlled horizontal drilling (intersection of the Maritsa River and Studen kladenets dam)*

The activities on crossing water bodies by the method of horizontal directed drilling are: Laying of pipelines and Impact of drilling fluids and drilling mud. From an environmental perspective this expensive method suitable for large rivers, prevents modification of water bodies and reduces the amount of suspended solids. The disadvantage of this method is the need for a large area near the river bank. It is expected the impacts of horizontal directed drilling on water quality to be minor, localized, reversible and short. The method of horizontal directed drilling will be used when crossing the River Maritsa, because of the significant amounts of water, large cross sections in the areas of intersection and their importance to the environment of their valleys. For crossing the dam Studen kladenets two alternative methods have been considered: open pit and horizontal directed drilling as the pipe is passing under the body of the dam. It is proposed the dam crossing to be performed through the method of horizontal directed drilling; the only expected impact on the water

body is in discharge of water from drilling fluids and water from the drainage of excavations, as well as fresh water abstraction for drilling activities performance.

– *Impact assessment – at draining the trench and the construction sites*

In some wet patches on the route it may become necessary to drain the trench. This work will be carried out and controlled carefully, as pumping will last several days only in the specific area. Rainwater and groundwater that will be pumped from the trench and construction excavations will be discharged into the nearest river. Water will pass through settling tanks (built temporary or mobile). Because the pipeline route does not cross certain areas with soil contamination, it is not expected these waters to be contaminated. Therefore, it is not expected to get an impact on the quality of water receivers.

– *Impact assessment - in the pipeline hydro test*

Activities for hydro test performance: Conducting pipe testing; Abstraction to perform hydro testing. No impact is expected on water quality from the discharge of water from the hydrotesting as use of chemicals in it is not intended. The wastewater will be treated in accordance with the individual emission limits. They will be determined by the competent authority according to the category of the water receiver. If meeting the individual emission norms prescribed the impact of discharged water will be low, controllable, local, direct, temporary and reversible after completion of the hydrotesting. The impact on water quality due to water abstraction from surface water sources is of low significance. It is short term, negative, but reversible.

– *Impact assessment – impact of polluted water from construction equipment and workers from accidental spills.*

- **Impact** on water quality of engine oil leaks, improper disposal of solid waste and wastewater;
- **Impact** on the quality of river water from contaminated water used for washing the wheels, fenders and chassis of vehicles returning from site and going to public roads;

During construction works spills of oils and fuels are possible in riverbeds or on the banks as a result of accidents, and also from improper maintenance of construction machinery. They can cause pollution of the river and / or groundwater in the river terraces. In case of obvious pollution from construction equipment, water will pass through the separator before being discharged into the water receiver. When using the best construction practices the expected impact is negligible.

– *Assessment of the impact on the sanitary protection zones*

No impact is expected on water quality of I or II sanitary protection zones within the pipeline route.

– *Impact assessment – on aquatic organisms*

There may be contaminants introduced into the water bodies during the construction works, as well as destruction of vegetation and temporary change of biodiversity at river and water body's crossings. The impact will be negative, direct, permanent, long-term, local (only in the points of crossing the rivers). Secondary, but not cumulative impact is expected. The impact will be rated low to moderate, if all technical requirements are met during construction. The impact will be reversible, because after completion of the construction period restoration and reclamation of disturbed areas will be carried out. Overall duration of

construction works in the water will be a short period of time. The expected impact will be temporary and of variable degree.

Summarizing the impact on the surface water – by the realization of the new investment proposal. During the construction negative impact on surface water is expected, level - minor and reversible; territorial coverage - local, length - short; frequency - temporary (in the course of construction works).

During operation

During operation of the pipeline no impact is expected on the surface water after the completion of the construction phase and the recreational activities.

The main and auxiliary technological processes in the operation of "Interconnection Greece - Bulgaria" are not a source of industrial wastewater. On the site of the facilities used in the operation of the pipeline domestic wastewater from staff will be generated in small quantities. No negative impact is expected within the sections of the river crossings by the pipeline.

During emergencies

All the activities in case of emergency along the pipeline route will be performed in accordance with the Action plan in emergency situations that will be prepared before putting the pipeline in operation and will be regularly updated.

No negative impact is expected on surface water in case of emergencies.

4.2.2.2. Groundwater

During construction

Currently, the quantitative and chemical condition of the groundwater in the pipeline project routes area is a result of pressure and impact by the human activity, due to deprivation of natural and attractable subterranean water resources for potable and household, industrial and other purposes, through the numerous water-intake systems and facilities built, and pollution from point sources, such as household waste depots, settlements without sewerage, industrial sites, oil bases etc., and diffuse pollution from agricultural sources, stock-farms etc.

The interaction of the pipeline with the groundwater during its construction is expected to occur in additional impacts on the indicated currently existing quantitative and chemical condition of the groundwater bodies. The impacts on the quantitative condition might include:

- draining of groundwater during dewatering of construction excavations under water level, mainly in river benches. This impact will be negative, direct, temporary and brief, with low degree and territorial scope in the pipeline route area only. The indicated impact on the quantitative condition of the groundwater is estimated as insignificant. It does not generate cumulativity, as in fact, it does not impact upon the existing quantitative condition of the groundwater;

- physical destruction of tube wells (possibly the pump station, too) of water-intake system "East zone" for water supply of the town of Haskovo, at the passing of the pipeline eastern route across the belt I territory of the Sanitary Protection Zone in the section from km 89+400 to km 89+500. This impact is impermissible under the requirements posed in Art. 8, Para. 2 of Regulation № 3/16.10.2000 on the conditions and order for research, design, approval and operation of the Sanitary Protection Zones, around the water sources and the

facilities for potable and household water-supply and around the mineral water sources used for treatment, preventive, potable and hygiene needs.

The impacts on the chemical condition might include infiltration of contaminated waters (mainly with mechanical admixtures), possibly generated during excavation, bulk, concrete and other works on construction of the pipeline and its auxiliary facilities. This impact appears to be negative, indirect, temporary, brief, with territorial scope in the pipeline routes range only, mainly within the pressureless subterranean water bodies in the alluvial river benches. Potentially most vulnerable to pollution are the areas of the pipeline disposal within Belt II, and partly belt III, too, of the Sanitary Protection Zones of the water-intake system “Uzundjovo 2 ET” in the section of the western route from about km 99+000 to km 100+500 and water-intake system ” East zone” in the eastern route section from about km 89+100 to km 90+100;

The anticipated impact on the chemical condition of the subterranean waters is assessed as insignificant, of low degree, as the amount of infiltrating polluted waters during construction is insignificant and, in fact, they do not contain harmful and hazardous substances. It does not generate cumulativity and does not lead to a change of currently existing chemical condition of the subterranean waters.

During operation – During the pipeline normal operation an impact on the subterranean waters is not expected.

In case of emergency – An impact on the subterranean waters is possible as a result of: natural disasters – earthquakes, floods etc., as well as possible break-downs and accidents. These possible impacts are negative, direct, temporary and brief.

4.2.3. Bowels of the earth and mineral diversity

During construction – The pipeline construction, as well as the construction of all linear facilities, includes deprivation and temporary disposal of the mould layer, narrow trench excavations where the pipes are laid and installed, temporary disposal of excavated earth masses, backfilling of trench excavations and the pipes laid in them, passing under rivers, gullies, roads and railways, permanent disposal of unnecessary earth masses etc. The scope of this impact is limited within the pipeline route corridor and the construction band around it and the temporary road deviations. This construction activity is objectively related to direct, permanent, continuous and partially reversible mechanical disturbance of the geological environment. The degree of disturbance of the geological environment is low, due to the expected small depth of the excavations for the pipeline and its auxiliary facilities.

During operation – During the normal operation of the pipeline, the geological environment might be affected by the progress of natural erosive processes mainly on the surface of unforested inclined slope areas, due to possible missing and/or bad maintenance of implemented anti-erosive activities. This impact will be negative, direct, temporary, brief and reversible, with low degree and local territorial scope.

In case of emergency – An impact on the subterranean waters is possible as a result of: natural disasters – earthquakes, floods etc., as well as possible break-downs and accidents. These possible impacts are negative, direct, temporary and brief.

4.2.4. Soils

During construction

During the construction of the pipeline facilities, a temporary impact is expected as well as permanent loss of soils in not large areas. The construction works impact will be limited within the construction band of 30 m, and in order to save valuable habitats and species, it will be reduced down to 20 m in some especially valuable woodland.

During the construction works the following impacts are expected:

- Violation of the soil profile during the trench excavation (after the mould layer removal).
- Soil compaction by construction machines within the construction strip, depending on the susceptibility to soil construction, especially for soils with heavier mechanical composition.
- Soil erosion – in considerable slope areas where shallow and susceptible to erosion soils are typical.
- Impact on the soil fertility – by violation of the soil structure as a result of trampling during the construction and mixing of mould horizon with poorer sub-mould horizons during recultivating activities.
- Potentially localized pollution of soils during the construction due to accidental spills of lubricants, fuel and waste.

These impacts will be negative, temporary (the soils will be recovered after the construction is finished), brief (during the construction only), local (along the pipeline route corridor only), direct. Cumulative impacts are not expected, but secondary ones are possible to arise due to erosion progress. The impact degree is medium.

In order to build the sites for the auxiliary facilities, the following construction works are stipulated: Foundation concreting, Building of massive fence facilities and Building of service roads. During these activities the following impacts are expected:

- Violation and/or destruction of the soil profile during the construction (after the mould layer removal).
- Soil compaction and congestion by construction machines within the boundaries, designated for sites and service roads.
- Potentially localized pollution of soils during the construction due to accidental spills of lubricants, fuel and solid waste.

These impacts will be negative, permanent (the sites and facilities remain during the pipeline operation), continuous, local (along the pipeline route corridor only), direct. Cumulative impacts are not expected, but secondary ones are possible to arise due to erosion progress on the steep slopes. The impact degree is medium. During these activities the soil layer within the area covered by the sites will be continuously destroyed.

During the construction works 4 temporary sites for each route are expected to be built. The anticipated impacts on the sites soils designated for housing needs, are due to trampling and pollution with household waste, spills of fuels and lubricants. The impacts on the soils of the pipe storage sites are mainly due to trampling by the heavy machines meant to work there, and due to possible spills of fuels and lubricants.

During the construction works the Investment Proposal is not expected to make significant negative impacts on the soils. Generally, these impacts could be classified as primary and secondary. The primary impacts occur due to digging, storage and backfilling of earth masses, and the secondary ones are marked by the progress of erosion on the steep slope areas. However this secondary impact is temporary, until the natural grass vegetation takes roots and grows up.

During operation - During the pipeline operation, negative impacts on the soil are not expected. One exception is the potential erosion which might arise on the steep slope areas within the work band, where the vegetation has been destroyed. This impact is secondary and temporary, and will last during the time necessary to recover the vegetation cover only – approximately in the first 1-2 years of the pipeline operation. The erosion will be local, from low to medium magnitude. Such impact is possible in case of badly implemented remedial works only, or after downpours. If the erosion mitigation measures stipulated in the project

are fulfilled, and in case inspections of the route corridor are made regularly, these impacts will be insignificant.

In case of emergency – in case of natural disasters of calamitous character, or serious pipeline breakdowns. Due to physical and chemical properties of natural gas, pollution or violation of soil properties could not occur, even in case of considerable leakage. The only exception is the case of inflammation or explosion, but availability of sufficient number of shut-off valves along the route would make this impact local and brief, until exhausting of the amount of gas in the damaged part.

4.2.5. Landscape

In landscape assessment, both, the significance of the Investment Proposal impacts on the landscape, and the visual impact are estimated.

During construction

The impacts on the landscape specific components are examined by the experts in the relevant items of the EIA (Environmental Impact Assessment) Report.

The main impacts on the landscapes during the construction will be of visual-aesthetic nature. Essentially, they will be the same in both alternative routs. The degree of the impacts will be low, up to medium in the western option, due to the fact that it crosses fewer woodlands where the visual impact will be more salient than in lowlands. At the eastern option, the expected degree of impacts will be medium, due to larger woodland which are crossed and will be affected. Apart from the physical changes in the landscape, other impacts will occur on the character of the surroundings as a result of visibility of the construction works.

The construction works will be related to a local and temporary change in the environment overall condition, without any significant changes in the landscape structures.

After the construction stage is finished, recovery and recultivation of the terrains will be made. This will be a positive impact which will be also permanent, continuous, local, direct and of medium degree.

When crossing rivers and reservoirs, a visual impact on water landscapes, as well as waterside landscapes is expected. Visual impacts will occur at each river crossing and lake crossing. The expected degree of the impacts will be low to medium, as the Investment Proposal stipulates that the crossing will occur during the dry periods of the year, and as quickly as possible. Visual impacts of medium degree will occur when crossing large reservoirs and rivers (Studen kladenets lake, the river Maritsa, the river Varbitsa, the river Arda etc.). The impact will be reversible as well, because after the construction period is finished, recovery and recultivation of the damaged areas will be done.

When crossing roads and railways and passing through a quarry, the visual impact is expected to be negative, temporary, brief (during the construction only), local (in the pipeline route area), direct and of low degree. A secondary impact and cumulative impact are not expected.

The visual impact during construction of Above ground installations is expected to be negative, temporary, brief, local (in the pipeline route area), direct and up to medium degree for the western route corridor, and medium degree for the eastern route. A secondary impact and cumulative impact is not expected. In general, the landscapes will not acquire completely new appearance, part of them will anthropogenize.

During demobilization of the equipment along the pipeline route corridor, a positive impact is expected, which will also be permanent, continuous, local, direct and of medium degree. It will occur as a result of the implemented recovery of the terrains, recultivation and afforestation of the terrains.

During operation – Visual impact during the operation will occur on the people living in the visible proximity of the pipeline route only. The pipeline will be laid underground, in a few years the marks of construction works will significantly diminish visually, after restoration of agricultural activities. Planting of local plant species on the sites will hide the facilities and will help them to become a part of the surrounding landscape. There will be a low degree of impact on the landscape, with sensitivity from low to medium. In this way the significance of the impact by the pipeline, valve units and the compressor station on the character of the receiving landscape, will be within the range from insignificant to low. The expected impact on the residents is assessed as low degree, because remedial and subsequent afforestation of the terrains will be done after the construction works are finished.

In case of emergency – During the construction and operation, emergency situations might arise, which might make an unforeseen impact on the pipeline, due to natural hazardous factors – floods, earthquakes, fires. During the operation it is possible emergency situations to arise, due to fire and explosions, pipe rupture, as well as due to natural disasters (earthquakes, floods etc.). By keeping strictly the safety requirements and implementing correct operation of the installations, the danger of hazardous situations is reduced to minimum.

4.2.6. Plant and animal species, protected areas

4.2.6.1. Plant species

During construction

During the construction the impacts on the vegetation will be equal in type for the both alternative routes. The degree of the impacts on the vegetation and eco-systems will be lower at the western route due to the fact that this route crosses fewer Protected sites and there is smaller probability some permanent negative impacts on protected and vulnerable species of plants and their habitats to arise.

The impacts on the vegetation during the construction stage might be direct and indirect.

The direct impacts on the vegetation are as follows:

- Total destruction of the vegetation in the construction strip along the pipeline route corridor (30 m for agricultural areas and up to 20 m for the woodland near Kirkovo). The construction activities impact in both alternative routes will be negative, direct, permanent, continuous, local (along the pipeline route only). Secondary impacts are expected, but cumulative impacts are not expected. The degree of the impact will be low to medium for the western option, and medium to high for the eastern option. The impact on the agricultural areas will be low, because, although all the vegetation will be cleared in the 30 m construction zone, the biocoenoses have comparatively low biocoenotic value. The meadows and grasslands are also agricultural lands and the impact on the biocoenoses in them might be significant, due to the change of biodiversity in them, but their area in both pipeline options is comparatively small, the overall impact on them could be assessed as low degree. The impact degree on the woodlands could be assessed as medium for the western route, and medium to high for the eastern route, because the whole woodland vegetation within the construction band will be cut down and the servitude zone will be maintained and cleared from wood and frutex vegetation, according to the project and regulation requirements. The impact degree at the eastern alternative will be higher, because in it the pipeline route will pass through larger woodland-covered areas.
- Destroying of vegetation and temporary change of biological diversity, when crossing rivers and reservoirs. The impact will be negative, direct, permanent, continuous, local (at places of river crossings only) for both alternatives. A secondary impact is expected but a

cumulative impact is not expected. The impact will be of low to medium degree, if all the technical requirements are kept during the construction. It will be of medium degree when crossing larger reservoirs. The impact will be reversible, because recovery and recultivation of the damaged areas will be done after the period of construction is finished.

- Fragmentation of habitats and populations, including typical species for the habitats, by creating of artificial barriers (excavations, fences, dewatering facilities etc.). This impact will be negative, brief, of low degree along the western route, low degree in the agricultural territories, and medium to high in the afforested areas along the eastern route. The impact will also be long-term, local (along the pipeline route). A secondary impact is expected due to the change of biodiversity, but a cumulative impact is not expected.
- Fragmentation of habitats of protected, vulnerable and critically endangered vegetative species, and species on the territory of Protected Natura 2000 sites, which are crossed by the pipeline route. This impact will be negative, permanent, of low degree, long-term, local (along the pipeline route). The impact along the eastern route will be of more significant degree, due to the fact that this routing corridor crosses a larger number of Protected sites. A secondary impact is expected, due to a change of biodiversity, but a cumulative impact is not expected.
- Dusting of habitats (near the routing corridor and the roads), trampling of the terrain, damaging of the normal population structure of the species typical for the habitats, and subsequent deterioration of ecological structure of the habitats themselves. This impact will be negative, permanent, of low degree, long-term, local (along the pipeline route) for both alternative routing corridors. A secondary impact is expected, due to a change of the biodiversity, but a cumulative impact is not expected.
- Possible pollution and change of vegetation populations along the pipeline route from the waste produced and accumulated, fuels and lubricants from the construction machines. This impact will be negative, permanent, of low degree, long-term, local (along the pipeline route) for both alternative routes. A secondary impact is expected, due to a change of biodiversity, but a cumulative impact is not expected.

The indirect impacts on the vegetation are as follows:

- Inpouring of invasive and ruderal plant species, extrinsic to the natural habitats. These species change the species structure and habitats, deteriorate the environmental condition and can be rivals to the local and typical for the habitats species. The expected impact will be negative, indirect, permanent, continuous, local (along the pipeline route) for both alternative routes. A secondary impact is expected, due to change of biodiversity, but a cumulative impact is not expected. In terms of the relatively small width of the construction band and the short period of construction, it is expected that the local species will develop rapidly, without giving a chance to invasive species to develop stable populations.
- Possible negative impacts are related to potential breakdowns, fire danger, pollution of areas neighbouring of the route, due to availability of people and machines during the construction of the installation. The particular impacts on the vegetation cannot be foreseen.

During demobilization of the equipment along the pipeline route, a positive impact is expected, which will be permanent, continuous, local, direct and of medium degree. It will result from implementation of terrain restoration, recultivation and afforestation of the areas. After completing the construction and demobilization stage, a restoration, recultivation and afforestation of the terrains will be implemented. This impact will be positive, permanent, continuous, local, direct and of medium degree.

A negative impact can be expected for the following vegetation co-societies in the Protected sites and out of them (both routing corridors):

- Arable areas – cornfields, vineyards, vegetable gardens etc.
- Grasslands dominated by perennial grass – *Chrysopogon gryllus*, *Botriochloa ischaemum*, *Festuca valesiaca*
- Pseudosteppes dominated by annual grass – *Trachynia distachya*, *Psilurus aristatus*, *Poa bulbosa*
- Ruderalized grasslands dominated by *Hodreum bulbosum*, *Cynodon dactylon*
- Mesophile grasslands dominated by *Alopecurus pratensis*
- Mildly salted meadows dominated by *Elymus elongatus* and *Cynodon dactylon*
- Makrophyt hygrophyte and hydrophyt communities of: *Phragmites australis*, *Typha latifolia* *Sparganium erectum*, *Lemna minor*
- Limestone rocks with chasmophytic vegetation
- Silicate rocks with chasmophytic vegetation
- Frutexes dominated by *Paliurus spina-christii*
- Frutexes dominated by *Juniperus communis* and *Juniperus oxycedrus*
- Mixed declining woodland of *Carpinus orientalis*, *Acer monspessulanum*, *Fraxinus ornus*
- Mixed thermophyl oak woodlands of *Quercus cerris*, *Q. frainetto*, *Q. pubescens*
- Xerophilous woodland of *Quercus pubescens* and *Carpinus betulus*
- Riparian woodlands of *Salix alba* and *Populus alba*
- Riparian woodlands of Common alder *Alnus glutionsa*
- Riparian frutexes of Saltcedar *Tamarix ramosissima*
- Beech woodlands of Moesian beech *Fagus sylvatica* ssp. *Moesiaca*

More detailed information about the area and degree of impact on specific habitats is shown in the Appropriate Assessment Report which is attached to the EIA (Environmental Impact Assessment) Report.

During operation

During the pipeline operation an impact in the open habitats is not expected, after completing of the construction and restoration stage.

In the forest habitats a fragmentation of habitats and populations is expected, including fragmentation of species typical for the habitats, in the pipeline safety zone. The impact will be negative, permanent, continuous, local (in the woodlands along the pipeline route only), indirect for both options. The impact is expected to be of medium degree for the western route, and medium to high for the eastern route, due to the larger area of the woodland-covered territory which will be disturbed. The impact on the agricultural areas will be temporary and short-term, and on the woodlands it will be permanent and continuous.

A secondary impact is expected but a cumulative impact is not expected. The impact will be of medium degree and non-reversible in the pipeline security zone only. In the security zone growing of any wood and frutex vegetation is not admitted and the fragmentation will be permanent. Out of this zone, the wood vegetation will be restored in a longer period of time.

In case of emergency

During the construction and operation emergency situations might arise, which might make an unforeseen impact on the pipeline, due to natural hazardous factors - floods, earthquakes, fires, and these might possibly impact upon the vegetation species and habitats along the pipeline route.

During the operation, emergency situations are possible to arise, due to fire and explosions, pipe rupture, or as a result of natural disasters (earthquakes, floods etc.). By keeping strictly the safety requirements and implementing correct operation of the facilities, the danger of hazardous situations is reduced to minimum. The specific degree of impact on the vegetation cannot be foreseen.

4.2.6.2. *Animal species*

The assessment of the Investment Proposal impact on the fauna is preliminary and is based on an expert estimation, and the results of the partial survey of the environment current condition carried out, taking into consideration as well the technical description of the project activities planned. The marks are based on the principle of cautiousness (at the worst possible case) and in case all designated suitable habitats are occupied!

The main activities accompanying the construction are the following: preparation of the terrain and removing the top-soil (mould), excavating of trenches, building of Above Ground installations, draining (dewatering) system, restoration of the terrain after laying the pipes. The following activities can be defined as secondary: transportation of the necessary prime and raw materials, equipment and workers to the site and back, disposal of waste accumulated, purifying of water used for household needs, waste water treatment.

During the construction phase the following direct impacts are expected:

- ***Loss of habitats*** – During the construction the habitats all along the routing corridor will be destroyed. The loss of habitats is permanent and non-reversible in the woodland covered with frutex vegetation and rock complexes, while in the open terrains it will be temporary and reversible. Recultivation is possible in the area of the servitude line, out of the safety line. New species inhabiting open territories will populate these areas. Crossing of water streams and wet zones is linked with making corrections in them, which is a prerequisite for local loss of habitats – removing of vegetation and riparian trees. Loss of nutritive habitats of rapacious birds occurs as a result of destroying colonies of ground squirrels in grasslands, situated along the route. Cutting down trees with nests of rapacious birds, as well as trees suitable for nests, also leads to destroying of habitats.
- ***Fragmentation of habitats*** – All the habitats along the route will be temporary affected during the construction, and the majority of them is expected to be restored. The fragmentation of habitats during the construction will be temporary, and for the forest habitats it will be permanent and non-reversible due to keeping the safety stripe denuded of forests during the phase of operation.
- ***Mortality*** – During the construction the destruction of birds hatch or nests with offspring. Mortality of specimens is not expected during the pipeline operation.
- ***Disturbance*** – Disturbance of species during the construction works is caused by the intensive motion of construction machines, supporting transportation machines and human presence. They are a source of noise, vibrations, light at night etc., which will disturb the fauna in the neighbouring area. As a result, the animals will keep away from the territories of construction works, and this might send them away from their nests, places of feeding and breeding. The harmful emissions released into the air, and vibrations will also contribute to deteriorate the quality of the animal species habitats.

During the operational phase the impact of the Investment Proposal comprises of the following aspects:

- ***Fragmentation of animal populations*** in the woodland on both sides of the route (due to keeping the safety line). A substitution of neighbouring communities will occur, as a result of populating of species inhabiting open areas.

- **Noise disturbance** from the maintenance work on exterior infrastructure connections for all site elements of the pipeline – these impacts can be described as direct, brief, permanent, occurring in the area of Above ground installations only. It could be supposed that the representatives of vertebrate fauna will adapt to them very quickly, considering the permanent character of the disturbance caused.

4.2.6.2.1. Birds

During construction – The species inhabiting the grass habitats (mainly grasslands with frutexes), the woodlands and small groups of trees can be described as potentially significantly affected, as a **loss of their habitats** is expected (permanent loss for forest habitats along the safety zone, and temporary for the area out of it). In a similar way, the species attached to water reservoirs and water streams are vulnerable. For the open parts of the route the degree of loss of habitats during the construction period is defined as medium, and the frequency – temporary .

Death of specimens – as a result of clearing of the construction stripe and other activities during the construction period, death of specimens can be expected – when destroying nests and eggs, if the construction works are done during the breeding season. Mortality of specimens of natatorial birds can be expected too, if the route goes across areas used for breeding and nesting.

Disturbance – For all kinds of birds, the strongest impact is during their breeding phase. The anticipated impact is temporary – for the construction period. Sensibility to light impact is displayed by vespertine birds, such as owls and some natatorial birds eating at night. The impact degree for them will be significant during the construction period.

During operation – A **permanent fragmentation** of forest and frutex habitats is expected in the safety zone. In the rest of the working stripe, the wood vegetation will be recovering for a longer period of time. The impact degree is big and the significance of the impact is high.

Disturbance of birds during the pipeline operation could be caused by clearing the safety zone in the woodlands. If this activity is implemented for a short period of time, within a narrow area and during the day only, then the impact degree will be low. The significance of the impact on the birds during their breeding phase can be described as medium, and it is low out of that period.

In case of emergency – In case of fire, the impact on birds is expected to be long-term. The restoration period depends on the number of affected specimens of the populations of specific kinds of birds. In general, the impact on birds is expected to be of low to medium significance.

4.2.6.2.2. Mammals

During construction – The pipeline construction phase will be accompanied by the most negative impacts on mammals.

Direct extirpation of specimens – The construction actions and their supporting activities can be a reason for death of specimens representing species of animals of poor mobility. The excavation works along the route will affect mainly rodents and insectivorous. Cutting down the trees during passing of the routing corridor through woodlands might lead to the death of single specimens.

Loss of habitats and moving of animals caused by this. As far as it will affect the greatest number of mammal species, the impact degree will be significant. It will be brief and reversible for the species whose habitats are out of the security zone, due to their

comparatively quick restoration after the construction. Restoration of forest habitats is not expected, which will have a negative effect.

Fragmentation of habitats and populations – A temporary and brief fragmentation of stocks of some small rodents is expected during the excavation works, mainly in open habitats – grasslands, meadows and cornfields. Building of temporary wire fences, enclosing the construction works area, will be an obstacle for larger mammals, and surrounding of the routing corridor (a stripe of 200 m wide) around the reservoirs crossing points, will lead to temporary fragmentation of habitats of the otter.

Disturbance is a negative factor of particular significance for mammals. The construction works related to the presence of people and machines, and generating significant levels of noise, will undoubtedly cause disturbance to some species. Medium to significant levels of disturbance are expected for the species – wolf, otter, jackal, fox, badger, Marbled polecat, fount, marten, roe, wild-boar, royal slag. The disturbance for the small mammals will be insignificant.

Deterioration of habitats quality – pollution of the water of rivers and other reservoirs by oils, fuels, chemicals and waste is possible during construction, and it might lead to decrease of nutritious base and deterioration of life conditions for otter. By keeping strictly the construction technology, the impact will be reduced to minimum and will be insignificant, local and short-term in character.

During operation – In the woodlands, the fragmentation of habitats along the pipeline servitude out of safety zone will be continuous. The restoration in this case goes more slowly, especially for riparian woodlands. The safety stripe will be restored as herbaceous habitat which could be used as a corridor or for new nutritive habitats of some of affected groups of animals. The anticipated impacts will be insignificant, brief and local. Travelling over the routing corridor will cause disturbance to some mammals having their lairs or places for feeding in proximity to the routing corridor.

In case of emergency – In case of explosion and fire, it is possible that local but significant negative impacts on the mammals occur, which might cause direct mortality of specimens, but also deterioration of the habitats quality. The significance of such impact on mammals is expected to be high, and the duration – continuous, in terms of the low reproductive capacity and the small number of specimens in the populations.

4.2.6.2.3. Reptiles

During construction – As a result of the project realization, during the construction phase the following potential impacts on the reptiles are possible: direct (loss or fragmentation of habitats, mortality, disturbance) and indirect (deterioration of the habitats quality). Most of the time they will be brief (during the construction only) and are displayed in the following:

Extirpation of specimen during the construction – during excavation works, lairs and eggs of many species will probably be affected. Killing of single specimens is probable for all kinds of lizards and snakes too, especially during the hibernation period. All the reptiles are endangered of killing by moving machines which will be used during the construction.

Destroying of habitats and moving of animals caused by this – this impact affects the greatest number of reptile species. Habitats of all determined species will be affected, and the changes will be brief and reversible. This does not apply to the forest and rock habitats which are essential for particular species – Aesculapian snake, common wall-lizard etc.

Disturbance and chasing away – in general, for reptiles this factor has a slightly displayed negative impact. All the active specimens along the route are expected to move to more remote areas.

Fragmentation of habitats and populations – for some larger species of reptiles, the building of temporary fences and excavations might cause problems with their moving around (for example for tortoises and turtles), causing a brief negative impact.

Detioration of habitats quality – Pollution of reservoirs with oils, fuels, chemicals and waste might lead locally to reducing the nutritious base of some reptile species.

During operation – Significant negative impacts are not expected during the pipeline operation. In the open habitats, temporary fragmentation will be available, and in the forest ones – continuous, due to the slower restoration of wood-species. During repair and maintenance activities, some contiguous habitats of reptiles next to the route itself, might be affected in a negative way, or some specimens representing species of animals of poor mobility might be run over. The frequency of such incidents is expected to be very low, so significant negative impacts are not expected.

In case of emergency – In case of fire due to accidents (explosion of gas) the significance of the impact on reptiles is expected to be high, and the duration – medium- short-term, considering the different reproductive capacity of the particular species.

4.2.6.2.4. Amphibians

During construction

Death of specimens during construction – all main and auxiliary activities during the pipeline construction might cause death to some specimens of most of designated species of amphibians. The impacts will be direct, negative and brief, local for most of the species.

Destruction of habitats – Some habitats of amphibians will be lost temporarily or permanently, and the specimens will leave them. The significance of the impact for most of the amphibians – medium to significant, due to their high sensitivity.

Fragmentation of habitats and populations – the construction band will cause temporary fragmentation to the amphibian populations in the route area. Due to the risk of accidental fall into the excavations, for some species this is a brief negative impact.

Detioration of habitats quality – pollution of the river waters and other reservoirs by oils, fuels and other chemicals during the construction, might lead locally to reducing the nutritious base for some amphibian species and/or their larvae.

Disturbance and chasing away – for amphibians, this negative impact is in general slightly displayed and is efficient within small distances only.

During operation – Disturbance of animals is possible during travelling over the routing corridor and maintaining the safety zone. The impact will be brief and insignificant.

Gas evolving during some routine activities will not impact significantly upon amphibians. During repair and maintenance works, some activities might be implemented which might have a negative impact on amphibians, for example they might change their habitats or might be run over by vehicles.

In case of emergency - In case of emergency (fire) the significance of the impact on amphibian species is evaluated as medium. In such cases, stronger negative impacts are more probable for species which spend more time on land, such as salamander, toads of the Bufonidae family and Syrian spadefoot.

4.2.6.2.5. Terrestrial invertebrates

During construction – During the construction the following impacts on invertebrate species are expected:

Destroying of useful entomofauna (mortality of specimens) – the typical earth inhabitants using the soil permanently or temporarily as an environment and refuge, and having an essential part for the environmental balance, will be affected directly. Anticipated mortality of specimens having high preservational status, including specimens having fallen

into the excavation. Due to the comparatively narrow stripe of the pipeline routing corridor, the degree of the impact is evaluated as low.

Loss of habitats – The impact on the species will occur during the construction phase only, caused by the route clearing from wood and frutex vegetation and travelling of transportation machines. Along the safety zone, new border habitats will appear, which will be inhabited by new species and this will have a positive effect on the invertebrates inhabiting open spaces. This impact will be temporary and short-term, as rapid restoration of the natural herbal covering is expected after completing of the construction works. The degree of impact is determined as medium.

Fragmentation – fragmentation of habitats of creeping insects is expected, which will be temporary and brief and will last until completing the construction works. The degree of impact will be low, the significance – medium because of the high preservational status of species.

Disturbance – disturbance of night invertebrate species is expected, caused by the light impact (*Eriogaster catax*, *Dioszeghyana schmidtii*, *Morimus funereus* etc.). The impact will be temporary, until completing the construction works, and within a narrow area. That is why the degree of impact is estimated as low, and due to the high sensitivity of most of the species, the significance of impact is estimated as medium.

During operation – The impact will be low and mostly indirect (residual) by the damaged habitats, nutritive base and possible noise during the safety inspections. For the invertebrate inhabitants of forest habitats, the degree of impact will be medium, and for the species with high preservational status, the significance of the impact will be medium.

In case of emergency – In emergency situations, the degree of impact is estimated as significant, and the duration – medium- or short-term, considering the different reproductive capacity of particular species.

4.2.6.2.6. Bats

During construction

Loss of habitats – It is probable for some bats' refuges to be lost during preparation of the terrain and route clearing. The impact will be continuous, because of the continued time necessary to recover the affected terrains.

Fragmentation of habitats – during the project realization, a temporary and permanent fragmentation, due to deforestation of the construction band. It will be within the safety zone all the time. The degree of the impact is defined to be low, up to medium, because of its small width (up to 16 m wide), and the significance of the impact – medium to high for the species with a high preservational status.

Disturbance and chasing away – it is expected during the construction only, if refuges are localized in close proximity (especially in areas with rock formations). This impact will be short-term in its duration – during the excavation works only, and of low degree.

Light impact – The most vulnerable in this respect are the night species. The impact will be significant and temporary, until completing the construction works, and on a narrow area. Significant disturbance is expected if the activities under the Investment Proposal are implemented during the breeding season.

During operation – Negative consequences for bat populations during the phase of operation are not expected, or they will be of insignificant degree (disturbance by transportation machines and maintain activities on the pipeline route), and will not lead to fragmentation and will not cause a cumulative effect with other activities.

In case of emergency – In emergency situations (fire) a significant local impact on bats is possible, which might result in direct death of specimen. The degree of impact is assessed as

significant, and the duration – medium- or short-term, considering the low reproductive capacity and the time necessary for the habitats to be restored.

4.2.6.2.7. Fish

During construction

Destruction of habitats and death of specimen – caused by the excavation activities in the reservoirs – most affected by the construction works will be the demersal fish which are more slowly moving as well. This impact will be short-term and with no significant consequences for the local fish populations.

During digging the route under the big rivers (Maritsa, Arda near Studen kladenets), by using Horizontal Directional Drill (*HDD*), in fact, an impact on the fish fauna is not expected, as the bed and the banks remain unaffected by the excavation activities.

Fragmentation of habitats – laying of the pipeline where rivers are crossed will cause temporary fragmentation of fish habitats. The degree and significance of the impact is assessed as low, and its duration – temporary and brief, until completing the construction works and restoration of the disturbed flow.

Disturbance and chasing of specimen away – the noise and vibrations from the machines and people's work along the route will also cause disturbance in the fish fauna. The impact will be temporary, until completing the construction works, and of different degrees, depending on the technology applied.

During operation – Negative consequences for the fish populations during the operational phase are not expected, or their degree will be insignificant (disturbance caused by transportation machines and activities to maintain the pipeline route) and will not lead to fragmentation or cause cumulative effect with other activities.

In case of emergency – In case of incidental fire and/or uncontrollable leakage of natural gas, the impact will be temporary until restoration of the damages from the incident. The degree of impact is assessed as low, and the duration – short-term – i.e. the time necessary for restoration works in the affected area.

4.2.6.2.8. Aquatic invertebrates

During construction

Destroying of habitats and death of specimens – it is expected during the excavation activities where the pipeline route crosses rivers (*open cut crossing*). The impact will be temporary until completing the construction works and within a narrow area. Due to the expected restocking of benthic fauna, the degree of impact is defined as low, and together with the high sensitivity of most of the species, the significance of the impact is assessed as medium.

Fragmentation of habitats – laying of the pipeline at river crossings will cause temporary fragmentation of habitats for preservationally significant aquatic invertebrates (*Unio crassus*, *Austropotamobius torrentium*). The degree and significance is assessed as low, and its duration – temporary and brief, until completing the construction works and restoration of the disturbed flow.

During operation – Negative consequences for benthic invertebrate neighbouring communities are not expected during the operational stage, or they will be of insignificant degree (activities to maintain the pipeline route) and will not lead to fragmentation or cause a cumulative effect with other activities.

In case of emergency - In case of incidental fire and/or uncontrollable leakage of natural gas, the impact will be temporary until restoration of the damages from the incident. The degree of impact is assessed as low, and the duration – short-term – i.e. the time necessary for restoration works in the affected area.

4.2.6.3. *Protected natural areas*

During construction – It is not expected an impact to be made on protected areas during the pipeline construction. The Investment Proposal pass through protected areas in the sense of the Protected Areas Act.

During operation – Because of the distance of the Investment Proposal route from protected areas, a negative impact on them is not expected if normal technological conditions of the installations are kept during the pipeline operation.

In case of emergency - In case of incidental fire and/or uncontrollable leakage of natural gas, the impact will be temporary until restoration of the damages from the incident.

4.2.6.4. *Protected sites*

During construction

During the construction, the impacts on the protected sites will be equal in type at both alternative routes. The degree of impacts on the protected sites will be lower at the western route, due to the fact that it crosses fewer protected sites and it is less probable that permanent negative impacts might occur on protected and vulnerable species and their habitats.

The impacts on the protected sites during the construction might be direct and indirect.

Direct impacts

- ***Destroying of habitats*** – Direct destruction of habitats is expected as a consequence of the construction works related to excavating earth mass, cutting and extirpating of natural and semi-natural vegetation, disposal of waste from the construction activity on the natural and semi-natural vegetation, change of the hydrological regime of wet zones, damaging during creation and maintenance of infrastructure.
- ***Fragmentation of species populations and their habitats*** – Construction of a linear object with a significant length and width is a factor for actual fragmentation of habitats of amphibians and reptiles, mammals and birds as well.
- ***Mortality of specimens*** – The construction and other auxiliary activities (excavation activities, building of temporary roads, construction and installation works, passing of construction machines) might cause death of specimens representing species of animals of poor mobility, fragmentation of habitats, during dewatering of terrains, some shores of reservoirs are possible to be destroyed and/or modified, and so death of adult specimens, eggs, larvae of waterside animals is also possible, or causing death of hydrobionts (fish, invertebrates).
- ***Barriers for normal functioning of habitats*** – Creation of barriers – excavations, fences, dewatering and embankment facilities, which cause fragmentation to habitats and populations, including vegetation and animals which are typical for the habitats, either or completely discontinue the genetic and coenotic exchange between them, and lead to deterioration of their environmental condition.
- ***Disturbance of animals*** – this impact will mainly affect the mammals, and in a smaller degree amphibians and reptiles, and will be the most strongly displayed during the construction.

The expected impacts will be negative, direct, brief for the agricultural areas and continuous for the woodlands, of low degree, long-term, local (along the pipeline route). A secondary impact is expected, due to change of biodiversity. A cumulative impact is expected.

Indirect impacts

- ***Deterioration of habitats quality*** – activities like trampling, clearing of the terrains, noise and light pollution, the stronger anthropogenic presence will lead to chasing away of specimens, disturbance of the normal population structure of species typical for the habitats, which, for its part, will lead to deterioration of the ecological structure of the habitats and phytocoenoses.
- ***Increased danger of fires*** – the moving of people, the work of machines increase the danger of fires which might lead to direct destruction of species and habitats – object of zone preservation.
- ***Invasion of alien species into the natural habitats***
- ***Damaging the possibilities for stable, environment-friendly development of the Protected sites***

The expected oblique impacts will be negative, indirect, permanent, continuous, local (along the pipeline route). A secondary impact is expected, due to change of biodiversity, and a cumulative impact is expected as well.

The specific impact on Protected sites, habitats, vegetation and animal species is shown in the Appropriate Assessment Report.

During operation - During the operation indirect impacts are expected as a consequence of disturbance of animals – this impact will affect mainly mammals, and in smaller degree amphibians and reptiles, and will be slightly to insignificantly displayed during the operation, in implementing the routine supporting activities. A detailed description of the specific impact on the protected sites, habitats, vegetation and animal species is shown in the Appropriate Assessment Report.

In case of emergency – In case of incidents related to explosions of gas, killing of animals and local deterioration of their habitats quality is possible. That is why, maintenance and care for pipeline safety is necessary to be of especially high level within the protected sites of the European ecological network Natura 2000.

4.2.7. Cultural heritage

The construction of the pipeline impacts the areas and protective zones of the designated archaeological objects along the western route, the eastern route and the common route. Disturbances are expected during the construction only, as the excavation works might lead to destruction of the archaeological immovable cultural valuables and their protective zones.

During construction a negative impact is expected on some of the archaeological immovable cultural valuables situated within the zone of 20 m on both sides of the pipeline, in the proximity of the archaeological immovable cultural valuables and their protective zones. A negative, direct and temporary impact is expected. During the pipeline construction, it will arrive to breaking the integrity of the structures of the archaeological objects situated within the pipeline servitude or in the close proximity. The impact will be continuous as well, as the integrity of the structures of the archaeological objects will remain unbroken. Cumulative and combined environmental impacts are not expected. It is necessary for these archaeological objects to be partly or completely examined, according to their characteristics and spatial structure.

The operation of the facilities for transportation of natural gas does not impact the material and culture-historical heritage in the area of its realization.

In case of emergency – The pollution of the archaeological objects territories from hazardous emissions and waste will not impact directly upon the condition of the objects of culture-historical heritage situated around. The possible pollution of the environment also creates

danger, and the damage to the immovable cultural valuables will be the same as the damage to the entire environment.

4.3. Sanitary and health aspects of the proposed technology and expected impact on population and workers

4.3.1. Hazardous materials and harmful physical factors

During construction – For population. Risk factors: preparation of the terrain and removal of the top-soil layer, excavation activities – emitting of dust and toxic chemical pollutant (gases from the construction machines, from the fuels used, motor and lubrication oils); Transport and work of transportation machines, installations, facilities, devices, aggregates – changes in the acoustic environment with increased levels of noise; Generating and accumulating of waste – construction and household waste; Other – accidental and/or episodic emissions. Some social hazardous factors: violation of the local infrastructure, impact on the transport and traffic; on the community interrelations; on the population's security and safety;

Specifically for workers: the builders' working places and activities are hazardous with regard to the toxic chemical materials, noise and vibrations levels above the normal ones, ultraviolet radiation, ultrasound, unfavourable climate factors (working outdoors), emergency situations. The main hazardous activities are: all the construction works, the work of the transportation machines, facilities, equipment, as well as their repair; welding; roentgenography; storing and working with chemicals, oils, fuels; producing and accumulating of waste. For the foreign workers some social hazardous factors exist too: working in unknown conditions for the foreign workers; differences in their habits and behavior from the local people; negative attitude on the part of the local communities; restriction in free travelling; difficult social contacts due to the language barrier.

During operation – for the population negative physical factors and emissions of chemical compounds which might affect the people's health are not expected. *For workers* – during the operation the main hazardous factor for harmful emissions is the technological process and the activities which are implemented overground, related to emitting of gas: cleaning of natural gas from mechanical admixtures (cleaning equipment); pressure control (Gas Regulation Stations); temperature and flow measuring (Gas Metering Stations); linear crane units; repair activities

In case of emergency – All the break downs, fires, explosions, earthquakes, which dislocate the earth layers and disrupt the strengthness of pipes, uncontrollable pressure increasing over 10% of the maximum pressure, are emergency situations, with a risk of increasing the gas emissions, which endangers the workers and/or the population.

4.3.2. Risk factors for human health during construction, operation and in case of emergency

During construction:

Impact on population. The emitted dust and the chemical factors are not hazardous for the population, as they are emitted on the territory of the work site only, are not in big quantities and are not spread to the settlements. The unfavourable noise impact from the pipeline construction on the people will be temporary (up to 4 months) and of minimum significance.

The health risk from the impact of the pipeline construction on people can be assessed as insignificant (limited). The impacts have temporary effect (during the construction period), direct and indirect, with no cumulative effect.

The magnitude of the negative social effect is insignificant, the intensity of the effect

is low, the frequency is during the construction only (brief), the hazards are possible to be taken in hand and can be controlled.

Impact on the workers. It is related to the impacts which are standard for such an activity – the very fine fractions (under 2 µm) might reach the lungs of the people working on the pipeline site, which imposes a mandatory use of personal protective means, including a suitable anti-dust masks for the workers. An impact of harmful chemical factors is possible in relation to the work and storage of chemicals, fuels and oils; transport, releasing worked off gases; the welding processes.

In order to prevent unfavourable impacts of the work environment - noise, ultrasound, vibrations and unfavourable microclimate, it is necessary to use personal protective means. For protection from UV radiation, workers holding a certificate of welders only are allowed to work, a training is provided too, as well as physiologically suitable timetable of work and rest, using of personal protective means provided by the employer.

The health risk assessment for workers, with regard to the criteria Probability, Exposition and Consequences/Harm can be defined as not big, to medium. An impact on the professional health of the staff working outdoors is not expected. Even in case of continuous pollution due to temperature inversions, fog and windlessness, the expected impact on the work places will not be significant. In this case the expected impact on the work places, provoked by the physical and chemical factors of the working environment, is within the limits of admissible and is possible to be prevented, with no lasting harms of the body.

During operation.

The health risk for the population is **low**, the population is not exposed to detriments from the activities related to the pipeline maintenance.

The positive effect which this project has on the economics and social environment in the areas which it passes through, is also important – opening of new job positions, providing of cheap and ecologically clean fuel, improving the infrastructure in the area. That is why, the significance of the project can be defined as **high with a positive direction**.

The health risk for workers. Unfavourable impacts on the working environment are not expected during the pipeline normal operation, provided that all safety requirements envisaged in the project are strictly kept.

The health and safety requirements will be defined and described in details, and will comply with the Bulgarian legislation, the European and international norms and requirements and with the best standards of the sector. The health risk is not big.

In case of emergency

It is difficult to estimate precisely the degree of the health risk in advance in case of emergency, because it depends on the type of emergency (break down, fire, explosion, earthquake etc.), the extend of the equipment damage, the type and amount of emissions, the distance between the people and the place of emergency etc.

Generally, in case of insignificant gas leakage only the risk for the population is low, the situation is controllable. For workers the hazard is higher, but controllable and does not cause significant damages to the health.

In case of fire, explosion or serious break down, the risk increases significantly, becomes more difficult to control, and there is a real danger for people's health and life. In order to prevent or control the risk in such cases, suitable manuals with plans, programmes, instructions and explanations for workers' behavior and rescue services' actions must be elaborated.

4.4. Summary assessment of the Investment Proposal impacts and comparison of alternatives

A detailed qualitative characteristic of the potential impact on people and environment caused by the construction of the Investment Proposal and its operation is presented in the Environment Impact Assessment Report.

Data related to the potential impacts during the construction and operation of the Investment Proposal, along each of the alternative routes – western and eastern, are summarized in a table in the matrix below.

It is seen from the matrix that the western route is the route whose realization is more environment-friendly. During the construction of the western route, lower impacts are expected than at the eastern route, regarding some environmental components, such as: landscape, plant and animal species and protected sites, and with regard to the rest of the components, it is expected to be equal to those along the eastern route.

Comparison of alternatives with regard to the specific environmental components.

Air – The eastern alternative of the pipeline route is less favourable regarding air pollution due to the greater height and complicity of the terrain, which will lead to the bigger air pollution. It must be taken into consideration as well that most of its length passes across mountain areas and Protected sites which are vulnerable to the high degree of dustiness and waste gases. For these reasons it is better to choose the western alternative of the route.

Water – During the construction, the impacts on the **surface water** will be almost equal in type for both options. Considering the numbers of big rivers crossings, small streams and gullies, the degree of the impacts are almost equal for both options during the pipeline construction and will make almost equal impact on the “waters” component. After comparing the ecological conditions of water bodies for both options, it can be concluded that water bodies affected by the Eastern alternative have a worse ecological potential.

During the construction the alternative pipeline routes are equal regarding the **ground water** of the crossing areas of water-bearing collectors of type I which are vulnerable to pollution, and are not in conflict with operative water-intaking systems and facilities, as it is admissible for them to cross the belts II and III of their Sanitary Protection Zones. The western route of the pipeline looks like more acceptable for realization, due to the fact that it passes across the Sanitary Protection Zone of a **protected** area of an subterranean water body “Pore waters in Neogene-Quaternary-Haskovo” with code BG3G00000NQ009, while the eastern route passes across the Sanitary Protection Zone of an **unprotected** area of the same subterranean water body in a terrace of the River Haskovska. Apart from that, a construction band of the eastern route is closer to the boundaries of belts I of the boreholes.

Bowels of the earth – the anticipated impact on the bowels of the earth during the construction is in practice identical along the alternative pipeline routes, as it is likely to be insignificant, to low, brief, direct, reversible to a considerable degree. Corrections are made to the western route which bypasses deposits holding confirmed reserves of underground natural resources, while the same things will need to be specified about the eastern route.

Soils – During the construction, the type of impacts on the soils are identical for both options. Less valuable soils, from agricultural point of view, will be affected along the Eastern route in the area of East Rodopi only, in the part between the border of the Republic of Bulgaria and the Studen Kladenets dam lake. This is determined by the shallow and infertile soils prevailing in the area. However, in contrast to the rest, these shallow soils are strongly susceptible to erosion. Up to the convergence point of the two routes, the soil types and the impacts on them are similar. The necessity of construction of deviations from the main pipeline to the big cities, and the additional disturbance of new areas, as well as the risk of

developing of erosion, makes the Eastern route the option with bigger general negative impact on soils.

Landscape – As the relief is one of the main factors contributing to the choice of the pipeline route, a comparison has been made between both options regarding longitudinal profiles of the Western and Eastern route – as a result, it was found that there will be fewer steep slopes and problem mountain ridges, which would make the pipeline construction more difficult, along the Western route, which is the more suitable option.

In morpho-hydrographic aspect, the routes of the pipeline both options pass through similar landscapes (mountain, hilly, plane). There will be a difference between the impacts at both options of the project realizing in the areas before the convergence point of the route only, but at the western option the degree of the impact on the landscape components will be smaller, because at the eastern option the route will go across bigger number of densely afforested mountain ridges with steeper slopes, with typical mountain landscape and much fewer drops.

Flora, Fauna and Protected Natura 2000 sites

For the bigger part of the pipeline the two developed options are elaborated (eastern and western route). In both cases the natural characteristic of habitats are impacted, but their different performance within each of the alternatives is a precondition for a different degree of the impact on specific groups of animals. From the analysis made in item 2.3.2. and the comparison of the characteristics of both routes, the following conclusions are related to the fauna:

- The Eastern route covers three times bigger territory with mountain relief (76.40 km), and the Western route - 28.45 km;
- Percentage of occupied territory by the Ecological network “Natura 2000” – 18.80% of the Eastern route, compared to 4.9 % of the Western one;
- 26.46 km (18.2%) of the Eastern route length goes across woodland massives, while for the Western route this index has a value of 7.44km (4.9%);

On this basis it can be supposed that in case the Eastern option is realized, the impacts (including destroying of refuges during fellings for preparation of the construction works, and probable death of specimens, as well as change of the natural characteristics of habitats) will be displayed in a significantly greater degree. This applies especially to the species inhabiting woodlands – birds, mammals and reptiles. The significant and long-term impacts, such as loss and fragmentation of habitats and disturbance, might lead to chasing away of some species. The impact on rapacious birds, nidificating in proximity of the Eastern route and regularly flying to the sites for artificial feeding of vultures in the area in order to eat.

The only advantage of the Eastern route is the fact that it crosses fewer reservoirs. In case of realization of the western option, crossing of the tail-end of “Studen kladenets” dam lake according to the Horizontal Directional Drill (*HDD*) technology will affect for longer time terrestrial habitats near the shore, which later will be restoring for longer time. But these habitats in practice do not have preservational value because they are part of the technical facility dam lake. By using the technology of the trench “*open cut*”, it will be necessary to dry this part, and so temporary loss of habitats for fish, water invertebrates and waterfowl birds. Such a type of impact is temporary and quickly restoring. With both methods the disturbance factor will occur, for minimizing of which it is recommended that the construction works are implemented in minimum time, and the measures recommended in the Environment Impact Assessment Report and Compitability Assessment Report to be fulfilled.

The comparison of the alternative routes regarding the impacts of their realization on the fauna is shown in the chart bellow (the marks are based on the data available, surveys conducted and on the principle of cautiousness):

Supposed impact	Western route								Eastern route							
	Birds	Mammals	Reptiles	Amphibians	Terrestrial invertebrates	Bats	Fish	Aquatic invertebrates	Birds	Mammals	Reptiles	Amphibians	Terrestrial invertebrates	Bats	Fish	Aquatic invertebrates
<i>Loss of habitats</i>	XX	XX	XX	X	XX	XX	XX	XX	XXX	XXX	XXX	XX	XXX	XXX	X	X
<i>Fragmented habitats</i>	X	X	XX	X	X	X	XX	X	XX	XX	XX	XX	X	XX	X	X
<i>Mortality</i>	X	X	X	X	X		XX	XX	X	XX	XX	XX	XX		XX	X
<i>Disturbance</i>	XXX	XX	XX	XX	X	X	XX	X	XXX	XXX	XXX	XXX	X	XX	XX	X

Legend: x – low; xx – medium; xxx – significant impact.

In terms of the animal world, the choice for realization of the Western route has significantly smaller degree of impact both, regarding changes in the natural characteristics of favourable habitats, and regarding direct and indirect impact on animal species. In view of the reasons above, the comparison made in designers and experts' analyses and conclusions in the Environment Impact Assessment (EIA) Report regarding the expected impact on the environment components, it becomes apparent that the Western option is more favourable and preferable.

This attitude is confirmed by the conclusion in the Compatibility Assessment Report too, namely that the Western alternative can be realized with regard to the aims of preservation of protected sites and enforcing of the operative Biological diversity Act and Directive 92/43/EIO. The preferred option for the western route crossing of Studen kladenets lake and the river Maritsa is according to the Horizontal Directional Drill (HDD) technology, and the length under the lake is about 1500 m, and under the river Maritsa – about 520 m.

Population – Regarding hazardous factors for the population, there is no difference between the two routes – the technology and impacts are identical. The impacts of the physical factors on the population and workers (the most important physical factor of significance to health during the construction is the noise), will be equal at realizing of each of the two routes for the pipeline construction. It was found from the comparison made between the two routes regarding some indices related to the impacts of hazardous energy factors, such as: „availability of public road network”, „access to rail ways”, „proximity to cities”, as well as indices such as „necessity of temporary access roads”, or „number of crossings of significant obstacles”, (as part of them are railway lines or transport networks), that the western pipeline route is more preferable to the eastern one, regarding all the indices, which is why it is recommended with regard to the impact of the physical factors (mainly noise), to accept the western route.

However the western route goes across and near bigger settlements in developed areas, which affords the opportunity for more people to use the natural resource – for household and public activities.

From the comparison made by the designers (shown in item 2), it becomes apparent that the western route is the preferable option to be accepted and approved for the next phase.

From the comparison made by the designers and the conclusions from the analysis in the EIA Report regarding the expected impact on the environment components, it is apparent that the western route has lower impact and is more favourable and preferable.

The conclusion in the Compatibility Assessment Report is that the western alternative can be realized with regard to the aims for preservation of Protected sites and applying of the operative Biological diversity Act and Directive 92/43/EIO, as well as regarding the aims for preservation of all Protected sites.

4.5. Trans-border impact

The trans-border impacts might occur with each pollution (due to the activities related to the project considered), which reaches a country (countries), neighbouring the country which is the source of pollution. The Investment Proposal “Gas Interconnector Greece – Bulgaria” is for natural gas transmission from Komotini – Greece to Stara Zagora – Bulgaria, and will connect the gas transmission systems of both countries, so that a trans-border impact can be expected in the area of the border band between Bulgaria and Greece only.

In the performance of its duties under ESPOO Convention, Ministry of Environment and Water (MoEW) of Bulgaria has established contacts with the competent body in the Republic of Greece. Both Ministries together have co-ordinated the procedure of EIA in trans-border context for the project. MoEW has sent a letter of Ref. EIA-1376/15.12.2011 and Notification about EIA, about the Investment Proposal for “Construction of Gas Interconnector Greece – Bulgaria”. On 13.02.2012 the Greek Ministry of Environment, energy and climate change has sent an answer letter to the MoEW letter (Ref. EIA-1376/15.12.2011) and Notification about EIA, for an Investment Proposal for Construction of Gas Interconnector Greece – Bulgaria – *Reply to Notification about EIA, in relation to project “Construction of Gas Interconnector Greece – Bulgaria”*. According to this letter, during the constructional or operational phase, the project does not cause significant, long-term and irreversible impacts on the physical and built-by-man environment, both on Bulgarian and Greek territory, which are considered as trans-border effects.

The border between Greece and Bulgaria lies on a high mountain ridge in the Rodopes. The point selected for the pipeline to cross the border, is at 905 m above sea-level and is situated 1.6 km east from the Makaza border pass on the international road which is still under construction. This is the highest part of the East Rodopes Mountain in Bulgaria, with extremely varied relief and more wooded part. It is crossed by small rivers, of which the closest to the route is the river Lozangradska. This frontier area in Bulgaria goes across part of the territory of protected sites according to Natura 2000 BG0001032 “East Rodopes”, announced with Directive 92/43 about the habitats, and crosses an area with length of about 6 km of this protected site.

Because of the matter of the project and the geographical location of border crossing, there are no activities which might make a significant impact so that trans-border impacts occur during the pipeline construction and operation. The expected trans-border impacts on the specific environment components are analyzed and assessed in details in the EIA Report. As a result, it is concluded that the pipeline route suggested as “preferred” on both Bulgarian and Greek side, is the best one from technical and ecological point of view, compared to the other options considered. A trans-border impact is not expected during the construction, in view of the fact that:

- During the project construction and operation there are no emitted quantities of air, water and soil pollutants above the standard, which might have the potential of a trans-border effect:
- The project does not affect the climate unfavourably, does not cross or affect frontier rivers or lakes;
- The expected trans-border impact on the biodiversity is insignificant. Significant natural complexes, protected areas and sites in Greece do not get into the range of route impact in Greece, the closest protected sites (according to the Directive for birds) – Foliuri and Kompsato, are more than 20 km away from the pipeline and an insignificant impact is expected on the habitats of the wolf and the wild cat. In Bulgaria, a Protected site BG0001032 Rodopes-Eastern gets into the route impact, but the impact on the considered natural habitats and species of animals at zone level is indicated as insignificant.

In letter № 1070/12/1119 dated 18.04.2012 Greek government concludes that the project does not make any significant, long-term and irreversible impacts on the natural and created mainly by men environment during the phase of construction or operation, on Bulgarian or Greek territory. which can be considered trans-border effects. For this reason we reckon that the project could be realized without any hazards for trans-border impact regarding both Bulgarian and Greek side.

4.6. Cumulative impact

The cumulative impacts in the area where the project “Gas Interconnector Greece – Bulgaria” will be realized, occur as a result of combined impact of the project with other existing or envisaged future activities in the same area.

The environmental impacts from its realization are mainly related to the construction stage, while the pipeline operation will not make any significant impacts on the environment. It is planned the pipeline construction to be done for a period of 18 months.

For this reason, cumulative impacts are expected during the pipeline construction with existing, already designed or constructed facilities and activities, especially linear, which are described below:

- Roads – Western route crosses 37 roads, of which 2 Motorways (under construction), 14 state roads (class I ÷ III) and 19 municipality roads, as well as a new road to Makaza (built) at 3 points and a new road to Makaza (under construction) at 2 points. Eastern route crosses 32 roads, of which 2 Motorways (under construction), 14 state roads (class I ÷ III) and 16 municipality roads.
- Railways: Western route crosses railways at 5 points: the railway (Dimitrowgrad - Podkova) at 3 points, the railway (Dimitrowgrad - Harmanli) at 1 point and the project for speed motorway to Turkey, while Eastern route crosses railways at 2 points: : the railway (Dimitrowgrad - Podkova) and the project for speed motorway to Turkey.

The strongest cumulative impact which it crosses, such as: the new segment of Motorway Trakia, currently under construction, the designed motorway Maritsa, the first-class road Kardjali – Podkova - which is under construction - Makaza pass - Greece (international symbol E85 and Bulgarian - I-5) etc., and also the planned high-speed railway is expected during the pipeline construction at the same time with other linear facilities to Turkey. The construction of the facility for pipeline crossing will be brief, and a cumulative impact is expected only in case the construction works of both projects coincide in time. In

this case a cumulative impact will occur from traffic increasing, and so there will be increasing of emissions of waste gases and noise, cumulative impact from increasing of dust during excavation works, and a cumulative impact on the population can be expected from the noise.

Investment Proposals envisaged – Based on the information received by MoEW, RIEW (Regional Inspectorate of Environment and Water) and the Municipalities about other projects, it was found that a number of Investment Proposals for wind generator and solar parks, storage bases, silos, shopping centres etc. have been planned, which will be realized/fulfilled by different investors. There are some unclear points regarding the potential cumulative impact in view of lack of information about the exact time frame within which the other Investment Proposals in proximity of the pipeline facilities will be realized, and whether they will be realized. Regarding the scale of these projects and their non-linear nature, it can be expected that their potential for cumulative impact with a pipeline is low. In case the periods of their construction coincide with the one of the pipeline, then a bigger cumulative impact can be expected.

A limited cumulative environmental impact can be expected only if a few big projects of third parties are combined with this project.

The major part of the pipeline route passes through populated areas with numerous realized, permitted or planned investment intentions. From the scale of the projects known and their non-linear character, it can be concluded that the significance for a cumulative impact together with the project is low or insignificant.

On the territory of **Momchilgrad** municipality there is bigger concentration of Investment Proposals significant in dimensions and importance. The project realization, in parallel with the realization of the Investment Proposals, will lead to appearance of a low cumulative effect.

On the territories of **Kardjali**, **Haskovo** and **Stara Zagora** municipalities there are no Investment Proposals creating a precondition for a cumulative effect .

5. INFORMATION ABOUT ENVIRONMENTAL IMPACT PROGNOSIS AND ASSESSMENT METHODS USED

Consultations on the scope of impacts in Bulgaria for defining the scope of impacts for EIA is a compulsory procedure provided in the legislation frame for EIA (Regulation about EIA). It is implemented before preparing the EIA report and stipulates consultations aiming to direct to the probable significant impacts of the project. As a result of defining the scope of impacts, an Assignment for EIA is prepared and submitted to the competent body (MoEW) for review and comment. In this way the competent body has exercised transitional control during the process of EIA Report preparation. The Assignment for EIA contains a description of the project and the alternatives for its realization, contents of the EIA Report, but the real focus is on the main description of the potential significant impacts which are expected to occur as a result of the project. The EIA report is prepared on the base of the Assignment for EIA.

For environment impact assessment and prognosis, the methods shown in “Reference book for the existing methods for environmental impact assessment and prognosis”, MoEW, 1997 are used too.

In the EIA Report the following items are described in details:

- Scope of impacts

- Impacts assessment regarding the environment components and factors: Impacts assessment common approach and principles: Types of impact, Foresight of the magnitude (extend, degree) of the impact, Decision about the vulnerability/sensitivity of the receptor, Assessment of the impact significance, Impact frequency (Permanent, temporary), Impact duration (brief, medium or continuous).
- Assessment of the impacts on species subject of preservation of Protected NATURA 2000 sites.

6. DESCRIPTION OF MEASURES PROVIDED TO PREVENT, REDUCE OR, WHERE POSSIBLE, CEASE THE SIGNIFICANT HARMFUL IMPACTS ON THE ENVIRONMENT, AS WELL AS A PLAN FOR IMPLEMENTATION OF THESE MEASURES

The description and the implementation plan of measures provided to prevent and reduce the harmful impacts on the environment and people's health, which is part of EIA Report, is developed under item 6.1, and item 6.2 shows the Plan for their implementation. This plan comprises of the following phases of execution:

- During the design phases
- During the construction
- During the operation

In connection with the construction of Gas Interconnector Greece – Bulgaria, it is necessary that respective emergency plans for prevention of disasters and break-downs are developed.

As a result of the analysis of the Investment Proposal for construction and operation of “Gas Interconnector Greece – Bulgaria”, in the EIA Report some recommendations are made under item 6.3 of the EIA Report, to elaborate a programme for a private monitoring on the particular environment components and factors, and to the company Emergency plan (item 6.4 of the EIA Report).

7. STATEMENTS AND OPINIONS OF PUBLIC CONCERNED, EIA DECISION-TAKING COMPETENT BODIES AND OTHER SPECIALIZED ADMINISTRATION AND COUNTRIES CONCERNED IN TRANS-BORDER CONTEXT, AS A RESULT OF THE CONSULTATIONS HELD

This item of the EIA Report describes the way of holding consultations, and a Reference is made and attached, containing Attitudes and opinions of the competent bodies and specialized administration, as well as attitudes and opinions expressed by the public in the region during consultations on defining the EIA Report scope, content and form. In the Table answers are given to each question asked or each opinion, and grounds and reasons for accepting or refusing of each one.

In conformity with the requirements of Art. 95, Para. 1 of *Environmental Protection Act* and Art. 4 Para. 1 and 2 of *Ordinance on the conditions and order for carrying out an Environmental Impact Assessment*, in the earliest stage of the Investment Proposal, the Employer sent letters to notify the Ministry of Environment and Water, Municipalities and other administration concerned. Copies of the letters and correspondence were submitted in the *Appendix* to the assignment for the EIA scope and content, because of which they are not attached to the EIA Report.

The Assignment developed for the EIA Report scope and content for the Investment Proposal was sent to the Ministry of Health for consultation, regarding the content and scope of the health and hygiene aspects assessment and the environment and hazard for people's health, as a result of which a reply was received, containing the respective requirements, presented in the EIA Report. During the consultation, letters were sent to all administration, organizations and bodies concerned, including to all municipalities concerned. Apart from this, meetings were held in all municipalities concerned (Stara Zagora, Opan, Radnevo, Dimitrovgrad, Haskovo, Kardjali, Djebel, Momchilgrad, Stambolovo, Kirkovo, Krumovgrad) and Region administration bodies (Kardjali, Stara Zagora and Haskovo), to whom the project was presented with all anticipated impacts during the pipeline construction and operation. Meetings were held in Basin Directorate for water management - East Aegean Region with main office in Plovdiv.

In consideration of the territory scope of the Investment Proposal, a trans-border impact can be expected only in the region of the border band between Bulgaria and Greece, because of which a Notification was sent to Greece. As a result, a letter was received from the Greek Ministry of Environment, energy and climate change – in the letter the competent body in the Republic of Greece expresses its intention to take part in the trans-border procedure of EIA.

In **Appendix 12** to the EIA Report, there is a tabular list of the organizations and persons having sent replies to the notification letters and with whom consultations were held regarding the Investment Proposal. In the same table, the replies received about the Investment Proposal are classified, as well as a reference is made about the grounds for accepted and refused notes and recommendations.

During preparation of the EIA Report of the Investment Proposal, the recommendations were taken into consideration, and replies were given to the questions arising during the consultations held, in accordance with the requirements of Art. 95, Para.2 of Environmental Protection Act and Ordinance on the conditions and order for carrying out an Environmental Impact Assessment.

Description of difficulties (technical reasons, shortage or lack of data) during information gathering for EIA Report

Under this item of the EIA Report, a description can be found of the difficulties encountered during elaboration of the EIA Report of the Investment Proposal, as well as the ways of surmounting them. They are related to the project, surveys on the alternative routes and gathering the necessary information.

8. CONCLUSION

The EIA Report was elaborated by a team of independent experts on the specific environmental components and factors of impact, who, during preparation of EIA, were guided by the principles of reducing and prevention of the risk for people's health and ensuring of steady development, in conformity with the environment quality standards operative in the country.

The Investment Proposal will connect to the existing gas transmission networks in Greece and Bulgaria. The purpose of the connection between the Investment Proposal and the National Gas Transmission System is to supply the amount of natural gas, provided for consumption in Bulgaria. This is a project of great significance for providing certain gas delivery for Bulgaria, which is why, with Decision № 452 dated 7 June 2012, the Council of Ministers in the Republic of Bulgaria declared the Gas Interconnector Greece – Bulgaria in the segment which will be built on the territory of Bulgaria, a national site.

The pipeline enters from Greece crossing the country border at Makaza pass, and approaches Stara Zagora. The EIA Report is prepared about the project facilities situated on the territory of Republic of Bulgaria. In the EIA Report an assessment is made of the Investment Proposal impacts on the natural and social environment during the construction, operation and in case of emergency, as well as taking the installation out of operation after his operational time comes to an end.

The alternatives of the pipeline routes and the technological solutions are surveyed and compared, and the assessment of the possible options for realization of the project shows that both alternative routes – the Western and the Eastern one, are practicable and possible solutions for the project. The Western route is preferable, as the expected impact on the environment is lower and less measures are necessary in order to prevent, reduce or, where possible, cease the significant harmful impacts on the environment. Selection of the more suitable Western route and applying measures to mitigate the unfavourable negative consequences would contribute significantly to restrict and reduce the expected negative consequences.

The water of the Arda river at Studen kladenets lake are classified as a water body with “medium ecological status” and “bad chemical status”. In accordance with the aims of Frame Directive about water (FDW), which Bulgaria is obliged to keep, being a member state of the European community, the aim is to improve the water quality from the current “bad status” to a “good ecological status” in 2021. The project will not endanger the achieving of this aim, as in it there are no elements producing continuously significant amounts of waste waters which are discharged into the rivers. As a result of the dam water bad chemical condition, as well as in conformity with the aims of the Frame Directive, more suitable method would be the method of Horizontal Directional Drill (*HDD*), as this method will allow avoiding the water body modification and will reduce the amount of suspended materials. After a detailed and profound analysis, the experts recommend that the crossing of Studen kladenets lake by the Western route would better be done through the method of Horizontal Directional Drill (*HDD*), with length of about 1500 m.

The river Maritsa water is classified as a water body with “bad ecological status” mainly due to pollution from the city sewerage and nutrients brought by rivers. In case of crossing the river Maritsa through the open method (*open cut*), from ecological point of view, this method might cause changes in morphology and deterioration of quality of the surface water (mobilizing of pollutants from bottom sediments etc). As a result of the river Maritsa water bad ecological status, as well as in conformity with the aims of the Frame Directive, more suitable method would be the method of Horizontal Directional Drill (*HDD*), as this method will allow avoiding the water body modification and will reduce the amount of suspended materials. For this reasons the designers have suggested that the crossing of river Maritsa by the Western route would better be done through the method of Horizontal Directional Drill (*HDD*), which is supported by the EIA Report experts.

The designers have provided a number of measures aiming in reducing the environmental impact. The pipeline routes are in conformity, as far as possible, with the recommendations of the experts on the specific environmental components during their surveys on site and during the analysis of the expected impacts. On the basis of the Investment Proposal expected natural and social environmental impacts, the experts preparing the EIA Report have recommended measures, intended to prevent, reduce or, where possible, cease the significant harmful environmental impacts. These measures are on the separate environmental components for the pipeline design, construction and operation phases. The EIA Report contains recommendations to the monitoring plan.

The pipeline routes cross a few protected sites of the ecological network Natura 2000, because of which, a Compitability Assessment has been made for all potentially affected

protected Natura 2000 sites, in accordance with Bulgarian and European legislation, which Assessment is attached to the EIA Report. On the basis of the data gathered and analysed, terrain surveys done and the anticipated impacts assessment, it was found that, regarding protection of vegetation and animals subject to protection in the protected sites, the Western route is more acceptable than the Eastern one. During realization of the Western route, insignificant to medium negative impacts can be expected, which can be minimized by applying a complex of measures, and this alternative can be realized. That is why the Western option can be approved. The Eastern route will have insignificant, medium and significant negative impacts on a larger number of amphibian, reptile and mammal species and on a bigger area of their habitats. For this reason it is not recommended the Investment Proposal to be realized through the Eastern route.

The data analysis in the health risk aspect shows that the investment project, by keeping strictly Bulgarian and European legislation requirements and the best international standards and practices in pipeline construction and operation, and environment protection, will not create a significant health risk for the population. The health risk is low for the population and medium for the workers, acceptable and controllable.

The conclusion of the independent experts team having elaborated the Environmental Impact Assessment and Compatibility assessment is, the Investment Proposal for Gas Interconnector Greece – Bulgaria to be approved for the Western route. Its realization can continue to the next stage of its development along the Western route, by keeping strictly Bulgarian and European legislation requirements and the best international standards and practices in the field of design, operation, taking out of operation and environmental protection, and by applying the additional measures for environmental protection recommended in the EIA and CA Reports.

9. APPENDICES

Appendix 1 – Layout with indicated location of the Investment Proposal and the settlements in the area

Appendix 2 – Layout with indicated location of the Investment Proposal and the NATURA 2000 Sites and Protected Areas