

**Gas interconnector
North Macedonia - Greece**

**CBA, Feasibility Study update,
Environmental and Social Impact
Assessment, Basic (detailed) Design
and Tender Dossier**

**Supplementary Environmental and Social Assessment
Draft Final Report**

August 2022

**Technical Assistance to connectivity in the Western Balkans
EuropeAid/137850/IH/SER/MULTI**



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List of Abbreviations

Abbreviation	Meaning
Aol	Area of Influence
CH	Critical Habitats
CHSSP	Community Health, Safety and Security Plan
CONNECTA	Technical Assistance to Connectivity in the Western Balkans
CSMP	Construction Security Management Plan
DG NEAR	Directorate-General for Neighbourhood and Enlargement Negotiations
DPM	Diesel Engine Particulates
EBRD E&S (2019) PR	EBRD Environmental and Social Policy Requirements (2019)
E&S	Environmental and Social
EPRP	Emergency Preparedness and Response Plan
ESMP	Environmental and Social Management Plan
GHG	Greenhouse gases
GIP	Good International Practice
HC	Hydrocarbons
HDD	Horizontal Directional Drilling
HIA	Cultural Heritage Impact Assessment
MoEPP	Ministry of Environment and Physical Planning
Mol	Ministry of Internal Affairs
Mott MacDonald-CONNECTA Consortium	The Consortium carrying out the present project
NER	National Energy Resources
NOx	Nitrogen oxides
OHS	Occupational Health and Safety
OHSMP	Occupational Health and Safety Management Plan
OSMP	Operations Security Management Plan
PBF	Priority Biodiversity Features
PRS	Pressure reducing station
SSEIA	Supplementary Environmental and Social Impact Assessment
SEP	Stakeholder Engagement Plan
SOx	Sulphur Oxides
TMP	Traffic Management Plan
TOC	Total Organic Compounds
PM 2.5 / PM10	Particulate Matter 2.5 micron / 10 micron
RoW	Right of Way
WMP	Waste Management Plan
HMMSP	Hazardous Materials Management and Spill Prevention Plan
VECs	Valued Environmental and Social Components

Synopsis

Project Title:	TA to Connectivity in the Western Balkans (CONNECTA)
Project Number:	Europe Aid/137850/IH/SER/MULTI
Sub-project Title	Gas interconnector North Macedonia – Greece CBA, Feasibility Study update, Environmental and Social Impact Assessment, Basic (detailed) Design and Tender Dossier
Sub-project Number:	CONNECTA-ENE-INFR-MK-CBA+FS+ESIA+BD+TD-03
Contract number:	2016/382-382 plus 2018/402-907 – Addendum No 1
Contracting Authority:	European Commission, DG NEAR
Beneficiaries:	Albania, Bosnia and Herzegovina, North Macedonia, Montenegro, Serbia and Kosovo*
Region:	South Eastern Europe (SEE)
Contractor:	Mott MacDonald Romania Srl in Consortium with WYG SAVJETOVANJE d.o.o., COWI A/S, CeS COWI d.o.o. (renamed CESTRA d.o.o.), TRENECON Consulting & Planning Ltd and SYSTEMA Consulting SMLTD
Contract signed:	19 December 2016
Full Mobilisation of 3 KE:	20 January 2017 (date of Kick-off Meeting in Brussels)
Project Duration:	72 months and 13 days (following Addendum No 1)
Anticipated completion:	31 December 2022 (following Addendum No 1)
Contractor's Project Director:	Andrei Penescu is the Project Director Dusan Savkovic is the Consortium's Project Manager
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* This designation is without prejudice to positions on status, and is in line with UNHCR 1244 and the ICJ Opinion on Kosovo declaration of independence

1 Introduction

The Government of the Republic of North Macedonia, as part of its national strategy for the development of the National Gasification System in the country, intends to construct an interconnector gas pipeline between North Macedonia and Greece. Promoter of the Project in North Macedonia is the National Energy Resources (NER). The gas interconnector with Greece is a key energy infrastructure for North Macedonia that will ensure energy security of supply, diversification of energy sources, increase competition via integration of energy markets and economic, social and territorial cohesion by linking North Macedonia, a pre - accession country, with the region and EU. The project is aligned with national objectives and priorities. It is also in line with EU policies, being indicated as a Project of Mutual Interest according to the EU Energy Community and included as a flagship project in the Economic and Investment Plan for the Western Balkans. The most important economic and social benefit stems from the security of supply feature.

The project received support from the CONNECTA technical assistance facility. The Environmental Impact Assessment (EIA) procedure has been processed separately for the Greek section and the North Macedonia section of the interconnector. For the North Macedonia section Mott MacDonald CONNECTA Consortium was engaged to develop technical documentation including an ESIA package providing basis for closure of the national environmental permitting process.

The environmental permitting process as well as development of appropriate E&S documents were carried out in compliance with EU and national laws and requirements, EIB and EBRD requirements.

The Project for the North Macedonian interconnector section received a decision for approval of the E(S)IA study by the Ministry for Environment and Physical Planning (MoEPP). Below is a summary of the permitting process:

- A transboundary environmental impact assessment procedure conducted
- EIA submitted to MoEPP
- Public consultation process (completed)
- Public hearing (completed)
- MoEPP issued a decision for EIA approval on 26th January 2021

In relation to the transboundary permitting, the MoEPP submitted a Letter of Intent regarding the implementation of the project to the Greek national authorities (the Ministry of Environment and Energy (MoEE) of the Republic of Greece) on 04.09.2019. An official reply was received stating that no significant environmental impacts are anticipated on the Greek territory and there is no need for the Greek environmental authorities and public to participate in the environmental impact assessment of the project.

The European Bank for Reconstruction and Development (EBRD) is considering providing finance to NER for the North Macedonia section of the Gas Interconnector. The Project falls under Annex II of the European Union EIA Directive, Category A according EBRD ESP Standards 2019. A gap analysis¹ of the Gas Interconnector EIA documents was completed in 2021 against the EBRD E&S requirements. It identified a number of E&S gaps and required that a Supplementary Environmental and Social Impact Assessment (SESIA) and Environmental and Social Management Plan (ESMP) are to be prepared and approved by the EBRD.

The Supplementary ESIA Report provides additional information to the national Environmental and Social Impact Assessment study completed by the project proponent (NER), to further consider the potential for significant effects and mitigation measures necessary for compliance with the EBRD E&S requirements.

¹ESAS. Environmental and Social Due Diligence of the North Macedonia section of the Greece-North Macedonia Gas Interconnector”, September 2021

This report should be read in conjunction with the following:

- Environmental Impact Assessment Report “Gas Interconnector North Macedonia – Greece”, Final Draft, July, 2020;
- Social Impact Assessment Report “Gas Interconnector North Macedonia – Greece” Final Draft, July, 2020;
- Associated documentation for ESIA: Non-Technical Summary, Stakeholder Engagement Plan, Environmental and Social Action Plan;
- Environmental and Social Assessment Report “Environmental and Social Due Diligence of the North Macedonia section of the Greece-North Macedonia Gas Interconnector”, September 2021 (“Due Diligence Report”)
- Associated documentation for ESA Report: Environmental and Social Action Plan
- DESFA Feasibility Study “Natural Gas Interconnector Greece – Former Yugoslav Republic of Macedonia” (2019) (Interconnector Feasibility Study)

This report forms part of the ESIA disclosure package in line with the EBRD requirements. The package includes:

Placeholder – to be filled out once the composition of the disclosure package is determined

2 Approach and Methodology for Supplementary ESIA

2.1 Supplementary ESIA Approach

Projects that are funded by the EBRD must be compliant with the EBRD's E&S Performance Requirements (PR). In 2021, an E&S Due Diligence (ESDD) was conducted on the project to ascertain compliance with the EBRD PR and of necessity the EIA completed for local EIA approval was reviewed as part of the ESDD. The ESDD contained multiple findings where the information presented by NER did not comply with the PR. The overarching recommendation from the ESDD was to prepare a supplementary ESIA and ESMP that would serve to address the areas of PR non-compliance identified in the ESDD by providing information or by providing a more detailed assessment, than was previously available.

The supplementary ESIA is based on EBRD's ESP 2019, including the following Performance Requirements:

PR1	Assessment and Management of Environmental and Social Risks and Impacts
PR2	Labour and Working Conditions
PR3	Resource Efficiency and Pollution Prevention and Control
PR4	Health, Safety and Security
PR5	Land Acquisition, Restrictions on Land Use and Involuntary Resettlement
PR6	Biodiversity Conservation and Sustainable Management of Living Natural Resources
PR8	Cultural Heritage
PR10	Information Disclosure and Stakeholder Engagement

Supplementary ESIA work was carried out in steps as follows:

- Desktop work - review of existing work and completed E&S documents
- Additional field surveys including baseline monitoring (air, water, soil, biodiversity)
- Supplementary impact assessment
- Socio-economic survey
- Supplementary mitigation measures proposal
- Preparation of supplementary ESIA report

2.2 Supplementary ESIA Impact Assessment Methodology

The supplementary ESIA assessment followed the methodology applied in the national ESIA.

For characterization of the potential impacts the criteria in the following table were used.

Table 2-1: Impact Assessment Criteria

Criterion	Further Description of Criteria	Indicative Assessment Thresholds used for each Rating Criteria	
		Threshold	Typical Descriptions
Characterization of Impact	Direction of the impact	Positive	The impact improves the current situation or is desirable.
		Negative	The impact worsens the current situation or is not desirable.
Type of impact	Type of impact	Direct	The project results in a direct impact upon an aspect/receptor/resource.
		Indirect	Indirect effect upon an aspect/receptor/resource.
		Cumulative	Cumulative effect upon an aspect/receptor/resource.
Reversibility	The ability for a physical parameter, biological or social community to return to the conditions that existed prior to the impact.	Reversible	The effect is reversible.
		Irreversible	The effect is potentially permanent and not reversible.
Geographic extent	It describes the area over which the particular impact will occur and is related to the spatial boundaries of the assessment.	Local	The impact is limited to specific individuals or population groups or environmental receptors at or close to the project.
		Regional	The impact extends across a region (several municipalities).
		National / Transboundary	The impact extends nationally or across borders.
		Global	The effect extends globally.
Time when the impact occurs	Associated with when the impact will occur.	Immediate	The effect occurs immediately following the project activity/action.
		Delayed	The effect is delayed and occurs sometime after the project activity/action.
Duration	How long an impact will last; closely related to the project phase or activity that could cause the impact.	Short-term	Short-term (e.g. less than two years).
		Medium-term	Medium-term (e.g. between two and ten years).
		Long-term	Extends throughout the operation of the project and/or beyond 10 years.
Likelihood	The likelihood that the impact will occur	Unlikely	The impact can be considered to be unlikely to occur.
		Likely	Medium likelihood of occurrence.
		Certain	High likelihood of occurrence.

This methodology is based on assessment of significance of impact which is a function of estimated sensitivity of resource/receptors and magnitude of the impact:

- **The sensitivity (value)** of the receiving environment/community/receptor and the affected numbers (where relevant)
- **The magnitude** of the impact and whether it is negative or positive is estimated based on:
 - The type (direct/indirect/cumulative)
 - The geographic extent (local/regional/national)
 - The reversibility (reversible/irreversible impact)

Sensitivity (value) of the receptors and resources: the analysed social and environmental resources that are likely to be affected include air, water, soil, landscape, habitats, cultural heritage, public health, and economic livelihood. The applied descriptive elements and criteria for assessment of the sensitivity of the resources / receptors are given in the following table.

Table 2-2: Sensitivity of receptors

Sensitivity	Typical descriptors
Very High	Very high importance and rarity, international scale and very limited potential for substitution.
High	High importance and rarity, national scale, and limited potential for substitution.
Medium	High or medium importance and rarity, regional scale, and limited potential for substitution.
Low	Low or medium importance and rarity, local scale.
Negligible	Very low importance and rarity, local scale.

Magnitude of the impacts: The descriptors and criteria used in order to define the magnitude of impact for the purposes of the supplementary ESIA are given in the following table.

Table 2-3: Magnitude of impacts

Magnitude of impacts	Typical descriptors of the criteria
High	<p><u>Negative:</u> Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements.</p> <p><u>Positive:</u> Large scale or high improvement of resource quality; extensive restoration or enhancement; major improvement in the quality of the attributes.</p>
Moderate	<p><u>Negative:</u> Loss of resource, but not adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements.</p> <p><u>Positive:</u> Benefit to, or addition of, key characteristics, features or elements; improvement of the quality of the attributes.</p>
Low	<p><u>Negative:</u> Some measurable change in resource or its quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements.</p> <p><u>Positive:</u> Minor benefits to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on resource or reduced risk of negative impact occurring (positive).</p>
Negligible	<p><u>Negative:</u> Very small loss or adverse change in one or more characteristics, features or elements.</p> <p><u>Positive:</u> Very small benefit to, or addition of one or more characteristics, features or elements.</p>
No change	No loss or change in the characteristics, features or elements; absence of any notable impact in any direction.

Significance of impact: Five categories (very high, high, moderate, low and Insignificant) are used to assess the significance of each impact.

Table 2-4 Significance categories of the impacts

		MAGNITUDE OF THE IMPACT (DEGREE OF CHANGE)				
		No change	Negligible	Low	Moderate	High
SENSITIVITY (VALUE) OF THE ENVIRONMENT	Very High	Insignificant	Low	Moderate or High	High or Very High	Very High
	High	Insignificant	Low	Low or Moderate	Moderate or High	High or Very High
	Medium	Insignificant	Insignificant or Low	Low or Moderate	Moderate	Moderate or High
	Low	Insignificant	Insignificant or Low	Insignificant or Low	Low	Moderate
	Negligible	Insignificant	Insignificant	Insignificant or Low	Insignificant or Low	Low

Impacts classified as “Insignificant”, “Low” and “Moderate” were considered not to require further mitigation. Impacts classified as “High” or “Very high” were considered to require specific/targeted mitigation and adaptive management verifying the efficacy of the mitigation in place and/or the need for additional mitigation.

Impact Mitigation

Where a significant impact was identified the following sequence of mitigation was applied:

- Avoid the impact
- Minimise the impact
- Remediate the impact
- Compensate for the impact

The above process defined measures that need to be implemented by the project to mitigate its impacts. These measures have been presented to and agreed with the project developer, and incorporated in the ESMP as clear commitments.

Residual Impacts Assessment

Residual impact assessment considered the significance of impact remaining after mitigation measures have been implemented. The assessment was based on expert judgement for each environmental and social aspect.

3 Project Overview

3.1 Project Context and Description

North Macedonia has limited domestic energy resources and its energy dependence on imports is 67%². Domestic energy resources have been historically limited mainly to lignite coal and hydro for electricity production, and to a lesser extent biomass and geothermal for heating.

Gross inland energy consumption¹ is dominated by petroleum products (38.7%), followed by solid fuels (29.3%) and renewable energy (13.5%). Natural gas constitutes 10.8% of the total energy needs, predominantly used in CHP and industry (see Figure 3-1 below).

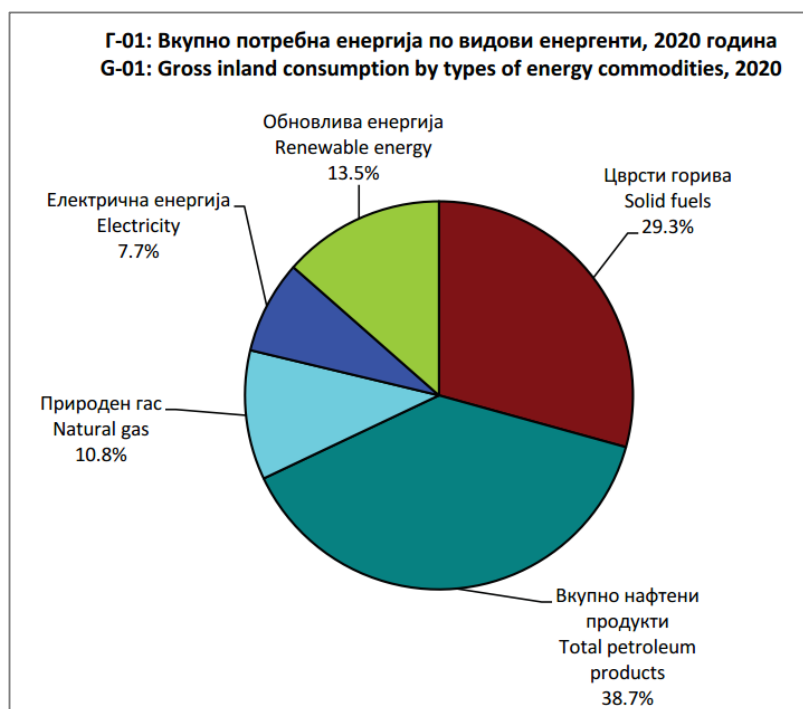


Figure 3-1 Gross Inland Energy Consumption 2020

According to Macedonian Energy Strategy (2020-2025), due to reduction of lignite and increase of wind and solar natural gas is projected to play an essential part as a transitional energy source through to 2050. Therefore, natural gas consumption is forecast to significantly increase in both energy transformation (electricity generation) in support of renewables, and as final energy use due to economic growth and conversion of domestic and industrial/commercial use to natural gas.

The extent of operational primary natural gas network is currently limited to a 98km pipeline from Bulgaria delivering Russian gas into Skopje, which has been in service since 1997. National Energy Resources is extending the primary gas network around the country to Shtip, Negotino, Prilep, Bitola, Tetovo and Gostivar (see Figure 3-2 below). The Government is also working on developing secondary gas networks in the municipalities.

²State Statistical Office, Energy Balance 2020

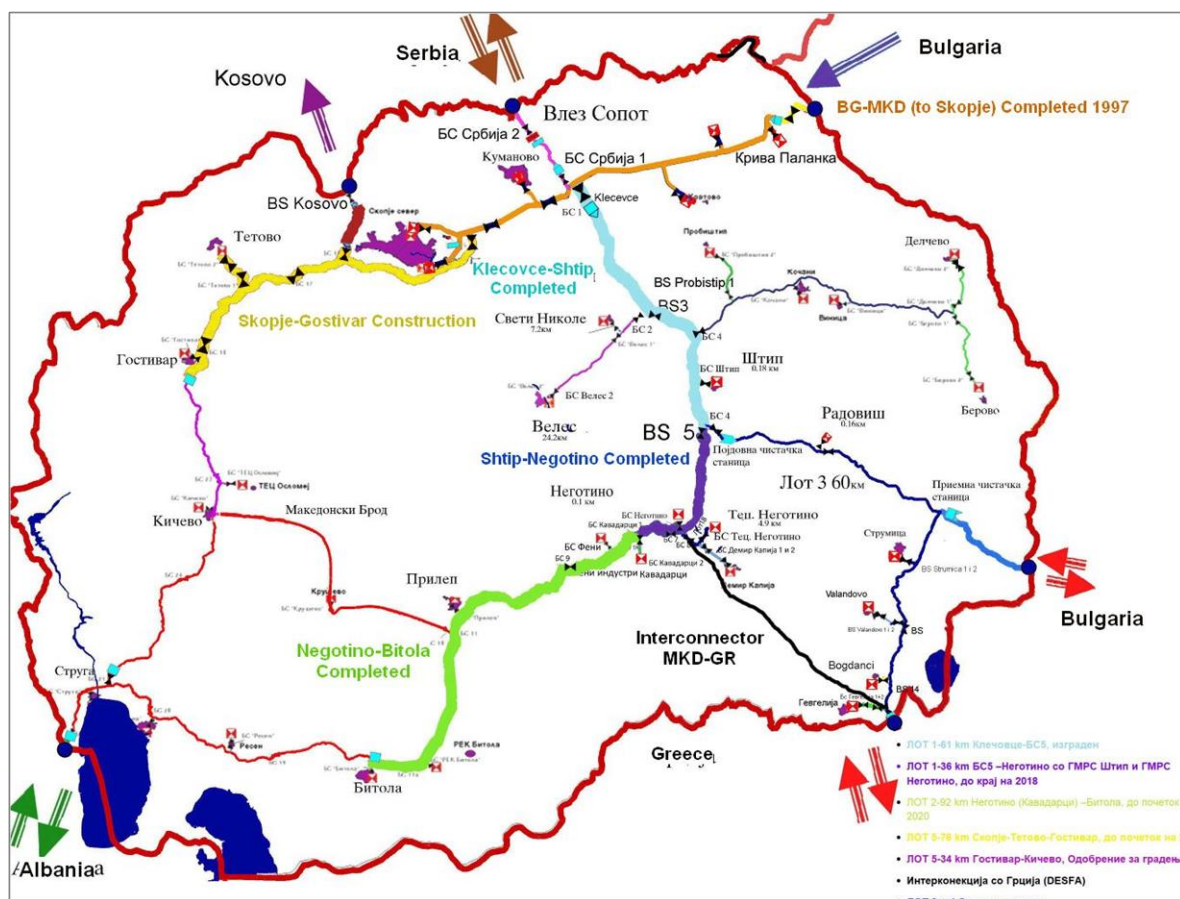


Figure 3-2 Primary Status of Gas Network Macedonia

Development of the primary and secondary networks will enable the projected increase in gas consumption. However, the only current source of natural gas is the Bulgaria-Macedonia pipeline.

Greece-North Macedonia Gas Interconnector will connect the Macedonian transmission network to the Greek network. The pipeline will be an integral part of the National Gasification System. It will provide diversification of natural gas sources and increase security supply.

The Macedonian section of the gas pipeline will start at the border with Greece in the vicinity of Idomeni village and the town of Gevgelija. The end point will be at the existing valve station (block station BS8) in the vicinity of the town of Negotino.

The project comprises an underground gas pipeline, cleaning stations (pig launcher and receiver), a pressure reducing station, pipeline section isolating block stations, and cathodic protection units, as shown in the table below.

Table 3-1: Project Underground and Aboveground Facilities

Description	Length or Chainage
Gas Pipeline, DN700 (28"), optical cable conduit	Length: 66.7km
Cleaning Station (pig launcher/receiver)	6+735km
Cleaning Station (pig receiver)	66+055km
Pressure Reducing Station	66+275km
Block Station I1	6+860km
Block Station I2	28+730km
Block Station I3	51+160km
Block Station I4/I5	66+440km
Cathodic Protection Unit 1	6+860km

Description	Length or Chainage
Cathodic Protection Unit 2	27+830km
Cathodic Protection Unit 3	51+060km

3.2 Project Categorization according EBRD's E&S Policy 2019

The national EIA document suggests that the project is classified as Category B as the project is partially captured according to EBRD's E&S Policy Appendix 2, and that the potential environmental and social impacts from the project are typical for the location and can be easily identified and effective mitigation measures can be addressed.

The due diligence report commented that, even though the project is partially captured according EBRD's ESP Appendix 2, the significance of environmental and social risks and impacts of the project cannot readily be identified or assessed. Therefore, Category A classification is appropriate.

The supplementary ESIA concurs with the due diligence report assessment that the project should be classified as Category A.

3.3 Material Use and Resource Efficiency

3.3.1 Energy

3.3.1.1 Energy usage during construction

Diesel/petrol and electricity will be the sources of energy during construction of the project.

Diesel/Petrol – diesel fuel or petrol will be used for light vehicles, powering construction machinery and equipment and electricity generators.

Diesel fuel can be delivered with small (10t capacity) fuel trucks directly to the pipeline construction corridor. Small trucks have 12m turning radius and are able to turn within the construction corridor. Environmental protection measures will be implemented for refilling mobile tanks from the fuel trucks, such as bunding to contain spillage. Construction contractor will be responsible for development of appropriate procedures.

Electricity – electricity used in construction activities, including welding, metalworking power tools, lighting, will be generated from mobile diesel generators. Electricity from the national electricity network will be used for domestic use at accommodation facilities which have existing infrastructure (see section **Error! Reference source not found.**). Grid electricity will potentially be used at laydown/storage yards, should there be existing electricity infrastructure, depending on the final location of the yards (see section **Error! Reference source not found.**). Grid connections for some anode fields can be established early and serve as power supply if laydown/storage located in the vicinity (e.g. nearby anode field #1).

3.3.1.2 Energy usage during operations

Diesel/Petrol – diesel fuel will be used for light vehicles and trucks for operation and maintenance activities. Diesel fuel will also be used for back up diesel generators at anode fields (for cathodic protection and as back up for pressure reducing station power supply. The pipeline system will be unmanned and regular operation and maintenance efforts will involve daily/weekly checks at the pressure reducing station, and regular checks along the pipeline corridor. Heavy equipment usage for regular maintenance is not anticipated. Fuel quantities required during operations will be minimal (fuel for light vehicles or trucks).

Electricity – electrical power during normal operations will be supplied from the national electricity network. Electricity use will be for anode fields (cathodic protection), for lighting and powering various equipment in the pressure reducing station.

Natural Gas – small quantity of natural gas tapped off the main pipeline will be used as fuel for the gas heaters in the pressure reduction station.

3.3.2 Water

3.3.2.1 Water usage during construction

During construction water will be used for the following:

Potable/sanitary: Bottled potable water or water dispensers will likely be used on sites during construction. Estimated requirement around 500 litres per day. Mobile toilets will be used during construction, no water will be required. Water for domestic sanitary needs will be provided as part of accommodation.

Dust suppression: water for dust suppression will be used during hot and windy periods. It is estimated that around 10-15m³ of water will be required daily during the dry season for dust suppression. Water for dust suppression will be sourced from municipal water networks, municipal or private wells and irrigation systems or from water streams.

Pressure testing: in accordance with EN1594 and EN12327, pressure testing of the gas pipeline can be carried out using water, which is the recommended method, or gas (such air or nitrogen).

If water used for pressure testing, possible sources may be suitable water bodies along the pipeline route, irrigation systems and local/municipal water networks. The pipeline will be pressure tested in sections which will be determined in accordance with the following requirements:

- Upper limit on hydrostatic pressure due to difference in elevation;
- Locations of water sources and discharge points, and quality of water

It is estimated that length of individual sections could potentially reach 15km, which would require up to 5,500m³ of water. Water may be reused for testing subsequent sections of the pipeline.

There are several potential water sourcing points for testing along the pipeline route: Gjavato and Paljurci water systems (Gevgelija Water Company), Vardar River, Petrushka (near Petrovo, BS-2, appx 29km), Drenska Dam (Koprishka and Drenska Rivers, appx 47km), Doshinica/Boshava, Irrigation channel from Tikvesh Lake Irrigation System.

Water used for testing has to be compliant with water quality specification (concentration of salts, pH value) in accordance with best industry practice and local regulations. The construction contractor shall develop a hydrotest procedure within the Construction Management Plan to ensure water sourcing for hydrotesting purposes does not adversely affect the water level of a natural water body.

Appropriate licenses and agreements for water usage as well as water discharge will need to be secured by NER or construction contractor, as appropriate according to law.

Alternatively, the pipeline can be pressure tested with air or inert gas, which will eliminate the need for water and its disposal. Testing with gas poses higher safety risks which need to be managed, primarily related to containment of stored gas energy (pressure-volume considerations) and decompression behaviour. If pressure testing is carried out with gas, appropriate procedures need to be developed and testing safety precautions need to be taken in accordance with standards and good industry practice.

NER will make a determination on the method for pressure testing based on technical, environmental and economic criteria.

3.3.2.2 Water usage during operations

Pipeline including aboveground facilities, will be an unmanned operation with intermittent presence of staff on site. Water installations are not required for operational purposes. Bottled potable water will be provided, and portable toilets will be sourced from a local contractor. Operation of the pipeline does not require process water make-up. Fire protection water for the pressure reducing station will be from the Negotino local fire station as part of the fire emergency response.

3.3.3 Equipment

Construction of the interconnector is a conventional civil engineering project and will not require untested techniques or non-standard equipment and materials. Equipment and machinery that will be used for construction of the gas pipeline is outlined in the table below:

Table 3-2: Project Construction Equipment

Excavator	Pipe welding manipulator
Trencher	Pipe welding machine
Bulldozer	Side boom
Power shovel	Compressor
Roller	Heavy haul transportation vehicle
Concrete mixer	Crew Transport Bus
Crawler loader	Pickup truck
Tractor unit	Water tanker truck
Truck	Ambulance
Trailer	Double cabin vehicle
Pipe hauling equipment	Diesel power generator
Crawler Crane	Other smaller equipment and tools

Specialised machinery and equipment will be used for construction in locations where HDD (horizontal directional drilling) has been specified as the crossing method. These are also industry standard techniques and equipment.

3.3.4 Materials

A wide range of materials will be used in the construction of the pipeline, including:

- Steel pipes and pre-fabricated pipe bends;
- Backfill sand;
- Explosives for blasting;
- Concrete, reinforcement steel;
- Structural steel for above-ground installations;
- Welding gases and consumables;
- Mechanical/electrical materials and components for underground and aboveground installations, including:
 - Power supply connections for anode protection and reduction station (transformers, cables, wired electrical panels and other HV/LV equipment);
 - Anode protection components;
 - Pumps, valves, fittings, pressure regulators, filters, gas heaters, instruments, cables and electrical/control panels and so on.
- Lubrication oils and other consumables for construction machinery.

Industry standard materials and components will be used in the construction of the project. Efficient use of materials has been built into the design, whereas pre-fabricated components have been specified as practically as possible thus minimizing waste.

In terms of pipe material, surplus pieces with minimal required length will be re-used, other pieces will be recycled.

Backfill material will be sourced to project specified quality from licensed commercial suppliers.

Padding and backfill material will be river rock material (not crushed rock) compliant with relevant standards (EN933-1, EN933-8, EN933-3, EN1097-3). It will be sourced from local licenced commercial suppliers to the required specification, minimising risk for pipe and coating damage. Material excavated from pipe trench will be fully reused as backfill, with any remaining material spread over the RoW in accordance with the design.

Concrete for foundations and structure for the pressure reducing station will be sourced to specification in accordance with the design requirements, from a local commercial batching plant in the vicinity of Negotino/Demir Kapija.

4 Health, Safety and Security

Implementation of the project requires community and occupational health, safety and security issues to be given high priority.

The supplementary ESIA focused on the following, as required in the ESDD report:

- In relation to community health and safety: accommodation, materials and equipment storage/laydown, traffic and construction access; and
- In relation to occupational health and safety: risks from working in/near surface water bodies, blasting activities, animal attacks and bites, and security.

4.1 Community Health and Safety and Security

4.1.1 Accommodation

Worker Accommodation

Construction workforce will vary depending on the construction schedule and sequencing, expected to peak around 100 people including investor's staff, supervision staff, contractor and sub-contractor management staff and labour force. During the peak, construction activities are likely to be taking place in multiple locations.

Existing infrastructure will be utilized for accommodation for construction workforce. Workforce accommodation is envisaged at both ends of the pipeline (Gevgelija region and Demir Kapija region) to reduce travel time and costs.

Gevgelija and surrounding region has significant capacity for hotel and hostel accommodation. This can service construction accommodation needs for the southern part of the pipeline.

Demir Kapija and Negotino region also has significant capacity within existing infrastructure to accommodate the remaining part of the route. There are several hotels in Demir Kapija and Negotino with capacity of up to 150 people, hostels, private accommodation and so on. It may be possible to utilize the construction work camp for Smokvitsa-Gevgelija Highway (Corridor X), located in the town of Demir Kapija, this is currently unused. It has a suitable location in terms of traffic connections as well as a significant area which can be utilized for intermediate pipe laydown, if required.

Portion of the workforce will be sourced locally, therefore the accommodation capacity will likely be lower than the peak workforce requirement.

Setup of temporary self-contained camps is not envisaged at this stage. Utilisation of the existing accommodation infrastructure will provide boost to the local economies.

Site Offices

Establishment of site offices at the two ends of the pipeline is considered a practical solution. Site offices could be in rented office space in urban areas (Bogdantsi, Gevgelija and so on) or in the same location as the storage yards, while another site office location would be in Demir Kapija.

Construction contractor will be responsible for all arrangements and logistics related to worker accommodation and offices.

Accommodation camps will not be combined with laydown/storage yards and bending areas as transport of materials and metal work create noise and dust.

4.1.2 Storage/Laydown

During construction temporary storage will be required for the following:

- Pipes;

- Construction materials and components;
- Construction equipment and machinery Tracked equipment vs tyred equipment;
- Padding and backfill material – no storage needed, directly delivered on site from supplier when needed;
- Explosives and blasting equipment; and
- Fuel – delivered via fuel trucks to site (or cannisters), spillage prevention etc according to best practise. Contractor to sort out.

Pipes and pre-fabricated pipe joints will be temporarily stored at established pipe storage yards (laydown areas) which will be located at suitable locations agreed with private land owners or local/state government. Sequenced fabrication and delivery of pipes and fittings to laydown locations is envisaged as the construction will take around 18-24 months to complete. Avoiding long periods of storage will maintain quality of the delivered pipeline components, as well as contribute to reducing storage footprint requirements.

Potential locations for pipe storage/laydown:

- At Gevgelija end (initial half of the pipeline) – possible location at the Gevgelija customs depot, Gevgelija industrial zone appx 13th km, at 6th km of the route convenient area for storage; and
- At Demir Kapija end (initial half of the pipeline) – possible storage at the depot in DK (west side of DK) same as accommodation, large plot.

Materials for pipeline civil construction will be temporarily stored within the pipeline construction corridor.

As outlined in section 3.3.4 padding and backfill materials will be sourced from local commercial suppliers. Intermediate storage will not be required as delivery of materials will be on demand directly to construction site.

For the pressure reducing station, concrete to required specification will be sourced from a local commercial batching plant in the vicinity of Negotino/Demir Kapija. Temporary storage of pressure reducing station materials and mechanical/electrical components can be either at customs storage or same as pipe laydown area. Consumables can be stored at pipe laydown locations.

Storage of construction machinery and equipment – during non-working hours machinery and equipment will be stored under project security on construction site. Other machinery and equipment, for shorter terms storage laydown/storage yards can be used; for longer durations construction contractor home depot or alternative location can be used.

As described in section 3.3.1.1 storage of diesel fuel is not anticipated. It is expected diesel fuel be sourced from a local supplier and delivered directly to construction sites via small fuel trucks. The construction management plan should incorporate appropriate precautionary and protection measures related to spillage containment and cleanup.

Construction contractor in conjunction with NER will determine locations for pipe laydown and storage of materials and equipment.

Storage of explosives – handling of explosives is covered by the Law for Protection from Explosive Materials³. The law covers the sourcing, procurement, transport and storage of explosive materials. The Ministry for Internal Affairs by law is required to be involved to ensure secure transport of explosives.

³ Official Gazette of Republic of Macedonia 148/2015.

The construction contractor will be responsible to ensure safe storage and transport of explosives to construction site by engaging a licenced company specialising in import and logistics of explosives in accordance with the law. Licenced companies have their own storage arrangements.

4.1.3 Traffic and Construction Access

The existing regional and local road network will be utilised during construction to access the pipeline construction corridor.

The route intersects with around 15 sealed local and regional roads and a significant number (over 30) local and country unsealed roads, which provides a broad range of access routes to the corridor. Construction of new road infrastructure will not be required.

The mountainous section of the route from Rudine to Dren (approximately 27km to 47km chainage) may utilise old tracks used for construction of the existing oil pipeline, which may require some improvement. A beneficial option would be to use access roads for the wind parks Dren 1 and 2, which are currently in preparation, with agreement from the project's developer.

All goods and personnel will be transported from these access points along the construction corridor.

Pipeline components will be transported from laydown locations to construction corridor entry points on flatbed trucks or transferred to tractors for final haulage in areas with terrain with over 30% incline. Transport of other construction materials and components as well as workforce will also be carried out using the same access routes.

Transport of explosives will be in accordance with the Law for Protection from Explosive Materials and will be carried out by a licenced company. Same access points to the construction corridor will be used as for other construction materials.

As required by the Law for Construction in Macedonia, a Traffic Management Plan will be developed by the construction contractor and implemented throughout the construction. Confirmation of access routes for the entire construction and requirements for road improvements need to be addressed in the tender documents for selection of the main construction contractor.

4.2 Occupational Health and Safety and Security

Supplementary baseline was scoped on the basis of desktop research, site visit as well meetings with the Designer/NER. Potential risks of working in/near surface water bodies, risk from blasting activities, risk from animal attacks/bites as well consideration for use of security personnel, workers site offices/accommodation and traffic management are part of the supplementary ESIA.

4.2.1 Construction - OHS risk from works in/near surface water bodies

OHS risk from works in/near surface water bodies on this project are associated with activities related to construction of river crossings. The most significant river crossings points are on km 8+500 (river Vardar) and 52+200 km (river Doshnitsa and river Boshava) which will be constructed with HDD technique. Other water crossings are occurred with small rivers, streams and channels which will be constructed using dry or wet crossing methods.

All equipment and machines shall be safety validated, tested and certified in accordance with the Law on OH&S as well certified with CE mark. Personnel working with the equipment must have appropriate operational and safety training. This validation shall be reviewed and checked by the supervising engineer before any drilling work commence.

4.2.2 Construction - OHS risk from blasting activities

Blasting activities during construction of the project are expected to occur between 20+000 km to 45+000 km where shallow rock terrain may be present along the route. This activity needs to be performed by a licensed contractor for blasting works that will operate under the mandatory safety and security protocols and systems.

Blasting activities involve use of explosives materials and devices in accordance with National requirements⁴. Ministry of Internal Affairs (Mol) is the government body that regulates the handling of explosive materials and devices including: trade, storage, protection and transport of flammable liquids, gases, explosives and other hazardous materials. That implies storage of the explosives in strictly approved facilities by Mol, transport with vehicles registered for that purpose, provision of blasting plan to the Engineer before any activity on site, communication procedure with Mol and affected Crisis centers, licensed and trained personnel for handling of the explosives, setting safety perimeter, re-check non exploded devices after blasting events, procedure in case of failure of blasting event under different circumstances and awareness training to all employees regarding usage of explosives.

4.2.3 Construction - OHS risk from animal attacks/bites

Supplementary biodiversity survey found presence of grey wolf (*Canis lupus*) and horned viper (*Vipera ammodytes*) along the route. Health and safety procedures should include incorporate potential risks of grey wolf attacks and horned viper bites. Potential for grey wolf attack is highest in the winter months while bites by horned viper during late spring months. All workers shall receive appropriate training by qualified biodiversity specialist regarding behavior, typical habitats and spread of these two species as presented in Biodiversity baseline document. The contractor shall develop a specific procedure for bite by venomous snake and reassure with the health centers or hospital along the alignment (Gevgelija, Valandovo, Demir Kapija and Negotino) the presence of anti-venom kits.

4.2.4 Construction - Use of Security Personnel

The construction of the project will be carried out on fixed construction locations (pressure reducing station, block stations, storage/laydown areas etc) and non-fixed locations (continuously moving construction site along the route). The specifics of the construction require access control and regular monitoring of the entire route and all other associated project locations against theft, people and animal trespassing, protection of construction equipment and plant on site during non-working hours.

A Project Security Plan including clear measures to protect project materials on site, storage and laydown areas as well workers against theft and attack should be developed by the Contractor. Engaged security staff/agencies must possess appropriate licences as required by Law, and confirmation that they have not been implicated in any previous crimes or abuses.

The Contractor should apply contractual agreements for securing services of sub-contractors and suppliers, which ensure they are obliged to comply with all environmental and social requirements contained with applicable Project documentation and standards. The Contractor will advise their sub-contractors and suppliers of their Environmental, Social, Health & Safety (including Labour & Working Conditions) responsibilities. Applicable ESHS requirements shall be contained within contractual agreements, including the requirement for sub-contractors to pass requirements to any of their sub-contractors and establish provisions for EHS reporting.

4.2.5 Operations OHS

Key risks during operations phase (operations and maintenance):

- Typical OH&S risks during operations and maintenance of the facility (electrical safety, trips/slips hazards etc).
- Process control hazards such as over-pressurisation, failure to vent due to procedural or equipment failure.
- Mechanical damage to buried pipeline which can occur due to unauthorized operation of excavation machinery in close proximity of the pipeline.

⁴Law for Protection from Explosive Materials

4.3 Health, Safety and Security Mitigation Measures

Pre-Construction Phase

- The tendering process for selection of the construction contractor will include criteria regarding community and occupational health, safety and security as a key consideration.
- The construction contractor should commit to the development of a detailed CHSSP and EPRP based on hazard identification and risk assessment for all project phases.
- Confirmation of design compliance with EN1594 and other applicable standards by a competent independent consultant.
- NER to complete a HAZOP and SIL studies prior to commencement of tender process.

Construction Phase

- Contractor to establish an **Occupational Health & Safety Plan** as part of an OHS management system in line with recognized international standard and ensure sufficient provision of medical care facilities and resources for workforce.
- The contractual conditions are to ensure all sub-contractors are required to follow the Health & Safety Plan and the OHS management system;
- NER to develop and implement corporate H&S policy and set a corresponding budget for staff visiting construction sites. H&S person to be assigned and corporate H&S plan developed;
- Contractor to develop **Community Health & Safety Plan** within the CESMP;
- Contractor to develop **Social Facilities and services plan for workers** within the CESMP;
- Contractor will be expected to monitor potential safety risks (including accidents) within the 'Works' area as part of their CHSP;
- The Construction Contractor shall develop a **Traffic Management Plan** as part of the CHSSP. This plan must specify the specific risk controls to be adopted as well as training, awareness raising and monitoring requirements. The proposed approach must be consistent with the objectives of EU Directive 2019/1936;
- The Construction Contractor shall develop a **Construction Security Management Plan**;
- The community safety measures in the CHSP should ensure **prohibition of public access** (including livestock) to the construction sites, especially at locations close to communities;
- Measures to ensure avoidance of the potential conflicts between the investor, workforce and members of the local community including code of conduct.

Operational Phase

- NER to develop an **Operational Phase OHS plan** and procedures based on National and EBRD requirements;
- NER to develop an **Operational Phase CHSS plan** and EPRP based on National and EBRD requirements;
- NER to develop an **Emergency Preparedness and Response Plan**;
- NER to develop an **Operations Security Management Plan** in accordance with national and EBRD requirements.

5 Project Alternatives

5.1 “Do Nothing” Alternative

As described in section 0 Greece-North Macedonia Gas Interconnector will connect the Macedonian transmission network to the Greek gas network and will ensure natural gas source diversification and increase energy security of supply. Project’s significance is accentuated with the follow-on benefits, including opportunities for economic development and improvement of air quality.

The “Do Nothing” alternative means not proceeding with the proposed project. The effects of this approach will be as follows:

- Level of natural gas source diversity and security of supply in the national network will remain low;
- Negatively affect national objectives and investment plans;
- Negatively affect EU Economic and Investment Plans for the Western Balkans;
- Loss of opportunity for direct and indirect economic development;
- Loss of regional economic development opportunity extremely valuable knowing involvement gas resources extremely diverse economic sectors;
- Loss of opportunity to improve air quality in populated areas through future installation of combined heat and power technologies;
- No permanent or temporary jobs created during construction and operation;
- No permanent or temporary impacts on the environment especially biodiversity;
- No land expropriation or land use change.

Overall, considering the levels of impact on the environment by the project, the positive effects outweigh the negative aspects. Therefore the “Do Nothing” alternative is not considered to be an acceptable option.

5.2 Adopted Alternative

The pipeline route has been selected following an extensive alternatives route assessment. The feasibility study proposed a route for the complete Greece-Macedonia gas interconnector based on initial identification of macro-corridors with the key criteria being minimization of pipeline length and maximization of route adherence to existing infrastructure.

Subsequently, the design on the Macedonian section considered alternatives refining the alignment of the route to optimize the project footprint, address the environmental, social and cultural constraints and impacts, and maximize safety and economic aspects. Interaction between the NER, the EIA team and the design team focused on ensuring early E&S mitigation measures and good construction practice are incorporated into design of the project.

Project design minimised land acquisition impacts on people and communities. Route options development avoided residential and urban areas to eliminate physical displacement. For example, significant section of the pipeline traverses several hundred meters from the urban areas of Gevgelija, Bogdantsi, Demir Kapija and Negotino while the route alignment gave preference to state owned land over private land to maximum extent possible (refer to Table 5-1).

Table 5-1: Land parcels affected by permanent and temporary acquisition

Ownership	Number of the parcels affected by permanent land acquisition			Number of the parcels affected by temporary land acquisition		
	No. of parcels	%	Area m2	No. of parcels	%	Area m2
Private owned	405	41	586,462	866	45	1,682,922

Ownership	Number of the parcels affected by permanent land acquisition			Number of the parcels affected by temporary land acquisition		
	No. of parcels	%	Area m2	No. of parcels	%	Area m2
State owned	571	58	368,593	1,037	54	50,407,305
Co-owned state / private	7	1	11,385	14	1	1,773,391
Companies	5	1	13,093	6	0,1	93,553
Islamic Religious Community						
TOTAL	988	100	979,533	1,923	100	53,957,171

Efforts were made to reduce impact on the campsite Akvatika and fishponds in Demir Kapija at chainage 52+490, which is a regional recreational area.

A number of route modifications were carried out during the design phase in conjunction with the urban permitting process (e-Urbanizam) as well as recommendations from the ESIA and MoEPP. Modifications incorporated during the design include the following:

Table 5-2 Route modifications during design

Chainage	Reason for modification	Influence	Comment
4.5-5.0km	Overlap with urban plans	Social	Houses near Rudina
12.5 - 14.0km	Overlap with urban plans	Social	Houses in v.Prdejtsi
15.0 - 17.0km	Avoidance of archaeological site	Social, Cultural	archaeological site at 15+500
27.0 - 29.5km	Avoidance of archaeological site	Social, Cultural	archaeological site at 28+000
33.5 - 42.0km	Overlap with urban plans	Social	Important Bird Area Demir Kapija
50.0 - 52.5km	River crossing; avoid existing infrastructure	Social, Biodiversity	Recreational and bike trails, fishponds and campsite Akvatika
55.0 - 60.0km	Avoidance of archaeological site	Social, Cultural	Houses in v.Przdevo and archaeological site
64.0 - 67.4km	Overlap with urban plans	Social	Private investment

6 Cumulative Impacts

Cumulative impacts are those that result from the incremental impact of a project when added to other existing, planned, and/or reasonably predictable future projects and developments. Cumulative impacts are limited to those generally recognized as important on the basis of scientific concerns and/or concerns from affected communities.

This section has been developed in line with the guidance provided in IFC's "Good Practice Handbook: Cumulative Impact Assessment and Management: Guidance for the Private Sector in Emerging Markets (2013)".

6.1 Baseline and Scoping

The supplementary cumulative impact assessment was based on desktop research, site visit and consultations with relevant stakeholders and Designer/NER (in the period of April 2022 to June 2022) in order to get insight on the project priority Valued Environmental and Social Components (VECs) and cumulative associated risks.

The following approach was implemented:

- Step 1 – Determination of spatial and temporal boundaries.
- Step 2 – Identification of Valued Environmental and Social Components (VECs).
- Step 3 – Identification of other projects in the region, scoping VECs for cumulative assessment.
- Steps 4, 5 and 6 – Assessment of cumulative impacts and their significance over VECs and definition of management and mitigation strategies to address impacts.

6.2 Spatial and Temporal Boundaries

The temporal boundary was set as the life cycle for the gas pipeline operation with specific emphasis on construction phase.

In regards of the spatial limitations the following limits have been set up:

Area of Influence (AOI): The area within which both direct and indirect impacts are expected to occur; this extends beyond the borders of the RoW and associated project areas to include the entirety of Lower Vardar Valley (important area with priority biodiversity features) from Negotino to the border with Greece. This area includes the land that will be directly disturbed by activities.

Project Footprint: The Project footprint includes those areas that are directly occupied by the gas pipeline project, infrastructure, and facilities, including temporary laydown and work areas associated with the project components. In accordance with the project documentation, for the construction of the gas pipeline, the working zone, i.e., the minimum space along the route of the gas pipeline required for its uninterrupted and safe construction is 25 meters, 12.5 meters on both sides of the pipeline axis. In this zone, temporary and permanent land acquisition will be performed.

Potential Effect Analysis Areas: Direct project impacts may extend beyond the direct project footprint. For the purposes of completing the impact analysis, an area around each project component was identified that was intended to incorporate the area of direct impact associated with each component. Indirect effects may extend beyond the analysis areas.

6.3 Identification of VECs

Analysis of Valued Environmental and Social Components (VECs) is important when evaluating the risk of an infrastructure project and/or the cumulative effect caused in conjunction with other projects / threats in the region. These values may include:

- Bio-physical characteristics (habitat, species and landscape diversity);
- Ecosystem services (provisioning, regulating, cultural and supporting);
- Natural processes (water quality, air quality, soil quality and other media and areas of concern);
- Socio-economic conditions (land take and resettlement, community safety, stakeholder engagement);
- Cultural Heritage (augmented by the worldwide significance of region).

The following table presents VECs identified for the Gas Interconnector North Macedonia-Greece.

Table 6-1: VECs for the project

ID	VEC	Status	Sensitivity
VEC01	River Vardar River Boshava River Doshnitsa	<p>The gas pipeline route will cross 3 main rivers (Vardar, Doshnitsa and Boshava). The riparian corridor of the Doshnitsa and Boshava Rivers was identified as an important habitat for mammals, insects, aquatic species and sensitive riparian habitats. Construction activities, considering these 3 rivers, using a HDD will allow direct impacts to natural habitats to be avoided. NER will continue to monitor these areas throughout the pipeline's lifetime.</p> <p>Regular monitoring of the water quality of the rivers in Macedonia is enabled by the National Hydrometeorological Service (NHMS). The existing monitoring network, has a total of 17 monitoring stations located in the Vardar river basin, of which water body (WB) 5 -Demir Kapija and WB6 Gevgelija are in the Aol. Based on the digital monitoring platform of National Hydro meteorological Service (NHMS), Biodiversity and Critical Habitat Assessment (15 to this report) provides biological, physico- chemical characteristics of river Vardar at Demir Kapija (near the end of the pipeline) and Gevgelija (at the beginning) in the period 2020-2021.</p>	Medium
VEC02	Reservoir Drenska River (Accumulation)	The route is passing near (100 m) reservoir Drenska Reka. The purpose of the reservoir is mainly for irrigation of agricultural areas (vineyards) in the area of the villages Dren and Chiflik; it is also used for sports and recreational purposes. These impacts can be controlled through monitoring and proper management activities.	Low to Medium
VEC03	IBA Tikves region IBA Demir Kapija Canyon IBA South Vardar	<p>IBA Tikves Region</p> <p>The area is important because of the presence of two Egyptian vultures (<i>Neophron percnopterus</i>) in its southern part, and also because of the presence of 230 to 250 nesting pairs of the lesser kestrel (<i>Falco naumanni</i>), which is nesting only in the villages and it is present in the northern part of the area. In the northern part of the area, 1-2 pairs of imperial eagles (<i>Aquila heliaca</i>) are nesting, as well as at least one pair of lanner falcon (<i>Falco biarmicus</i>). Also, the largest colony (60 to 90 pairs) of grey heron (<i>Ardea cinerea</i>) exists in this region. The gas pipeline corridor penetrates more than 10km in the area (chainage 57+000km).</p> <p>IBA Demir Kapija Canyon</p> <p>The Demir Kapija Canyon is one of the richest ornithological reserves in Europe by the presence of rare birds of prey: griffon vulture (<i>Gyps fulvus</i>), Egyptian vulture (<i>Neophron percnopterus</i>), golden eagle (<i>Aquila chrysaetos</i>), short-toed snake eagle (<i>Circaetus gallicus</i>), long-legged buzzard (<i>Buteo rufinus</i>), various falcons (<i>Falco peregrinus</i>, <i>F. naumanni</i>), as well as some less common species of birds such as <i>Hieraaetus pennatus</i>, <i>Milvus migrans</i>, <i>Falco biarmicus</i>,</p>	Medium

ID	VEC	Status	Sensitivity
		<p>Cerchotrichas galactotes etc. The gas pipeline corridor passes on the border of IBA between 47+250km to 48+800km and intersects from 50+800km to 52+250km, in total length of 3km.</p> <p>IBA South Vardar</p> <p>The area has been identified as an important area for nesting of two species of terns (<i>Sterna hirundo</i> and <i>Sternula albifrons</i>), as a nesting area of almost 10% of the national white stork population (<i>Ciconia ciconia</i>) and as a potential bottleneck for migration of large floating species of birds (birds of prey, storks, etc.) In addition, the flood meadow of the Gjol area (in the vicinity of the village of Bogoroditsa) is an important stop-over site for many wintering species in this part of North Macedonia. This includes several species of duck and egret families, and the greater flamingo (<i>Phoenicopterus roseus</i>) has been spotted on several occasions. Also, this locality is crucial in the feeding of the breeding non-resident species such as the large nesting populations of white storks in the villages of Stojakovo and Bogoroditsa. The gas pipeline corridor intersects the area between 0+000km and 9+500km and 10+500km and 13+000km, in total length of 12 km.</p>	
VEC04	<p><u>Critical Habitats</u></p> <p>91AA* Eastern white oak woods;</p> <p>6220* Pseudo-steppe with grasses and annuals of the Thero-Brachypodietea;</p>	<p>91AA* Eastern white oak woods</p> <p>A Priority Habitat according to EU HD. Oak Forest belt is characterised by a range of forest communities developing in the area. It belongs to the community <i>Querco-Carpinetum orientalis</i>. It comprises the following important species:</p> <p>3 nationally protected species of fungi (<i>Amanita caesarea</i>, <i>Boletus aereus</i>, <i>Craterellus cornucopioides</i>)</p> <p>1 insect (ground beetle <i>Carabus convexus</i>) listed as Corine species;</p> <p>a number of nesting birds with unfavorable conservation status;</p> <p>4 amphibians (<i>Rana dalmatina</i>, <i>Pelophylax ridibundus</i>, <i>Hyla arborea</i> and <i>Bufo tesviridis</i>);</p> <p>7 reptile species (<i>Zamenis longissimus</i>, <i>Vipera ammodytes</i>, <i>Testudo hermani</i>, <i>Pseudopus apodus</i>, <i>Podarciserhardii</i>, <i>Lacerta viridis</i>, <i>Dolichophis caspius</i>)</p> <p>6 mammals EUHDA4 (<i>Dryomys nitedula</i>, <i>Myotis mystacinus</i>, <i>Pipistrellus pygmaeus</i>, <i>Miniopterus schreibersii</i>, <i>Canis lupus</i>, <i>Felis silvestris</i>).</p> <p>It is possibly the most widespread habitat type in the country, which is largely cut and degraded in the project area.</p> <p>6220* Pseudo-steppe with grasses and annuals of the Thero-Brachypodietea</p> <p>A Priority Habitat according to EU HD. It contains hill pastures developing on siliceous substrate and dominated by annual plants. This habitat is not rare in the country, and it occurs in the most arid regions, in thermophile, dry and sundrenched areas. In the pipeline corridor, the habitat is present in several places along the pipeline route, mainly in lowland part, on hilly pastures or near agricultural land. It comprises the following important species:</p> <p>2 Balkan endemic plants (<i>Centaurea grisebachii</i>, <i>Centaurea finnazzeri</i>)</p> <p>2 amphibian species (<i>Bufo bufo</i> and <i>Bufo tesviridis</i>) and additionally two more with lower frequency of occurrence</p> <p>Immense diversity of reptiles with 14 important species (<i>Zamenis longissimus</i>, <i>Vipera ammodytes</i>, <i>Testudo hermanni</i>, <i>T. graeca</i>, <i>Pseudopus apodus</i>, <i>Podarcismuralis</i>, <i>P. erhardii</i>, <i>Lacerta viridis</i>, <i>L. trilineata</i>, <i>Malpolon insignitus</i>, <i>Dolichophis caspius</i>, <i>Elaphe quattuorlineata</i>, <i>Coronella austriaca</i>, <i>Anguis fragilis</i>)</p> <p>A number of bird species with the most important nesting birds in this</p>	High

ID	VEC	Status	Sensitivity
		habitat as follows: <i>Alectoris graeca</i> , <i>Coturnix coturnix</i> , <i>Lanius senator</i> , <i>Lanius collurio</i> , <i>Melanocorypha calandra</i> , <i>Calandrella brachydactyla</i>) 2 mammals (<i>Myotis mystacinus</i> , <i>Canis lupus</i>)	
VEC 05	"Akvatika" Fishery and Campsite	Akvatika is an operating fish farm in the surroundings of Demir Kapija. AKVATIKA PARK is a picnic place located along the river Boshavain the municipality of Demir Kapija. It has a picnic area, fresh fish, as well as recreational fishing. The picnic area is provided with electricity, water, a barbecue area, oven, toilets, showers and parking spaces, and is equipped with appropriate cutlery and drinking utensils that are available to visitors. At the same time, AQUATIC PARK is known as a camping area. The gas pipeline is crossing near Akvatika (at approximately 200 m).	Low

6.4 Identification of other Projects in the Region

The EIA/SIA includes an assessment of cumulative impact, mentioning intersection with current operational projects along project RoW such as:

Table 6-2: Project intersections with significant existing infrastructure

Chainage	Element
km7+190.44	Asphalt road Gevgelija-Bogdantsi (R1109)
km12+831.37	Railroad Skopje-Gevgelija
km13+557.30	Motorway "Priateljstvo"(Friendship)
km13+584.42	
km13+729.75	Asphalt road (R103 Gevgelija-Skopje)
km 13+735.79	
km 12+754.37	Existing oil pipeline
km 17+129.63	Existing oil pipeline
km 35+761.19	Existing oil pipeline
km 36+244.80	Existing oil pipeline
km 36+770.43	Existing oil pipeline
km 51+657.07	Existing oil pipeline

The supplementary assessment identified the following projects that may have cross-influence with the Gas Interconnector.

Table 6-3: Identified Projects and developments

Project	Project Phase	Affected VEC	Location /area to be considered
Wind Park Dren 1 and Dren 2	Construction to commence in July 2022	VEC 02 VEC 03 VEC 04	See map below (Error! Reference source not found.)
Wind Park Petrovo	Design / Planning	VEC 04	See map (Error! Reference source not found.)
Wind Park Koprishnitsa	Design / Planning	VEC 04	See map (Error! Reference source not found.)
Oil pipeline	Operational	-	Intersections presented above in table 6-2
Existing Roads	Operational	-	Intersections presented above in table 6-2

Transmission line 400 KV	Operational	VEC 03	See map (Error! Reference source not found.)
Railway	Operational	-	Intersections presented in table 6-2

6.5 Assessment of Cumulative Impacts and their Significance over VECs, Management and Mitigation

Taking into account the affected VECs, the three Wind Park Projects (Dren 1/Dren2, Petrovo and Koprishnitsa) have been included in the assessment of cumulative impact. All three projects are wind farm developments and involve the construction of wind turbines, internal roads, overhead transmission lines, and related infrastructure. EIA studies have been prepared for all three projects and copies are available on MoEPP website along with information regarding the outcome of the public hearing.

The EIA study for Wind Park “Dren” was approved by the MoEPP in September 2018 and comprises the construction of 10 wind turbines with a total of 34 MW of installed capacity. The investor is Kaltun Energy – Skopje (headquartered in Turkey). In February 2020 the investor proposed an enlargement of the Dren wind park through additional 4 wind turbines and the EIA was amended in June 2021 and later approved by MoEPP. The start of construction as notified by the Investor is planned for July 2022.

The EIA study Wind Park “Koprishnitsa” was approved by the MoEPP in April 2021. The project has installed capacity of 30 MW and was developed by Pera Energy – Skopje (headquartered in Turkey). Wind Park “Petrovo” is with installed capacity of 40MW. The EIA was approved by MoEPP on July 2021 and is also investment by Pera Energy – Skopje. WP Koprishnitsa and WP Petrovo are still in design phase.

Error! Reference source not found. below shows locations of the three planned wind parks, the planned gas interconnector pipeline, the operational oil pipeline and the operational 400 KV overhead transmission line.



Figure 6 1 Map of projects and developments - cumulative impact

Considering existing, planned, and/or reasonably predictable future projects and developments along the RoW, VEC02, VEC03 (partial) and VEC04 (partial) have been scoped in for further cumulative assessment within the following table. Other identified VECs are scoped out considering the fact that was not identified any nearby project and development that may result with cumulative impact.

Magnitude of Cumulative Impacts		
VECs	Cumulative Impacts	Magnitude of Impact to sustainability or viability of VEC
VEC 02 Dren Reservoir	<p>The reservoir is mainly for irrigation of agricultural areas (vineyards) in the area of the villages Dren and Chiflik; it is also used for sports and recreational purposes. During construction activities on gas pipeline (app 50-100m distance), construction of access road for WP Dren 1 and Dren 2 (app 50-100m distance) and further consideration for WP Koprishnitsa and WP Petrovo, it may potentially cause erosion and increased sediment into the reservoir. Moreover, increased traffic with presence of mechanization, noise, vibration and improper handling hazardous waste / hazardous materials as well leakages will impact water quality within the reservoir.</p> <p>Focal point: VodostopanstvoTikves https://www.vodostopanstvo.mk/index.php/mk/</p>	<p>Low to Moderate impact on the Dren Reservoir is anticipated as a result of cumulative impacts.</p> <p>(negative, cumulative, reversible, regional, immediate, short term, unlikely)</p>
VEC 03 IBA Demir Kapija Canyon	<p>In the area, gas pipeline corridor intersects the IBA area between 47+250km to 48+800km and from 50+800km to 52+250 km, in the total length of 3km.</p> <p>In particular, operational phase of the Gas Interconnector North Macedonia - Greece would not pose any adverse impact on bird species and IBAs.</p> <p>Operational transmission line 400 KV is presented in the area, so cumulative impact will be combined with construction phase of gas pipeline as well construction phase of WP Dren 1 and Dren 2 (to commence in July 2022). Expected the cumulative impact are mainly due to increased noise and vibration (excavation, blasting, increased traffic etc.), emission in ambient air as well change on the landscape and habitat loss and fragmentation with consideration of main projects and access roads.</p> <p>Further assessment as well biomonitoring of birds and bats will be undertaken during construction and operational phase of WP Dren 1 and Dren 2, WP Koprishnitsa and WP Petrovo as stated in the subsequent approved EIA reports.</p> <p>Since IBA Demir Kapija Canyon trigger species breeding and nesting sites are far not located within the cumulative affected zone, the cumulative impact would not be with significant magnitude.</p>	<p>Low to Moderate impact to the sustainability or viability of the IBA Demir Kapija Canyon is anticipated as a result of cumulative impacts.</p> <p>(negative, cumulative, reversible, regional, immediate, short term, unlikely)</p>

<p>VEC 04 Critical Habitat 91AA* Eastern white oak woods</p>	<p>*91AA Eastern white oak woods - above Dren village, is the area is presented of forest of <i>Quercus pubescens</i> and <i>Carpinus orientalis</i> (Coordinates 41,36452467 N; 22,25094963 E;). Identified Projects in the region such as gas pipeline construction and operational phase as well construction and operational of 3 Wind Parks as well operation phase of oil pipeline and transmission line 400 KV, in a cumulative view may pose further impact:</p> <ul style="list-style-type: none"> • Direct loss/disturbance/degradation/fragmentation of habitat due to construction activities of gas pipeline and 3 WP including access roads and laydown areas ; • Spread of invasive species; • Permanent conversion of habitat to grass and shrubland within 7m operational gas pipeline; • Landscape impact both in construction and operational phase; and • Socioeconomic impact (positive in construction and operational phase). <p>Additionally, habitat impact may be divided in the 4 main areas as follows:</p> <p><u>Habitat loss</u> Vegetation clearance for the preparation of the working corridor and access roads; Construction of pipe laydown areas; Vehicles causing soil destruction and erosion; Dust produced by vehicles causing reducing the fitness of plants and therefore habitats.</p> <p><u>Habitat Conversion</u> Conversion of habitats in order to maintain a RoW along the area.</p> <p><u>Habitat fragmentation</u> From disruption to routes through which fauna utilise to move through the landscape, both physically and through creating barriers of disturbance.</p> <p><u>Habitat pollution; including deposition and runoff</u> Dust emissions can pose a number of problems including detrimental effects on health, nuisance problems and effects on vegetation.</p>	<p>Moderate impact to the sustainability or viability of the 91AA* Eastern white oak woods is anticipated as a result of cumulative impacts. (negative, cumulative, irreversible, local, immediate, long term, likely)</p>
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The potential significance of a cumulative impact has been determined using the methodology presented in Chapter 2.2. The results of this assessment are presented in Table 6-4: Significance of Cumulative Impacts.

Table 6-4: Significance of Cumulative Impacts

VECs	Sensitivity of VECs	Magnitude of Impact	Indication of Impact Significance on VEC
Reservoir Drenska River	Low	Low to Moderate	Not significant
IBA Demir Kapija Canyon	Medium	Low to Moderate	Low to moderate significance
91AA* Eastern white oak woods	High	Moderate	Moderate or High significance

Taking into consideration the significance of impact, within the table 6-5 below are summarized mitigation and management actions for the identified cumulative impact on VECs.

Table 6-5: Mitigation and Management Actions

VECs	Mitigation and Management Actions
VEC 02 Dren Reservoir	<ul style="list-style-type: none"> Careful planning and execution of pipeline construction activities nearby reservoir, install temporary plastic fence on expropriation zone as a limit area; Cooperation with wind farm investors for minimization of footprint of construction activities (use of same roads, cooperation on community and occupational safety considerations); Forbidden storage area of non-hazardous and hazardous waste as well hazardous materials within the area of Dren Reservoir. Forbidden parking and maintenance of mechanization at least 300 meters from reservoir zone; Awareness training to workers with emphasis on importance of Dren reservoir; and Laboratory measurement of water quality of Dren Reservoir (pH, BOD, COD, TSS, total organic compounds and hydro carbons) on a quarterly bases during construction (baseline measurement prior any construction activities commence) as Contractor's responsibility.
VEC 03 IBA Demir Kapija Canyon	<ul style="list-style-type: none"> No laydown areas or camps will be allowed in the area, working areas will be clearly marked and contractors will be fully informed as to the sensitivity of the site in general and of the watercourses in particular. Pollution prevention measures will be strictly applied; Awareness training to workers with emphasis on importance of IBA trigger species, location and concerned areas; Usage of already existing access road from construction of oil pipeline (currently in operational phase), meetings with Investors of 3 wind parks in the region for minimization of footprint of construction activities (usage of same access roads, environmental meeting with biodiversity topics in regards of exchange information from biomonitoring of bird fauna in the region); Planning of nearby blasting activities out of nesting period of the trigger bird species (May-June); and Implementation of actions identified in BAP.

<p>VEC 04</p> <p>Critical Habitat</p> <p>91AA* Eastern white oak woods</p>	<ul style="list-style-type: none"> • Reduce pipeline working area width from 25m to 10m where Critical habitat is located in the area as per Habitat map presented in the Biodiversity and Critical Habitat Assessment; • Contractor to develop procedures to avoid, monitor and control invasive species, as appropriate. See Invasive Species Management Plan (as a part of supplementary ESIA/BAP); • Usage of already existing access road from construction of oil pipeline (currently in operational phase), meetings with Investors of 3 wind parks in the region for minimization of footprint of construction activities with emphasize on habitat 91AA* ; • Work to be supervised by a Biodiversity Specialist (Contractor's engagement); • Inform construction and operation staff (including contractors) on the habitats of conservation value and protected and threatened plant and animal species; • Undertake habitat restoration within laydown and former production well areas; • Prevent and reduce hunting and logging in areas opened up through the creation of new or improved access roads; • Methodical clearance of forested areas under ecological supervision; • Access roads to be sited on existing dirt roads where ever possible or existing access road for other projects in the project area. Where new access roads are required, pre-construction biodiversity surveys will be carried out and all impacts to species/habitats of conservation importance will be managed in accordance with the BAP; • No laydown areas or camps will be allowed in the area, working areas to be clearly marked; and • Ban for construction workers to access to the forested areas for any purpose.
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7 Air Quality and GHG

This section provides supplementary information for the potential impacts and mitigation measures associated with ambient air quality, in accordance with EBRD E&S (2019) policy PR3, as outlined in the due diligence report.

The supplementary assessment used the same precautionary approach as the ESIA which defined AoI as the distance from the pipeline where human receptors could be negatively affected by project induced changes in air quality. It applies to the construction and operational phases of the project. It covers additional air quality measurements, scoping of sources of impact, site visit, re-evaluation of impacts and mitigation measures, monitoring and residual impacts.

Calculation and reporting requirements for the project's greenhouse gas emissions are detailed in the ESIA document; therefore, no additional GHG emission assessment is included in this report.

7.1 Baseline

The baseline assessment of the air quality in the ESIA has been supplemented with: scoping of sources of impact, site visit, and additional air quality measurements.

Scoping

The scoping identified the following sources of impact in relation to two relevant types of atmospheric emissions: dust and exhaust gases.

Dust– includes fine particles PM10 (health risk dust) from fugitive emissions and diesel engine particulates (DPM), and coarser dust greater than 10 microns (nuisance dust). Dust propagation through air is influenced by multiple factors including particle size. Smaller particles (less than 10µm) can travel as far as 1 km or more from sources. This pollutant is associated with construction phase only.

Exhaust gases– focusing on carbon monoxide, sulfur oxides and nitrogen oxides.

A range of construction activities which require use of vehicles or construction machinery are associated with emission of exhaust gases.

During operations, main sources of exhaust gas emissions will be at the gas heater in the pressure reducing station.

Site Visit

The pipeline and associated infrastructure including block stations, cathodic protection fields and pressure reduction station extend mainly within rural areas.

Site visit along the entire route of the pipeline did not identify industrial areas or facilities that are likely to emit air pollutants within the AoI.

Significant sources of dust / particulate matter or exhaust gas emissions were not identified in the AoI, while relatively low level of local traffic and agricultural dust emissions were noted. Consequently, it is reasonable to assume that the AoI does not interact with areas of already compromised air shed or greater sensitivity to air emissions.

Particularly sensitive receptors such as schools or hospitals have not been identified within 1km of the proposed RoW or construction sites, therefore no further consideration is provided.

Given the impacts of dust emissions on adjacent crops could be a material issue, agricultural land is considered a sensitive receptor both along the RoW and around the PRS. Construction contractors need to apply appropriate air quality management procedures for monitoring and mitigation of such emissions.

The site visit did not identify scattered houses (individual residential receptors) along the pipeline route. This allows general mitigation measures to be developed for construction with particular focus on settlements in the vicinity of the pipeline, storage yards and workers' accommodation.

Additional Air Quality Measurements⁵

Air quality measurements were performed along the route of the pipeline focused on two larger zones with agricultural activities. The first zone covers the terrain from the border with Greece to the village of Prdejtsi, and the second from Demir Kapija to Negotino (Figure 7-1, Figure 7-2, Figure 7-3).

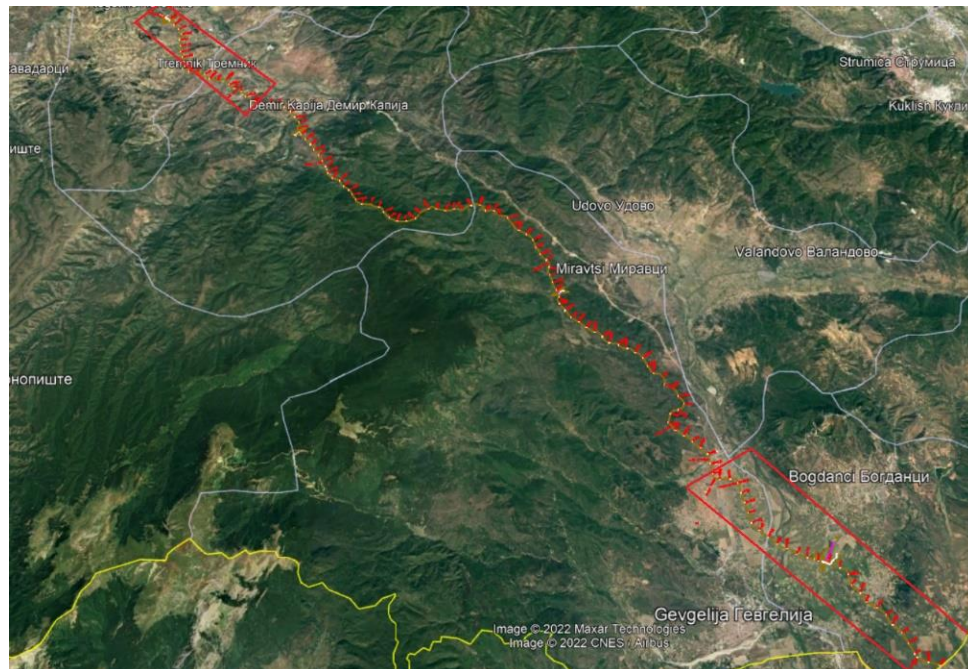


Figure 7-1 Additional Air Quality Measurements Map (2 zones)

⁵AMBICON.UGD Report of Air Quality

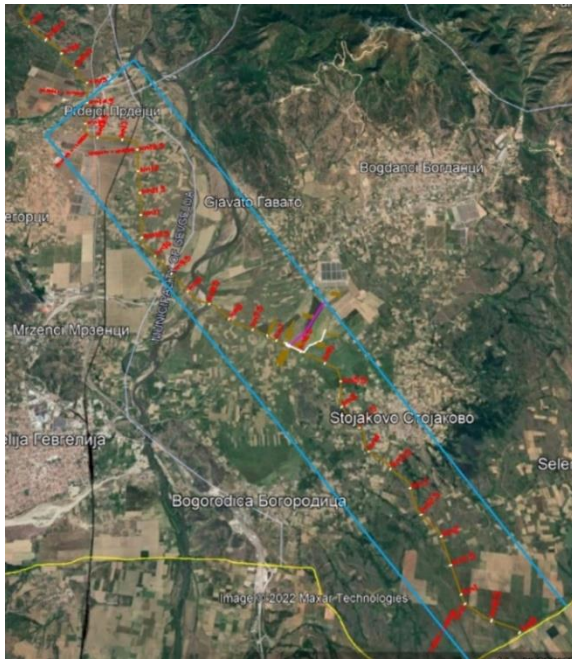


Figure 7-2 AQ Measurements: Bogodolica - Prdejtsi zone

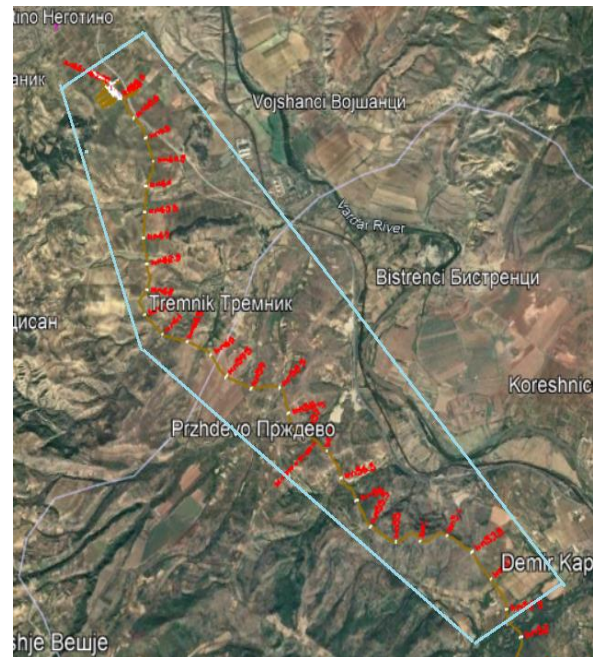


Figure 7-3 AQ Measurements: Demir Kapija - Negotino zone

Measurement program involved real time monitoring of ambient air quality including concentration of suspended particulate matter (PM 2.5 and PM 10) and gaseous pollutants (SO₂, NO₂, CH₄, CO₂ and C₆H₆). In order to better reflect baseline concentrations within the area of interest a combination of fixed-point monitoring and walk-through survey techniques were used.

Measurement of particulate matter concentrations at two fixed points (points B5 and B7) were performed using real time light scattering instrument with particle size selection (ES-642, Metone, USA) and portable compact outdoor air quality station (Air pointer MLU, Austria) for monitoring of gas pollutants (SO₂, and NO₂) using reference methods (UV Fluorescence - EN14212 and chemiluminescence – EN 14212).

Walk through surveys were performed using hand held particle counter Aerocet 831, Metone, USA (PM 2.5 and PM10), GEOTECH GEM 5000 (CH₄ and CO₂) and RAE 3000 PPB (C₆H₆).

Data at the two fixed monitoring points were collected over one week at each site.

Walk through surveys were performed at selected monitoring points within two zones (**Error! Reference source not found.**, points from B1 to B11), while lab operators were walking through the sites for at least 30 minutes with instrument constantly switched on.

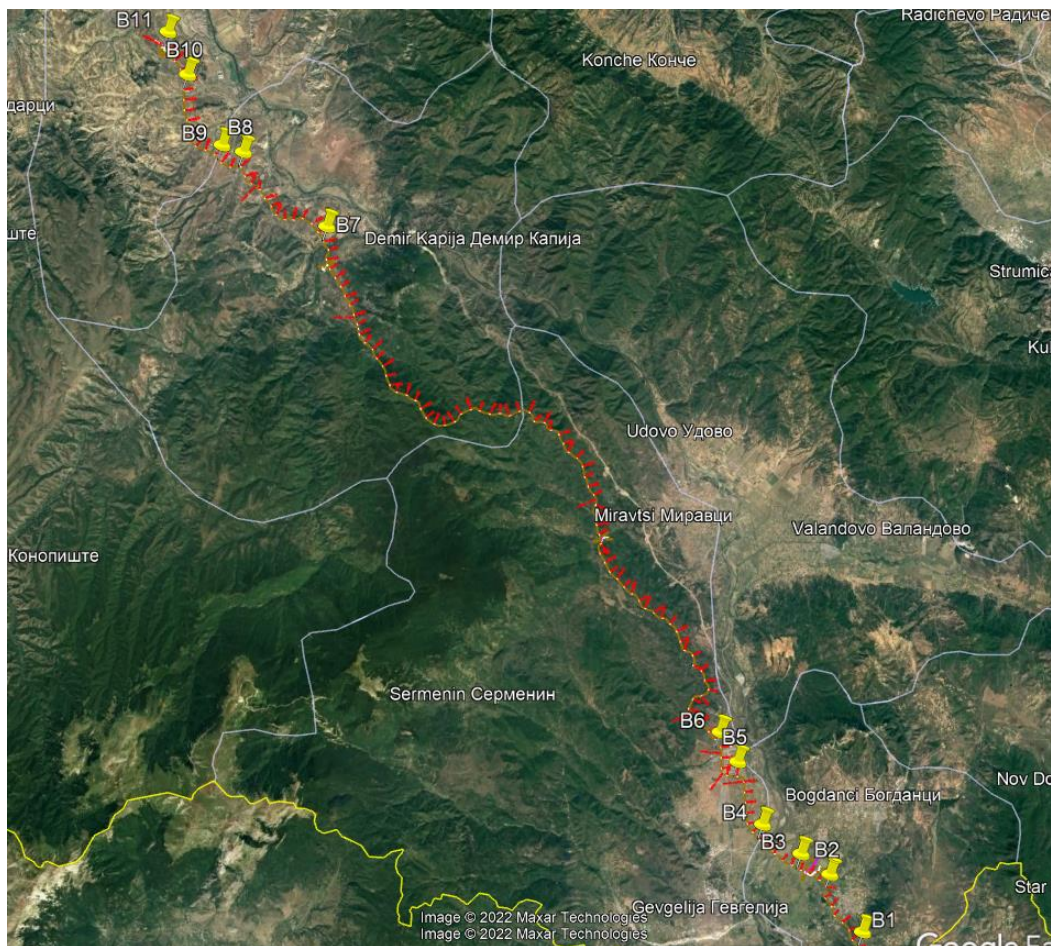


Figure 7-4 Additional AQ Measurements - Measuring points for detection of benzene

Monitoring points geographical coordinates are given in Table 7-1.

Table 7-1 Additional Air Quality Measurements - Monitoring points coordinates

Code	X	Y	Code	X	Y
B1	4555388.2	7633126.7	B7	4583938.6	7602104.3
B2	4557793.4	7631128.0	B8	4586713.6	7597581.8
B3	4558512.4	7629611.5	B9	4586857.0	7596526.0
B4	4559570.3	7627553.2	B10	4589900.6	7594283.5
B5	4562301.7	7625858.5	B11	4591738.9	7593010.8
B6	4563537.3	7624782.8			

As expected, the baseline concentrations of pollutants monitored reflect the rural nature of the area and with exclusion of fugitive dust events, no significant concentration of any pollutant measured were observed.

Average daily concentrations of suspended particulate matter concentrations (PM10) were within the 24h limit values at both sites, ranging:

- from 4.42 to 16.6 $\mu\text{g}/\text{m}^3$ (9.92 ± 3.66) **at B5**, and
- from 12.58 to 22.18 $\mu\text{g}/\text{m}^3$ (16.50 ± 3.12) **at B7** site

Average concentration of gaseous pollutants was very low at both sites.

- for SO₂ average hourly concentrations range
 - from 0.85 to 1.37 $\mu\text{g}/\text{m}^3$ (1.18 ± 0.19) **at B5**, and
 - from 1.04 to 1.43 $\mu\text{g}/\text{m}^3$ (1.27 ± 0.12) **at B7** site
- for NO₂ average hourly concentrations range
 - from 0.34 to 0.37 $\mu\text{g}/\text{m}^3$ (0.36 ± 0.01) **at B5**, and

- from 0.31 to 0.37 µg/m³ (0.35 ± 0.02) at B7 site

During the walk-through survey, no concentrations of methane and volatile organic compounds (benzene) were detected, or concentrations of C₆H₆ were < 0.4 ppb while concentrations of CH₄ were below < 0.5 %.

Due to intensive agricultural activities near the monitoring sites, fugitive dust emissions were visible and measurable. However, dispersion zones and duration were limited to the activity's vicinity and after short maximums, concentrations of PM 2.5 and PM10 rapidly return to the rural background.

PM 2.5 and PM 10 concentrations observed during walk through survey within each zone are summarized in the tables below.

Table 7-2 Additional Air Quality Measurements - PM 2.5 and PM 10 concentrations during walk through survey

	PM 2,5 (µg/m ³)	PM 10 (µg/m ³)
Gevgelija Zone		
Min	1,4	4,7
Max	31,7	90,3
Average	4,7	22,0
Demir Kapija Zone		
min	0,8	2,2
max	39,5	146,7
average	3,5	21,7

Conclusion: Ambient air quality data collected in May 2022 indicate that the studied area's air quality is excellent and reflects its rural character. All measured concentrations of pollutants were deemed to be low and within national (OG of RM, No. 50/05 and 183/2017) and European (Directive 2008/50/EC) limits.

7.2 Impact Assessment

This section assesses the potential impacts of project activities on local air quality while also discussing the climatic impacts of Project emissions, excluding Greenhouse Gas emissions. Table 7-3 summarizes the major sources of impact, as well as the resources that may be impacted (receptors), and project-related influencing factors.

Table 7-3 Key assessment considerations

Sources of Impact/Risk	<ul style="list-style-type: none"> • During the Project construction, temporary dust emissions from earthwork, excavation, vehicle traffic, stockpiles, unpaved surfaces, etc. throughout the working strip, access roads, yards, and camps. • Temporary emissions of exhaust gases into the atmosphere from construction-related vehicles (i.e. excavators, bulldozers, trucks, cars). • Emissions of atmospheric pollutants produced from reduction station during the operating phase of the Project.
Potentially Impacted Resources and Receptors	<ul style="list-style-type: none"> • Population residing in close proximity to the construction site, workers, and local vegetation. • Human receptors of pollutants emitted by the reduction station
Baseline Conditions that are Potentially Influencing Impacts/Risks	<ul style="list-style-type: none"> • The air quality field investigation did not reveal any critical concentrations of macro pollutants in the studied region.
Project Factors that are Potentially Influencing Impacts/Risks	<ul style="list-style-type: none"> • Location of reduction station; amount of machinery in use during the construction phase; traffic management, reduction station layout and characteristics.

In the following sections each potential impact has been elaborated upon by discussing how each source is expected to have an influence on the receptor and the mitigating measures put into the project to reduce any negative effects.

7.2.1 Construction Phase

As mentioned above, during construction of the project, the following activities may have an impact on the local air quality:

- temporary dust emissions from earthwork, excavation, vehicle movement, stockpiles, unpaved surfaces, etc. along the working strip, access roads, and work sites; and
- temporary emissions of exhaust gases from vehicles (i.e. excavators, bulldozers, side booms, trucks, cars).

Dust Emissions

Dust emissions are created by the following activities:

- the pulverization and abrasion of surfaces by vehicles transporting dirt and other materials;
- dispersion of dust particles resulting from wind degradation of unpaved surfaces;
- mechanical action on incoherent materials and excavation with excavators, bulldozers, etc.; and
- involuntary transfer of mud by truck wheels that, when dry, forms dust.

It should be noted that various dust-generating activities throughout the construction phase of the Project (e.g., working strip along the route and access roads) would not have fixed geographical locations along the route. Consequently, the effects on air quality along the pipeline path will only last a few weeks at a given site, depending on the rate of pipeline building. On average, each spread will have works that are in progress for around two to three months.

The construction of the compressor station has the potential to generate largest dust emissions, because of its duration (up to 2 years) and fixed geographical location.

It is anticipated that dust emission will be greater during the drier summer months than at other times of the year.

The magnitude of the impact at these locations was assessed using the descriptive method based on sensitive receptor (settlements) proximity and the weather conditions, as given in Table 7-4.

Table 7-4: Key assessment considerations – air quality

Sensitive receptor proximity	Weather conditions	Magnitude of impact
< 200 m	precipitation > 0.2mm per 24 h, wind speed < 3 m/s	Insignificant or low
	precipitation < 0.2mm per 24 h, wind speed > 3 m/s	Low or Moderate
> 200 m	Regardless of the weather conditions	Insignificant or low

There are no sensitive receptors (settlements) located less than 200 m from the working strip (main dust emission source), so the magnitude of the impact from these activities, regardless of the weather conditions are considered **insignificant or low**.

Several locations, like storage yards and equipment depots, are separately assessed due to their fixed geographical location during the project construction phase and extended duration of impacts.

Table 7-5 : Dust Emissions - facilities with sensitive receptors located within Aol

Facility	Location	Sensitive receptor proximity	Magnitude of impact
Storage yard	Gevgelija next to anode field	> 200 m	Insignificant or low
Equipment machinery depot	Gevegelija (Shimov Petrol - paved road access and base)	< 200 m	Low or Moderate
Storage yard	Gevgelija (Tech zone- paved road access, gravel base)	> 200 m	Insignificant or low

Facility	Location	Sensitive receptor proximity	Magnitude of impact
Storage yard	Gabrovo region	> 200 m	Insignificant or low
Accommodation camp and Storage yard	Miravtsi (former AKTOR camp)	> 200 m	Insignificant or low
Accommodation camp and Storage yard	Demir Kapija (to be determined)	< 200 m	Low or Moderate
Pressure reduction station (PRS)	Negotino area	> 200 m	Insignificant or low
Storage yard	Negotino area, next to PRS	> 200 m	Insignificant or low

Note: potential storage yard and depot locations shown in the table; selection of facility locations to be carried out by construction contractor and NER.

Exhaust Gases

Regarding the vehicle's emissions, it should be highlighted that only few units of heavy construction equipment (excavators, dozers, load lifters, trucks) will operate at the same time in same area, so the emissions are temporarily and spatially dispersed, localized, and transient. Exhaust emissions from construction-related traffic are comparable to those from regular agricultural activities and scarce traffic on local roads; hence, their impacts are **insignificant** if specified mitigation measures are implemented.

Similarly, vehicle emissions around depots and storage yards near urban areas (such as Gevgelija and Demir Kapija) caused by the movement of pipes and other equipment, could also be regarded as temporally dispersed, localized, and transient, therefore they are also considered **insignificant or low**.

7.2.2 Operations Phase

The only potentially relevant emission source of air emissions during operations will be the pressure reduction station PRS, which will be located near the pipeline's end near Negotino. For the purpose of gas heating, the PRS will be outfitted with two active and one backup 1 MW gas boilers (total installed power of 2 MW active and 1 MW idle as backup).

According to EMEP/EEA air pollutant emission inventory guidebook 2019, pollutants with potential for gas combustion activities to be a key category include particulate matter (TSP, PM2.5 and PM10), oxides of nitrogen, sulphur and carbon (SO₂, NO_x and CO), volatile organic compounds (VOCs) and black carbon (BC).

Emissions for all key pollutants were calculated using the EMEP/EEA Tier 2 emission factors for bottom boilers using natural gas (table 3-12, emission inventory guidebook 2019) and total estimated gas consumption (220 m³ per hour), and assuming uninterrupted operation of 8000 hour per year, as given in the table below.

Table 7-6 Key pollutant emission during operations phase (calculated using EMEP/EEA Tier 2 emission factors)

Emissions rates	TSP [kg]	PM 2.5 [kg]	PM 10 [kg]	SO ₂ [kg]	NO _x [kg]	CO [kg]	NM VOC's [kg]	BC [kg]
Per hour	0.007	0.007	0.007	0.0025	0.5	0.25	0.0217	0.0208
Per year	56	56	56	20	4000	2000	173.6	166.4

According to this estimation, only relevant pollutants emitted are NO₂ and CO, although even their emission rates (ER = 0.000139 g/s for NO₂) and (ER = 0.000069 g/s for CO) are below the modelling significance. Taking in account the very low background concentrations (see chapter 7.1) it is anticipated that maximum concentrations of CO (daily 8 hr), NO_x (hourly) and NO_x (annual) in the PRS immediate surrounding will fall well below 25% of their respective limit values, even when compared against the NO₂ limit value for protection of vegetation. Therefore, no additional modelling is conducted, and long-term air quality impacts on potentially sensitive receptors are assessed as insignificant.

It must be noted that entire assessment was based on conservatively overestimated assumptions (continuous full load operation; all NO_x assumed to be NO₂, implying that all NO emissions were transformed to NO₂). Even with this overestimation, no moderate or significant impacts on ambient air quality at receptor sites are expected and all impacts were evaluated as **insignificant**.

7.2.3 Decommissioning Phase

From this perspective it is very hard to predict how the pipeline system will be decommissioned as their usual live time is above fifty years.

Regarding the effects on air quality, much will rely on whether the pipeline will be abandoned in place or salvaged from the ground. If the pipeline is removed, the same ambient air impacts will result from groundwork along the pipeline and construction traffic as during construction.

The equipment of the pressure reduction station will be disassembled, the structures will be removed, and the sites will be restored. Dust emissions from the PRS site decommissioning will likely be lower than during construction because the decommissioning activities will be conducted on paved surfaces, primarily within the PRS site, and the generation of particulate matter from the demolition of buildings and surfaces can be reduced through the implementation of suitable measures (e.g. screens and water spraying).

Residual effects will be of a similar character to those that occur during construction, although on a smaller scale. Similar dust control measures to those envisaged during the construction period will be implemented. Stopping the functioning of compressor stations will also end persistent emissions, relieving the airshed. Activities associated with decommissioning are not anticipated to have any substantial negative effects on the air quality of potential sensitive receptors.

Thus, it is reasonable to assume that the air quality impacts of the Project's decommissioning phase will be negligible for the dismantlement activities and favourable for the airshed following decommissioning.

7.3 Mitigation Measures and Monitoring

The following mitigation measures were identified in the supplementary assessment.

Mitigation Measures during Construction

Good engineering practices for building sites, such as sprinkling working areas and access roads with water and washing tires, are generally relevant mitigation strategies.

Specifically, the following good practice steps are recommended to reduce dust generated by building activities:

- immediately before to leaving a construction area or temporary facilities, vehicles will be washed to remove any dusty debris from the body and wheels;
- vehicles carrying dirt or products from/to the building sites will be covered to reduce wind erosion;
- the speed of vehicles will be restricted, particularly during the dry season;
- access routes will be kept free of dusty materials or sprayed with grey water to keep the entire road surface wet; and
- when necessary, the working area will be sprayed with water to prevent the formation of dust.

As stated previously, this approach must be enforced, particularly when operating strip is near some sensitive receptor or zone with intensive agricultural activity.

Regarding steps to reduce vehicle emissions, the following best practices are recommended:

- proper maintenance of equipment; and
- training of drivers and operators for careful driving/operation of equipment resulting with low emissions.

Mitigation Measures during Operations

Due to the design, location, and equipment selection of the pressure reduction station, no additional mitigation measures are being explored or deemed as necessary.

Monitoring

As magnitude of impacts from dust and vehicles exhaust emissions are considered insignificant or low, no special monitoring requirements are envisaged during construction phase.

General air quality monitoring program during the construction phase will include visual dust monitoring and observations of the deposition of dust on crops along the RoW and appropriate mitigation and monitoring measures should be initiated in case any significant impacts are observed.

Although, based on their installed power, these boilers are considered to be small, and the long-term air quality impacts on potentially sensitive receptors are deemed insignificant, operational emissions of NO_x, CO, and CO₂ must be monitored and submitted to the competent authorities for review in accordance with national regulations and EU Directive 2008/50/EC. The frequency and format of monitoring will be set by the appropriate permitting procedure.

Key Performance Indicators: Key Performance indicators will be set for both environmental and social management of key issues. These will be discussed and set with contractors during the tender process and will be integral NER's monitoring of the contractor's environmental and social management performance.

7.4 Residual Impacts

Residual impacts on air quality caused by the project construction phase are summarized in Table 7-7.

Table 7-7: Construction phase residual impact on air quality

Impact / Risk	Mitigation measures to address the impact	Risk Significance of Residual Impact/Risk
Dust emissions	<ul style="list-style-type: none"> - tiers/vehicles washing, - cover of material in construction sites in order to reduce wind erosion, - vehicle speed limits, - water spray to roads and working surface with water 	Insignificant or low Dust emissions are restricted, localized, and transient. With the expected mitigation measures in place, the impact should be minimal.
Vehicle emissions	<ul style="list-style-type: none"> - training of drivers in cautious driving, resulting in reduced vehicle emissions. - regular equipment and vehicle maintenance. 	Insignificant or low Construction traffic and equipment emissions are comparable to scarce local road traffic. With the expected mitigation measures in place, the impact should be minimal.

Residual impacts on air quality caused by the project during the operation and maintenance phase are summarized in Table 7-8.

Table 7-8 Operation and maintenance phase residual impact on air quality

Impact / Risk	Mitigation measures to address the impact	Risk Significance of Residual Impact/Risk
NO _x and CO emissions	<ul style="list-style-type: none"> - PRS is located away from sensitive receptors. - Proper maintenance of equipment including valves, fittings and flanges. - use of leak detection 	Insignificant or low Anticipated maximum concentrations of CO (daily 8 hr), NO _x (hourly) and NO _x (annual) in the PRS immediate surrounding will fall well below 25% of their

Impact / Risk	Mitigation measures to address the impact	Risk Significance of Residual Impact/Risk
	<p>equipment, e.g., monitoring the flow in the pipe through pressure sensors connected to alarms and automatic pump shutdown systems;</p> <ul style="list-style-type: none"> - continuous metering to provide a comparison between input and output for leak detection. - periodical air quality monitoring in the area of the station during a period of 1-2 years after start of operations to verify no impacts 	<p>respective limit values, even when compared against the NO₂ limit value for protection of vegetation.</p>

8 Water

Water resources are critical to a wide range of sensitive receptors and ecological functions. This section provides supplementary information for the potential impacts and mitigation measures associated with water resources, in accordance with EBRD E&S (2019) policy PR3 and PR6.

During the development of the pipeline route, the Project sought to avoid, minimize, and mitigate impacts on water resources (in accordance with EU Water Framework Directive 2000/60/EC as amended by 2008/105/EC and Groundwater Directive 2006/118/EC) via options evaluation, route refinement, and final assessment.

As highlighted in the due diligence report, the supplementary ESIA assessment focused on water crossings, and hydro testing construction activities and their impact on ground and surface water, including analysis on ecological services, ecological services and additional measurements on quality of water and thermal springs. Additional measurements on quality of water were performed, including analysis on thermal springs.

8.1 Baseline

The supplementary assessment involved: scoping of sources of impact, additional measurements, re-evaluation of impacts and mitigation measures, monitoring and residual impacts.

Scoping

River crossing and hydro testing construction activities may involve water extraction (surface/groundwater), de-watering, wastewater discharge and equipment oil/chemical spills, potentially resulting in impacts to groundwater and surface water level and quality. This in turn may impact the primary receptors (water resources) and the secondary receptors (users of water resources) which are outlined below:

- Users of potable water or irrigation water;
- Aquatic flora/fauna; and
- Water level dependent habitats.

Potential impacts on groundwater and surface water are outlined below.

Groundwaters

- Temporary reduction in groundwater level and availability (from river crossings and hydro testing).

Surface Waters

- Temporary reductions in flows and water levels (river crossings, extraction from water courses for hydro-testing and dust suppression);
- Disturbance of the structure and nature of the river bed (in-stream construction activities); and
- Direct discharges of effluent into water courses (de-watering from river crossings, effluents from hydro-testing).

River Crossings

According to standard international practice there are two main construction methods for water stream crossing: open cut trenching and underground drilling.

Water crossings by open cut trenching methods will result in disturbance of the river bed affecting downstream human populations (extraction potential) and biodiversity receptors (light penetration, riverbed vegetation).

Crossing water streams by horizontal directional drilling (HDD) on this project will be applied on Vardar and Boshava/Dosnitsa rivers to minimize impact on riverbeds and during installation of the pipeline.

All other crossings on the project are small rivers, streams and channels proposed to be constructed using open-cut trenching methods outlined below:

- Cofferdam using a flume or pump/hose arrangement (dry working conditions);
- Partial cofferdam (dry working conditions);
- Open cut in wet conditions; and
- Water diversion.

Hydro Testing

Hydro-testing water a possible source of water extraction impacts and wastewater discharge impacts. Water from hydrotesting may be reused, thus reducing the overall quantities extracted.

Operation activities will not require water usage from surface on groundwater sources. Pipeline system operations will not generate wastewater. Rain water run-off from hardstand areas around the pressure reducing station will be managed in accordance with the project design which incorporates national standards and good international practice.

Ecological Functions of Water Bodies

Open cut river crossing methods used on this project will cause disturbance of the river bed and release of sediments affecting downstream water quality. This will cause increased turbidity which could have an impact on the secondary receptors (flora/fauna) through:

- Reduction in light penetration;
- Physical damage to leaf surfaces; and
- Adversely affecting aquatic populations.

Water bodies have different sensitivity to increases in suspended sediment concentrations which is dependent on a range of factors, including natural background levels, sediment particle size distribution, flora/fauna using the environment and its adaptability, topography of the river bed. Due to natural variability of suspended and deposited sediment stream and river habitats have adapted to cope with a range of sediment concentrations. However, if the frequency and/or magnitude of sediment loading from construction activities exceeds those of natural events, this can put stresses on watercourses and associated habitats.

Additional water quality measurements⁶

Additional surveys of groundwater, surface and geothermal waters were performed along the route of the pipeline. Total of 11 samples were taken: 5 samples of surface water (V1, V2, V3, V4 and V5), 4 samples of groundwater (PV 1, PV2, PV 3 and PV 4) and 2 groundwater geothermal water (TC 1 and TH 1). Sampling locations are shown in Figure 8-1. **Error! Reference source not found.**

⁶AMBICON.UGD Water Quality Report

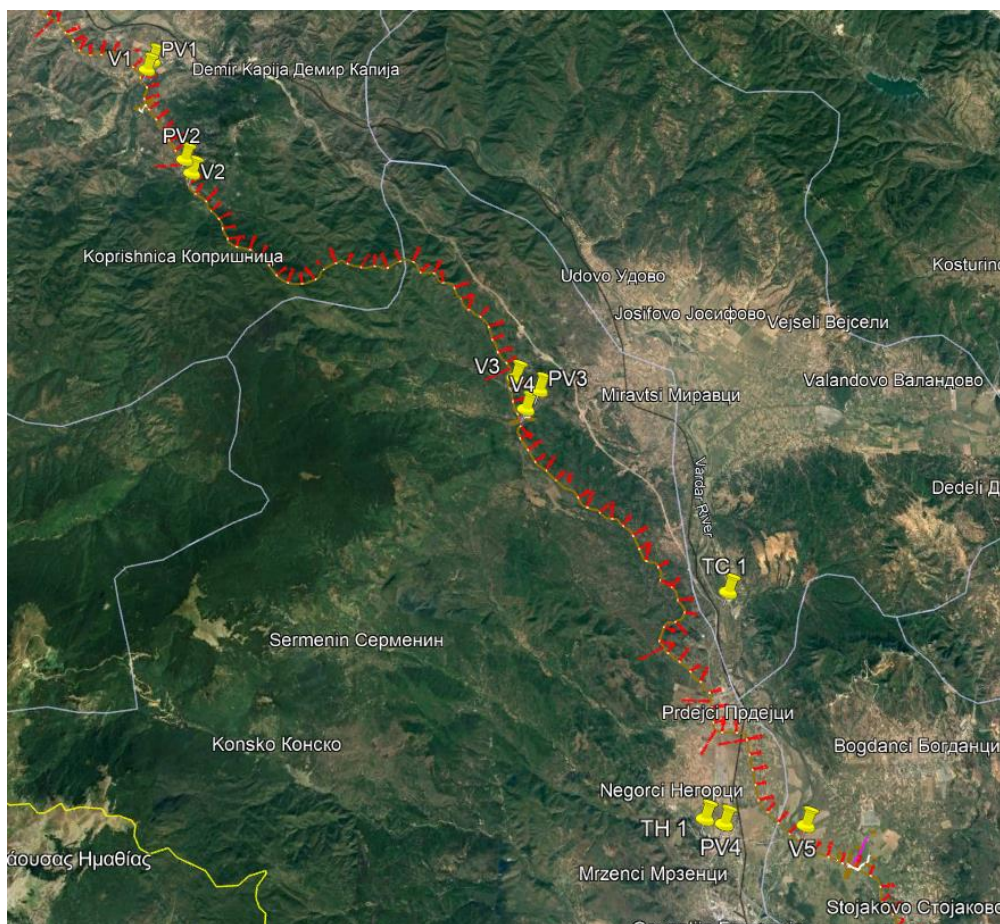


Figure 8-1 Additional Water Sampling Map

The surface water samples were taken from intersections with permanent water flows, while the groundwater samples were taken from the wells downstream from the location of surface water samples.

Table 8-1 provides a description of the location, the type of samples and its coordinates, and results from the testing.

Table 8-1: Additional Water Sampling Locations, Descriptions and Testing Results

#	Label	Sample Type	Description	Coordinates	TOC (mg/l)	HC (mg/l)
1	V1	Surface Water	Demir Kapija Aquapark, r. Boshava	7602272.6 4583705.0	1.3	1.5
2	V2	Surface Water	village Dren, River	7604638.4 4579720.2	<1	<1
3	V3	Surface Water	Stara river near Bel Raj	7617218.9 4573239.3	<1	1.9
4	V4	Surface Water	Gabrovska river near Bel Raj	7617699.3 4572154.9	<1	2.0
5	V5	Surface Water	Vardar river near Mrzentsi	7628415.5 4559013.2	<1	2.9
6	PV1	Groundwater	Demir Kapija (akvatika) well	7602419.8 4584090.4	<1	1.2
7	PV2	Groundwater	village Dren, well	7604271.5 4580236.9	<1	3.1

#	Label	Sample Type	Description	Coordinates	TOC (mg/l)	HC (mg/l)
8	PV3	Groundwater	source near Bel Raj	7618099.7 4572888.2	<1	<1
9	PV4	Groundwater	village Mrzentsi, well	7625702.9 4558786.6	<1	2.6
10	TC1	Geothermal Water	Well near Smokvitsa	7625288.1 4566483.9	<1	2.6
11	TH1	Geothermal Water	Well Negorski banji	7625055.0 4558885.5	1.8	2.7

TOC = Total Organic Compounds; HC = Hydrocarbons

The samples were analyzed by the UNILAB laboratory, University Goce Delchev University, Stip. Spectrophotometric method was used to determine the total organic compounds and hydrocarbons in the samples.

Total Organic Carbon (TOC) is a measure of the total amount of carbon in organic compounds in pure water and aqueous systems. Unless it is ultrapure, water will always contain some natural organic compounds.

Most of the hydrocarbons found in nature occur as a result of the decomposition of crude oil and natural gas, where decomposed organic matter provides an abundance of carbon and hydrogen.

From the testing results it can be concluded that in all samples the **level of TOC and hydrocarbons is very low**. This allows a direct comparison of these results from the baseline monitoring with the data from future monitoring that would be conducted during and after the construction of the pipeline.

Geothermal water

There are 2 geothermal water sources along the route:

- Negorski banji, at a distance of 3.3km from the route; and
- Smokvitsa, at a distance of 1.6km from the route

Negorski banji is an active a tourist and health and rehabilitation center. The geothermal source is associated with a fault in volcanic rocks. The geothermal waters appear at the contact of volcano with the alluvial of river Vardar, and are at an altitude higher than the gas pipeline. The elevation difference and the distance from the route eliminate potential for impact of the project on this geothermal system.

Smokvitsa is a borehole system in the alluvial of river Vardar. The water is likely used for heating of farming greenhouses. The facility is in bad condition. The pipeline runs 1.6km west of the source through spilite and diluvial sediments, which are relative hydrogeological insulators, which eliminate potential for impact of the project on this geothermal system.

8.2 Impact Assessment

The primary sources of influence, possibly impacted resources and receptors, baseline and project influencing factors related to the project's impact on water resources (including surface water and groundwater) are outlined in table below.

Table 8-2: Key assessment considerations - water resources

Sources of Impact/Risk	<ul style="list-style-type: none"> - During the Construction phase: preparation, construction, and management of temporary facilities (construction camps, storage yards, water network, etc.); dewatering; watercourse crossings; erosion control; hydrotesting (water abstraction and discharge); site preparation and installation of PRS; movement of vehicles, equipment, and personnel; upgrade of existing access roads; working strip preparation, trenching, lowering, and laying of pipeline; construction waste management and storage and handling of fuels and chemicals. - During the Operation and maintenance phase: production and disposal
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	of solid and liquid wastes (such as at pressure reduction station); utilization of water and raw materials; pipeline maintenance. - demobilization and abandonment of installations and infrastructures constitute the step of decommissioning.
Potentially Impacted Resources and Receptors	- Freshwater resources: surface water and groundwater.
Baseline Conditions that are Potentially Influencing Impacts/Risks	- Crossings between pipeline and surface bodies of water, - Quantity and quality of available water sources, - Use of groundwater and surface water as potable water sources.
Project Factors that are Potentially Influencing Impacts/Risks	- Techniques used for hydrotesting water management, river crossings (trenchless technology, for example horizontal directional drilling-HDD), construction camp management, waste management, and traffic management.

The following discuss each significant potential impact, providing information on how each source is anticipated to affect receptors and the mitigating strategies integrated into the project.

8.2.1 Construction Phase

Watercourse crossings

Main watercourses traversed with the proposed pipeline route include Vardar and Boshava/Doshnitsa rivers, while all other crossings are small rivers, streams and channels.

There will be two primary construction methods: open cut and trenchless (HDD). Although the chosen approach will rely on the specific characteristics of the affected watercourses in order to minimize damage, HDD will be used for installing pipelines beneath sensitive areas or infrastructure without affecting the watercourse directly, while open cut will be used for small streams, creeks and channels.

HDD can be implemented only when geology and geomorphology of the crossing site permit the use of trenchless procedures. Typically, HDD provides a robust and almost maintenance-free way of stream or river crossing with minimal impact on the stream or river bottom. Nevertheless, as drilling fluids are utilized during HDD, there is a potential of leakage and consequent repercussions on surface and groundwater. Consequently, under normal HDD execution, the scale of impacts is deemed minimal, and no substantial consequences to surface or groundwater quality are expected. Therefore, the magnitude of impact for this procedure is **assessed as insignificant or low**.

Open-cut techniques necessitate a trench through the watercourse. After the trench has been backfilled, the surface (river or stream bed) is restored to an almost original state. Principal disadvantage of the open-cut method is that in aquatic systems, open-cut trenching can generate a pulse of suspended sediment that can reach concentrations several orders of magnitude above background levels. The flumed and dam and pump techniques are typically less intrusive when dealing with large sediment concentrations. In general, the open-cut method, when combined with the appropriate scheduling of the works (during low water volume periods) and diversion of water flow during the works (upstream and downstream damming and the over-pumping of waters, or the installation of flume pipes if the channels are sufficiently narrow), will produce small impacts on water turbidity and chemical characteristics or changes in riverbed morphology. Typically, the application of the approach to creeks, streams, or irrigation channels with low to moderate sensitivity or value will result in **insignificant or low** impacts.

Trenching

Trenching activities (outside the watercourse) may have potential effects on surface waters as the topsoil and other earth materials that will be removed from the building site and set aside, may become entrained by heavy rainfall and enhance the turbidity of nearby streams and major watercourses along the pipeline's route. Depending on the proximity to a watercourse (with flow) and the absence of mitigating measures based on best practices, low to moderate impacts on surface water quality, could occur during periods of intense precipitation. This is determined based on the relatively localised nature of the impact, as well as the significant degree of change silt will bring to a surface water body and the potential secondary effects this may have on aquatic life.

In addition, during some rainy or high-water-table situations, it will be essential to drain the trench. Dewatering makes construction safer by reducing trench collapse and permitting inspection of the trench bottom (bedding) prior to excavation. It also prevents fine sediments from accumulating in the trench, which could impair the soil's future permeability and natural drainage. During dewatering, the water table in the subsurface is lowered and process is usually continued until work is completed and the pipeline trench is backfilled. The extracted groundwater will be dumped into available ditches and irrigation channels, watercourses, rivers (sloping away from the dewatering area), or to pre-agreed land areas with authorization from the appropriate authorities.

The depletion of groundwater is anticipated to be localized, and levels will quickly return to normal upon termination of pumping. The effects of dewatering on the availability of groundwater depend on the kind of aquifer and its hydraulic property, however, as a result of the short duration of dewatering, impacts are thought to be **low to insignificant**. Groundwater quality will also be minimally affected by dewatering and the relevance of this influence on groundwater is deemed to be minimal. Sediment content or past contamination may have secondary effects on surface water quality related with the discharge of waters (from dewatering or runoff or erosion from dewatering).

Hydrotesting

As the part of the construction process, the pipeline will undergo a hydrostatic pressure test following installation. This technique comprises filling the pipeline with water, performing a pressure test to confirm the pipeline's integrity, and then releasing the water. Hydrotesting necessitates water extraction from nearby water sources. Generally, the used water will be collected and reused in succeeding pipeline segments. The water sources for the hydrostatic testing are the water bodies or water supply lines along the route, and their availability will be regulated through a permitting process. This is a temporary extraction process, with typical duration of 2-3 days for one section and amounts of few hundreds cubic meters for given section (total amount for the pipeline is estimated at 5000 m³). The water will then be dumped into local watercourses. The volume of water discharged from each portion during hydrotesting may have physical effects on the receiving waters. In general, the discharge rate after hydrotest completion will adhere to the same principles as abstraction. The discharge rate into a watercourse must be proportional to the size and type of the water body in order to prevent artificial flooding and morphological changes to the riverbed. The hydrostatic testing approach given is centered on the reuse of fresh water. After testing one or more portions successfully, water will be emptied into the subsequent test section(s) if possible.

The contractor will be responsible for the extraction, reuse, monitoring of water quality, and eventual discharge of hydrotesting water. The contractor will also secure the necessary permits from the relevant authorities (as applicable).

The hydrotesting water by default will not contain any chemicals or oxidizers and before discharging the water into the recipient, it will pass through a sedimentation pond to separate any solids. However, during hydrostatic testing, oxygen scavengers, corrosion inhibitors, and biocides may be utilized to protect the pipeline against chemical and microbiological damage and these substances may have toxicological effects on the receiving area.

Therefore, if not performed in environmentally safe manner, both water abstraction and discharge can have substantial repercussions, such as depletion of water resources, water contamination, soil erosion, etc. Prior to the application of mitigation, these impacts are anticipated to have a **low to moderate** impact on the linked watercourses, given the relatively low amount of water and possibility for morphological changes following discharge, as much as the potential for chemical substance contamination.

Accidental contamination

Accidental contamination of water resources by solid, liquid wastes and hydrocarbon/fuel spills can result from the following activities:

- generation and disposal of solid and liquid wastes, which may be inert (no risk of pollution), sanitary (to be transported to a controlled municipal waste disposal site), oily and hazardous (to be segregated for collection and disposal by specialist contractors);
- storage and handling of fuels and chemicals, to be used on site; and

- accidental discharges from cars, storage tanks and chemical warehouses, as well as metalworking and welding, that can contaminate water supplies.

Overall impact significance is considered **low to moderate**.

8.2.2 Operations Phase

Project operation has very limited impacts on water resources (including surface water and groundwater). Freshwater resource consumption and accidental pollution activities could result with limited impacts only, due to very small amounts of water used only at PRS station and relatively small amounts of solid and liquid waste generation, primarily as a result of maintenance activities at the PRS station and block stations (rainwater and greasy water).

Because the pipeline will be buried to a depth of around 1 meter and any additional excavation work above it will be prohibited, its existence may restrict the creation of new irrigation networks. Nevertheless, the issue is technical in nature, and it is believed that alternatives to crossing the pipeline route would be developed, thus only insignificant impacts are predicted.

Pipeline existence could have a comparable impact on the development of potential drainage networks. However, given that most drainage networks are established at depths between 0.7 and 0.9 m, it is envisaged that similar networks can be constructed without difficulty once the pipeline is operating. As a precautionary measure, the drainage networks in the crossing area should not be excavated by machine.

8.2.3 Decommissioning Phase

As mentioned in Section 7.2.3, it is currently impossible to predict which decommissioning procedures will be implemented at the time of decommissioning, but NER is committed to ensuring that these approaches will be state-of-the-art at that time. It is anticipated that identical equipment, machinery, and vehicles will be employed during Project decommissioning as were used during Project construction, and that relevant operations will have comparable impacts. Therefore, it could be safely assumed that associated effects on freshwater resources will be negligible.

8.3 Mitigation Measures and Monitoring

Mitigation Measures during Construction

Crossings of Water Courses

For each crossing, a Water Course Crossing Plan will be developed with standards for minimising sediment dispersion and impacts on water ecology, including riverbanks and riverine habitats.

Horizontal directional drilling will be used for Vardar and Boshava/Doshnitsa rivers in order to reduce potential consequences.

Special precautions will be required for the containment and disposal of cuttings and bentonite fluid during HDD application. The remaining small watercourses will be traversed using open-cut techniques employing measures such as flume pipes (where necessary) to ensure continuous flow.

Locally-appropriate materials will be used for reinstatement when open-cut techniques are employed. It will be preferred to carefully remove the components so they can be reinstalled at the same spot. Vehicles will be prevented from driving through waterways. To avoid this contact between equipment and surface water, portable bridges may be employed.

The following mitigation actions will be implemented in areas of high sensitivity along the study area:

- maximum speed allowed for vehicles in the vicinity (100 m) of any surface water will be 20 km/h;
- whenever feasible, machinery shall avoid coming into contact with surface water;
- all machinery will be inspected for leaks prior to being mobilised to cross watercourse.

- during crossings using the open-cut method, riverside topsoil piles will be utilised for machine safety distances.
- access roads located near surface water, as well as the installation of suitable erosion and sediment control/drainage, will be paved or irrigated on a periodic basis;
- excavated topsoil, subsoil stockpiled, and erosion control for topsoil/subsoil stockpiles will be irrigated on a periodic basis.

Trenching

A Water Management Plan will be developed to determine and manage groundwater pumping demands and surface runoff. Dewatering released waters, if returned to streams or rivers, shall be discharged so as to minimise physical impacts on channel morphology, i.e. without turbulent flows and with sediment levels below receiving waters.

Careful management and control of the groundwater table via monitoring holes will be conducted when dewatering is required to ensure the required water reduction level is met. The water will be discharged in accordance with all permissions and notices issued by proper authorities and landowners.

Sandbags and settlement tanks or lagoons should be used to catch runoff from the operating corridor in order to minimise the suspended sediment load of the water before to its discharge into watercourses. Prior to release, the water may also be purified by passing it through a suitable membrane, such as a geotextile material. Filters, such as straw bales or 'sedimats' or silt fences, will be placed around dewatering sites to act as filters and trap any sediment that is released into the watercourse.

All disturbed soil drainage features will be fully restored after construction. There will be no discharges without previous agreement and the authorities' consents and proper permitting procedure.

Hydrotesting

In order to minimise the requirement for fresh water abstraction, water will be reused whenever possible. Prior to discharge, water will be analysed to ensure that its quality satisfies local and international standards for wastewater discharge. If necessary, local treatment (i.e. filtration) will be provided. There will be no discharges without previous agreement and the authorities' consents and clearances.

Periodic inspections should be conducted, and appropriate action should be taken in the event that a spill or leak is identified.

Minimize water use as much as possible by training employees in personal water conservation and recycling techniques (such as not allowing water to flow when it is not in use, not discarding water but storing it for reuse when practical, etc.).

Minimize water usage associated with construction tasks.

A Water Management Plan will be produced to outline the water conservation strategies that will be used during the Construction and Pre-commissioning phases.

Accidental contamination

Implementation of the ESMMP and specific sub-plans according to international best practice;

- development of a Waste Management Plan to avoid solid or liquid waste discharges to water bodies; and Development of a Hazardous Materials Management Procedure to detail procedures for working with chemical products; and
- development of Spill Prevention and Response Plan to prevent and respond to accidental pollution of water bodies caused by hydrocarbon/fuel spills.

Specific mitigation measures in construction camps will include bunding of all places where there is a risk of leaks or spills during plant and vehicle storage, repair, or refueling, as well as storage areas for potentially polluting products. Bunded areas will be designed to contain at least 110% of the largest storage tank plus 10% of the aggregate volume of all storage tanks within the bunded area.

Dangerous substances will be stored in impermeable bunded areas to protect groundwater from accidental spills.

Mitigation Measures during Operations

The impacts on irrigated areas will be mitigated with the proper timing of future irrigation network construction. In this instance, the following solutions are suggested:

- the building of a new irrigation canal above the pipeline should be avoided; and
- every new irrigation network near a pipeline must be constructed per the owner's specifications.

Prior to final restoration, plastic or elastic hoses will be used to replace the piping removed from the construction zone when irrigation is provided by wells and water is supplied to a pipe network.

Monitoring

An appropriate water quality monitoring program for construction phase of the project will be developed in compliance with national regulations. This document should be included in the construction management plan. An environmental specialist should be included in the preparation and realization of the monitoring plan.

Key Performance Indicators: Key Performance indicators will be set for both environmental and social management of key issues. These will be discussed and set with contractors during the tender process and will be integral NER's monitoring of the contractor's environmental and social management performance.

8.4 Residual impacts

Watercourse crossings

The use of trenchless techniques to bridge the Rivers Vardar and Boshava/Doshnitsa will ensure that residual consequences to water quality or river bed morphology are **insignificant**. The bridging of any smaller rivers and streams, which are predominantly seasonal and transient in flow, is predicted to have minor residual impacts.

Trenching

Limiting the length of the working corridor to be open at any time, and fast completion (including reinstatement), will reduce soil storage time and potential consequences to surface watercourses from construction working corridor runoff. The implementation of methods to intercept and treat runoff from the construction site, such as the use of sandbags, will also reduce the likelihood and degree of any adverse effects. As a result, no major residual effects on surface water quality are anticipated from runoff.

With monitoring of groundwater level during dewatering efforts, the residual consequences in locations with shallow groundwater will be reduced to negligible levels. Given that all discharges will be captured and treated before entering a watercourse, the discharges from dewatering activities will have a negligible impact on surface water quality.

Therefore, overall residual impacts are anticipated as **insignificant or low**.

Hydrotesting

In conjunction with local authorities, the release of hydrotest waters will be tailored to prevent to the any damage to receiving water body. Additionally, the Contractor shall not apply any chemicals that can result with surface water pollution. Given the implementation of these steps, it is predicted that residual effects will be insignificant.

The proposed mitigating measures will minimize the quantity of freshwater utilized by the Project. The magnitude of the impact is defined as very low, hence its relevance is deemed **insignificant**.

Accidental contamination

The recommended mitigation measures will reduce the amount of freshwater utilised in the project, which should be implemented across the entire project site, as well as inadvertent solid and liquid waste contamination. The magnitude of the impact is anticipated as **insignificant**.

The relevance of the residual impacts on water resources throughout the construction phase is summarized in Table 8-3.

Table 8-3: Residual impacts on water resources

Impact / Risk	Mitigation measures to address the impact	Risk Significance of Residual Impact/Risk
Watercourse crossings	<ul style="list-style-type: none"> - HDD crossing at the Rivers Vardar and Boshava/Doshnitsa, - Open cut techniques for the small creeks and channels crossings, - Application of watercourse crossing plan, and - Prohibition of vehicles to drive through watercourses. 	<p>Insignificant or low</p> <p>Insignificant residual impacts to Rivers Vardar and Boshava/Doshnitsa, due to the trenchless crossing (e.g. HDD) method.</p> <p>Insignificant residual impacts for small streams crossed by the open cut technique.</p>
Trenching	<ul style="list-style-type: none"> - Minimal modification of channel morphology - Careful management and control of the groundwater table via monitoring holes - Interception of run-off from the working corridor - Fast and full reinstatement of land drainage features - Specific length of working area open at any one time. 	<p>Insignificant or low</p> <p>Low impacts in areas with shallow groundwater table.</p> <p>Insignificant impact on tower quality.</p>
Hydrotesting	<ul style="list-style-type: none"> - Where practicable water will be reused in subsequent sections, - Water will be tested prior to discharge and local treatment will be provided, if necessary, - Minimisation of physical impacts on receptor morphology - Discharges will not be made without prior agreement and appropriate consents and - approvals from the authorities - Additives will be used in special cases and upon approval from the NER 	<p>Low to Moderate</p> <p>Maximum abstraction from surface watercourses appropriately limited and only low sensitivity groundwater will be considered as a potential source of water.</p> <p>Reuse of water.</p>
Accidental contamination	<p>Operation under international standards and development of appropriate plans, including but not limited to:</p> <ul style="list-style-type: none"> • Waste Management Plan • Hazardous Materials Management Procedure • Spill Prevention and Response Plan 	<p>Insignificant or low</p>

9 Soil

Pipeline construction will disturb existing soils in the usual 25-meter-wide working strip along the approximately 66.7-kilometer-long route between the border with Greece in the vicinity of Idomeni village and the existing valve station (block station BS8) in the vicinity of the town of Negotino covering total surface of around 166 hectares. Relatively small additional surface will be temporarily disturbed by the pipeline and pressure reduction station construction camps, equipment and pipe storage yards currently planned for the project.

This section provides supplementary information for the potential impacts and mitigation measures associated with water resources, in accordance with EBRD E&S (2019) policy PR3, as outlined in the due diligence report. The supplementary assessment focuses on soil erosion in potential risk areas, including hilly-mountainous sections and water crossings.

9.1 Baseline

The baseline assessment of the soil quality in the ESIA was supplemented with: scoping of soil characteristics along the route, site surveys and soil quality measurements, re-evaluation of impacts and mitigation measures, monitoring and residual impacts.

Conditions along the Route

Soil resources in the south-eastern parts of Macedonia are an important resource, especially given the high utilization of agricultural land in this region. Several soil types are found along the pipeline route. Table 9-1 below shows the soil types from which certain sections of the pipeline route are constructed.

Table 9-1: Key soil characteristics along the proposed pipeline route

Pipeline Section	Description of soils
Section 1: Border - Prdejtsi	Soils in the relatively flat agricultural areas are dominated by colluvial and fluvial soil type and locally isolated rigosol zones occur.
Section 2: Prdejtsi - Gabrovo	In this sector there is a gradual increase in altitude and there are hilly areas with poor vegetation. The types of soils found in this sector are regosol and leptosol.
Section 3 Gabrovo – Dren	Hilly-mountainous part of the route, predominantly built of brown forest soils, and ranker and regosol occur
Section 4 Dren - Tremnik	In this section there is a sharp decrease in the height of the terrain and the appearance of agricultural areas where regosol and smolnica dominate and in the vicinity of the village Tremnik there are smolnica and rendzina soils
Section 5 Tremnik - Negotino	This flat part of the route is dominated by rigosol type of soil on which large areas of vines are planted.

Soil Susceptibility to Erosion and Compaction

For most of the proposed route, the soils are reported to be in relatively good condition with fairly good cohesion and a soil structure that provides for aggregate stability and reduces the likelihood of soil erosion. Part of the region has, however, been experiencing accelerated soil degradation and erosion as a result of both urban development and deforestation. Where the ground is already saturated, during periods of high intensity rainfall flash flooding is also a concern with negative impacts for both agricultural land and settlements (greater slope instability, landslides and erosion).

A number of areas have been identified where the erosion risk is particularly high due to the soil properties and topography as illustrated in Figure 9-1.

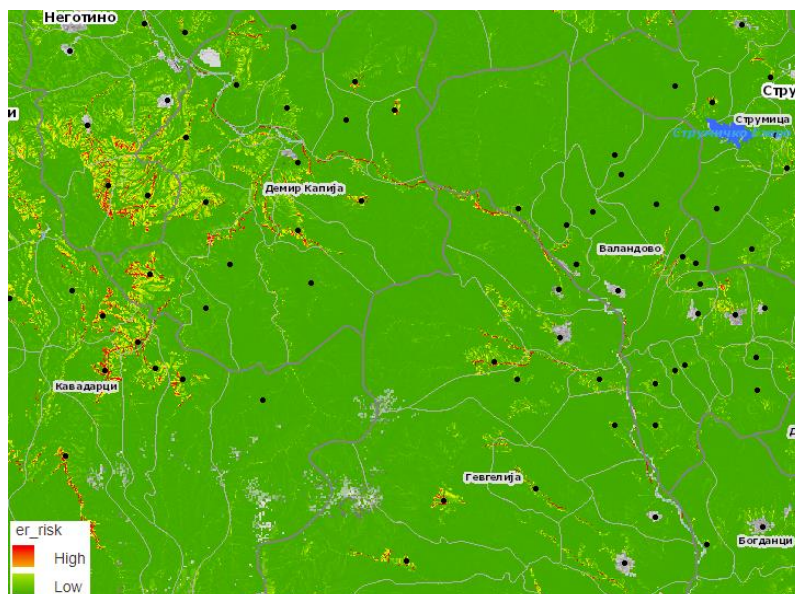


Figure 9-1 Soil erosion risk map

As can be seen from this map, the most endangered parts of erosion along the route are the parts around the villages Miletkovo, Gabrovo and Petrovo. A large part of the route between the villages of Dren, Przhdevo and Tremnik is also sensitive to erosion.

Additional Soil Quality Measurements⁷

Supplementary soil surveys were performed along the pipeline route. The survey campaign included 5 samples from locations shown in Figure 9-2-2.



Figure 9-2 Additional Soil Measurement Locations

Samples (P1, P2, P3, P4 and P5) were taken from natural (undisturbed) soil and from agricultural (cultivated) areas.

⁷AMBICON.UGD Soil Quality Testing Report

Table 9-2 provides a description of the location, the type of samples and its coordinates, and results from the testing.

The samples were analyzed by the UNILAB laboratory, University Goce Delchev, Stip. Kotzmann and SOXHLE methods (ASTM D 2974 00) were used to determine total organic compounds and hydrocarbons in the samples Table 2 shows the results of the analysis.

Table 9-2: Additional Soil Sampling Locations, Descriptions and Testing Results

#	Label	Sample Type	Description	Coordinates	TOC (mg/l)	HC (mg/l)
1	P1	Soil	near Negotino (Block Station 8)	7593206.1 4591565.0	3.37	0.05
2	P2	Soil	Demir Kapija (near Akvatika park)	7602137.8 4583870.6	2.76	0.01
3	P3	Soil	village Dren	7604243.3 4580530.1	3.29	<0.01
4	P4	Soil	near village Miravtsi	7617674.9 4572277.0	1.54	<0.01
5	P5	Soil	near village Mrazentsi	7627472.5 4559573.2	2.94	<0.01

From the testing results it can be concluded that in all samples the **level of TOC and hydrocarbons in all samples are minimal**, and results shown above clearly demonstrate that the soil quality reflects the largely rural character of the region, which is portrayed particularly well by the low hydrocarbon contents.

9.2 Impact Assessment

Summary of primary sources of impact, potentially impacted resources and receptors, and Project influencing factors is provided in Table 9-3.

Table 9-3: Key assessment considerations – soils

Sources of Impact/Risk	<ul style="list-style-type: none"> - During the Construction phase: installation (including site preparation) of temporary construction camps, pipe yards, and related infrastructure; upgrade of existing access roads; movement of equipment and personnel; solid and liquid waste generation and disposal; preparation of working strip (removal of topsoil); works in elevated regions; pipes lowering, and laying; backfilling and reinstatement of the pipeline trench and construction-disturbed land; pipeline cleaning and gauging; installation and setup (including site preparation) of PRS station; - Operation and maintenance phase: transportation of employees, equipment, and vehicles; earthworks to expose the pipeline for repair or maintenance; production of solid and liquid wastes and their disposal; movement of vehicles, equipment, and employees; production and disposal of solid and liquid wastes;
Potentially Impacted Resources and Receptors	<ul style="list-style-type: none"> - The geomorphological effects of erosion and landslides - Influence on soil quality.
Baseline Conditions that are Potentially Influencing Impacts/Risks	<ul style="list-style-type: none"> - Land usage - Qualitative properties of soil - Degradation of delicate soils
Project Factors that are Potentially Influencing Impacts/Risks	<ul style="list-style-type: none"> - Project footprint, - Topsoil removal and reinstatement techniques, - Blasting and hammering techniques - Specific techniques used for crossings (i.e. HDD, open cut river crossings), - Construction site and waste management, - Traffic management

9.2.1 Construction Phase

Geohazard and seismicity evaluation

Geohazards indicate potential project consequences owing to landslides and rock falls, soil liquefaction and karst formations, as well as subsurface seismic activity. Numerous geological, geomorphological, and geotechnical factors of the subsoil, surface, and climatic conditions, such as soil types and grain sizes, mineral composition and stratification of rock formations, rock weathering process, slope angles of terrain surfaces, presence of groundwater in sediment deposits or rain fall characteristics or soil freezing, etc., influence these effects.

Most common potential impacts to the pipeline itself include:

- Lateral pipe displacement;
- Pipe settlement due to landslides or soil liquefaction;
- Pipe uplift (heave) due to landslides or buoyant rise due to soil liquefaction;
- Significant plastic deformation of the pipe wall material (due to compression, tension or shear strain by landslides, lateral spreads by soil liquefaction, due to subsidence in Karst or sink holes);
- Spanning (i.e., the loss of ground support if a landslide eliminates the ground material over a large length of the pipe trench) or temporary spanning due to soil liquefaction;
- Increase in the pipe's static load; (i.e. pipe is buried under landslide debris); and
- Temporary increase in the pipe's dynamic load (i.e. is imposed by falling rocks).

Due to the selection of location, these occurrences are deemed irrelevant to pressure reducing station location.

This occurrences and proper mitigation measures are covered in technical documentation which include data from specific geotechnical and seismic investigations, and if proper mitigation strategies and measures are fully implemented, possible impacts could be estimated as **low to moderate**.

Soil Erosion

The soil structure along the pipeline path changes according to the types of soil. Along the majority of the route, soils have moderate cohesion where soil structure offers aggregate stability and decreases soil erosion risk. However, there are susceptible parts where the soil erosion risk is especially significant due to soil qualities and terrain and these sections are identified in the baseline chapter presented above (see Section 9.1.). Unless adequately managed and mitigated, the loss of vegetation and trenching activities on the steep slopes of the mountain may result in substantial irreversible soil erosion impacts. This is especially true in regions with medium or high soil sensitivity, as illustrated in section 9.1. The risk of soil erosion along these pipeline segments is regarded as **moderate or high**. modest or considerable.

In addition, all parts of the pipeline route identified for construction in elevated areas are identified as areas with **moderate to high** soil erodibility sensitivity.

Compaction of soil

When soil particles are pushed together, reducing the soil's porosity, compaction occurs. This increases the mass of solids per unit of soil volume (bulk density). Generally, soil compaction can occur throughout the majority of construction projects requiring heavy gear, particularly when soils are damp. Clay-dominated soils are particularly vulnerable.

During the pipeline's development, trucks and heavy machinery will utilise the construction corridor. Given the brief period of the development process and the fact that just the construction corridor will be affected, the extent of the impacts is deemed to be **low to moderate**. For the high-sensitivity route segments like water crossings, the accompanying impacts are of great significance and are estimated as moderate to high.

As, in most parts the current road network will be used and there will be no need for new access roads, effects on compaction are deemed as insignificant to low.

Also susceptible to soil compaction are temporary Project installations like as material and equipment depots and camp sites. However, as most of these temporary facilities will be located on existing infrastructure or brown field areas, the impacts are also anticipated as insignificant to moderate.

Soil Pollution

During the building of the pipeline (along the construction corridor) and the above-ground facilities, the soil could be accidentally contaminated by direct spillage of items such as oils or hydraulic fluids from trucks and machinery, surface runoff, and sanitary waste. However, any prospective spills will likely be of limited volume and localized in nature; hence, the scale of these potential effects is deemed to be negligible. It is clarified that there would be no permanent gasoline tanks along the construction corridor, and to the best of our knowledge, the route does not traverse any polluted sites, dumps, or uncontrolled waste landfills. Due to rural character of largest part of the route, confirmed with the baseline investigations, existing soil contamination has a minimal potential for adverse effects.

Overall, it is estimated that inadvertent soil contamination or disturbance of polluted soil during the construction, will have **insignificant to low** effects on the soil.

Reduction of Soil Productivity

Despite the reinstatement of the land after pipeline construction, the building of the pipeline, and notably the work performed in the construction strip, may have an impact on the ability of soil to perform its function in agricultural output, i.e. soil productivity. In regions where soil has a high agricultural value due to its capacity to promote agricultural production, soil sensitivity is greater. The soil type and quality along the pipeline route are summarized in ESIA and Section 9.1 of this document. As anticipated, soil sensitivity as an agricultural resource is high or extremely high primarily in the parts of Gevgelija and Negotino areas, where agricultural output is already intensive. However, potential changes to soil productivity are normally of minimal scale, as the soil will be effectively reinstalled so as to prevent any potential productivity loss, and only the construction corridor along the pipeline route will influence the soil (a working strip of max. 15 m width). Therefore, the effects on soil productivity are deemed as **insignificant**.

9.2.2 Operations Phase

No major soil and subsoil consequences are anticipated during Project operations. With a ploughing depth of 30 cm, agricultural soil can still be utilized. As part of the pipeline route maintenance, the 7-meter-wide pipeline protective strip will be kept clear of any vegetation with deep root systems. To protect soil, groundwater, and surface water, physical means will be employed. Use of herbicides, defoliants, etc. will not be permitted. No significant effects on geohazards such as landslides are anticipated.

9.2.3 Decommissioning Phase

Depending on the strategy and technologies available during decommissioning, the pipeline may remain in the ground or be partially or entirely removed. Regarding soil concerns, the removal of the pipeline will have similar effects to construction. Soil profiles will be disturbed, but because NER will adhere to international best practice during the construction and decommissioning phases (diligent care in excavation, separation and appropriate storage of topsoil and subsoil, de-compaction of working strip after deconstruction), it is guaranteed that soils will be returned to their previous conditions as closely as is technically feasible. Thus, soils will once again be available for agricultural use and replanting in non-agricultural areas. However, it is evident that soil profiles that have been repeatedly disturbed would not have the same qualities as the original soils surrounding them.

9.3 Mitigation Measures and Monitoring

9.3.1 Construction Phase

During pipeline construction, a number of mitigation techniques will be implemented to avoid or minimise soil and subsurface impacts:

- All removed topsoil, subsoil, and parent material shall be stripped, processed, and refilled separately. On one side of the working strip, the topsoil will be stored temporarily. On the opposite side of the working strip, the non-fertile subsoil extracted from the pipeline trench excavation will be kept. To ensure optimal crop / plant growth, it is necessary to redeposit fertile topsoil on top of non-fertile soil;
- The slopes should be aligned perpendicular to timber silt fences, which will be removed after pipeline installation. This is a crucial approach for mitigating the significant danger of soil erosion, particularly on the steeper mountain slopes;
- The storage and handling of fuel, particularly larger quantities, will take place in safe bunded locations. Lubricant oils, chemicals, and liquid wastes will be subject to similar conditions. In the event of a leak, contaminated soils will be cleaned or removed for proper disposal; and
- All wastes shall be managed, stored, and disposed of in accordance with local laws.

It is mentioned that the BVS and PRS sites will be permanently sealed (at least for the duration of the project's technical life) and consequently, the Solid Waste Treatment Plan will describe the management of the excavated soil.

Mitigation of Geohazards and Seismicity

The following mitigating measures are representative of those that may be necessary. To decrease seismic wave loads, the pipe wall thickness can be increased locally or the pipeline's flexibility can be increased by the use of joints. By raising the wall thickness, decreasing the friction angle between the pipeline and the bedding material with a specific coating, or combining special granular backfill/bedding material with bigger pits, the influence of surface fault movements on the pipeline can be mitigated. At crossings with fault zones, it is also possible to reduce the thickness of pipeline covers as an additional mitigating strategy.

The phenomenon of soil liquefaction can be minimized by increasing the density and strength of sand, reducing the water table, or replacing liquefiable soils. The cost and environmental effectiveness of this technique are limited to the ground surface in close proximity to layers of liquefiable soil deposits and in locally constrained areas with a high groundwater table. For the purpose of mitigating the effects of probable liquefaction in river crossing locations, trenchless crossings could be planned to cross below soil deposits that are susceptible to liquefaction.

The effects of landslides can be mitigated through a series of construction design measures, such as using embankments at the base of the slope or retaining structures, reducing the slope inclination with additional soil deposits or lowering groundwater levels, or even replacing or reinforcing sensitive soil layers. Using stoppers, barriers, and/or wire fences, it is possible to limit the effects of rockfall.

Impacts from geohazards during construction phase can only be mitigated for rockfall and landslides by reducing potentials for these incidents due to project-induced earth movements, excavations or embankment works, and rock blasting activities by implementing international Best Practice for construction sites and Health and Safety Management Plans and specific working activities instructions for geohazard areas.

Soil Erosion Control

As soon as the pipe is backfilled, the restoration process will begin and continue until the construction site is restored and replanted. The work area will be seeded, fertilised, and mulched in order to restore ground cover and reduce erosion. The considerable danger of erosion will be mitigated by employing soil restoration and land reclamation strategies. These techniques include seeding, hydroseeding, and other approaches for soil revegetation, as well as silt fences. Seed combinations of endemic species and varieties already existing in the section (fescue grass and legume seeds), mulch, fertiliser, tackifier, and water are administered using the hydroseeding method. It is the most efficient (optimal)

way for achieving growth on steep or challenging terrain. Planting shrubs is thought vital in areas with considerable precipitation, moderate to steep slopes, and poor or structureless soils. These methods lower the risk of soil erosion and aid in its restoration. In order to aid in the reinstatement, it is crucial that silt fences used during construction to limit the high risk of soil erosion remain in place after the completion of pipeline building activities.

The risk of soil structure destruction and soil compaction is especially high during the months with the heaviest precipitation, so pipeline construction should be avoided in these periods wherever possible. In addition, the combination of heavy precipitation, structureless soils, and moderate-to-steep slopes results in an increase in the already high danger of soil erosion.

In order to limit erosion risk, it is necessary to emphasise that the construction strip will be reinstated quickly after construction, particularly on sites with high or moderate erosion sensitivity.

Additionally, in addition to hydroseeding, natural reforestation processes are anticipated and must be monitored.

Mitigating Soil Compaction

The following mitigation methods have been implemented to mitigate the effects of compaction during pipeline construction:

- Soil stockpiles resulting from topsoil stripping will be around 1-2 m in height, depending on local soil characteristics, working strip width, and local coverage of the pipeline (i.e. required trench);
- By covering soil stockpiles with sheets, they will be protected from runoff, such as from severe rainfall. The length of time spent storing topsoil will be limited. When it is necessary to preserve topsoil stockpiles for extended periods of time, the topsoil will be planted with fast-growing seeds (such as mustard) to prevent entrainment by wind or precipitation;
- Only the construction corridor and access roads will be used by heavy equipment and project vehicles;
- Efforts will be taken to organise Project activities during the dry period on soils with a high sensitivity to compaction (e.g., clayey soils, Luvisols);
- In order to mitigate the compaction impact of heavy construction equipment (such as side booms with pipeline loads and line pipe delivery trucks), temporary surface stabilising materials will be used on the selected segment with highly compaction sensitive soils. Driving mats or geotextiles with a gravel layer on top are the international best practice for pressure distribution on the ground in accordance with modern technology. Before starting strip restoration, these temporary driveways will be removed; and
- Deep ploughing (subsoil decompaction) will be undertaken on the construction zone and temporary construction facilities (such as pipe yards and construction camps) following project construction and during restoration. The deep ploughing shall be carried out on the entire working strip, where topography permits, to a depth of roughly 60 cm below the surface, and if locally required owing to equipment limits, diagonally and along the working strip.

Mitigation of Soil Pollution

On any big construction site, inadvertent spills of lubricants or fuels can cause localised soil contamination caused by construction activity. In such instances, the polluted ground will be excavated, removed, and treated as dangerous/hazardous waste by a licensed contractor in accordance with the Work Site Management Plan, which includes the Spill Management Plan.

On the basis of the baseline data obtained to date, it seems doubtful that considerable existing soil contamination would be detected during the excavation of the pipeline trench. Nonetheless, if suspected contamination is found, the following actions will be taken:

- An evaluation of the potential dangers, including soil sampling, if necessary, will be conducted;
- The construction workers will be equipped with the proper personal protective equipment; and

- The excavated contaminated soil will be separated from the main stockpiles (to minimise the potential impact on the adjacent land and the potential for runoff to reach the land drainage network) and disposed of by a licensed contractor; and in the vicinity of any contamination, the pipeline trench will either be walled with impermeable materials or backfilled with materials having low permeability, such as clay.

Reduced Soil Productivity

The reinstatement methods indicated previously, such as reserving fertile topsoil, limiting the long-term consequences of subsoil compaction, and protecting the surface from erosion, will contribute to the restoration of soil productivity. Restoring excavated topsoil while preserving its biodiversity lowers weed growth in agricultural areas. In natural areas, weed control is not necessary because no weeds are present.

9.3.2 Operations Phase

In addition to vegetation clearing, the Pipeline Route Maintenance Plan will include periodic checks for surface erosion and the development of stabilization measures where necessary to repair or avoid topsoil losses on the reinstated construction strip. In the unlikely event that external pipeline maintenance is required, i.e. excavation of a pipeline segment for repair (which will be a rare occurrence), impacts and mitigation at the particular site will be comparable to those of the construction phase.

During the operational lifetime of the project, construction phase restoration earthworks undertaken along the temporary working strip in elevated locations will contribute to the regeneration of soils and vegetation cover. Along the pipeline protective strip shallow-rooting vegetation (such as grass) will be allowed to grow.

In places prone to geohazards, the pipeline's technical design would also incorporate operational geohazard risk mitigation.

9.3.3 Decommissioning phase

In the event that the pipeline is removed, mitigating measures for soil preservation and reinstatement will be the same or comparable to those indicated for construction. At the time of decommissioning, mitigation measures will be planned according to the best available practices (i.e. in 50 years).

9.3.4 Monitoring

An appropriate soil quality monitoring program for both the construction and operational phases of the project will be developed in compliance with national regulations. This should be included in the construction management plan and operations management plan.

Key Performance Indicators: Key Performance indicators will be set for both environmental and social management of key issues. These will be discussed and set with contractors during the tender process and will be integral NER's monitoring of the contractor's environmental and social management performance.

9.4 Residual Impacts

Despite the adoption of numerous mitigation measures, irreversible changes in soil profile and water regime are typical residual long-term consequences. This pertains specifically to the profile's soil moisture content. Sand tends to drain the soil profile above and adjacent to the trench, whereas compacted subsoil with a high loam or clay content could result in water logging below the reapplied topsoil in the affected working strip. These effects are unavoidable, but they typically do not have a substantial impact on the agricultural or habitat function of soils and magnitude of is anticipated as **insignificant to low**.

In regions with a high sensitivity to soil erosion, the adoption of mitigating measures will lessen the magnitude of the impact. For soils that are sensitive to disturbance and challenging to reestablish, the

reestablishment process will certainly take longer. With the application of best practices soil handling techniques as outlined above, no significant residual impacts to soil structure are anticipated along the majority of the pipeline working corridor as a result of compaction. In areas where the route crosses clay soils, scheduling construction activities during the driest months of the year will reduce the likelihood of significant adverse impacts. Overall, it is estimated that residual impacts on clay soils will be of **insignificant to low**.

The table that follows provides an overview of the residual effects that the construction of the project had on the soils.

Table 9-4 Construction phase residual impacts - soils

Impact / Risk	Mitigation measures to address the impact	Risk Significance of Residual Impact/Risk
Soil erosion	<ul style="list-style-type: none"> - An Erosion and Sediment Control Plan (ESCP) will be developed as part of the in order to detail restoration work procedures. - The ESCP will identify specific measures to mitigate impacts along sections of the route that are particularly vulnerable to erosion (i.e. sections in elevated areas). - When feasible, the original surface contours will be restored following construction. - In addition to seeding, hydroseeding, and other soil re-vegetation practises, silt fences will be utilised in soil restoration techniques. - Pipeline construction activities will avoid the wettest months of the year. - Immediately after pipeline construction, hydroseeding and shrub planting will take place. - Storage of original surface soil along pipeline (to be re-used). - Monitoring and promotion of natural reforestation processes. - The placement of silt fences perpendicular to slopes. 	<p>Low to moderate</p> <p>Along modified sections in elevated areas with medium or high sensitivity to erosion, moderate impacts are anticipated due to the extensive construction earthworks required and harsher conditions for any restoration work.</p>
Soil compaction	<ul style="list-style-type: none"> - Topsoil stockpiles not higher than 2-3 m in height. - Soil stockpiles will be protected from heavy rainfall (covering). Topsoil storage periods will be kept to a minimum otherwise will be vegetated. - Access areas to heavy machinery will be restricted to the construction zone and access roads. - On sensitive soils construction 	<p>Insignificant or low</p> <p>Insignificant impacts are anticipated for the pipeline route.</p>

Impact / Risk	Mitigation measures to address the impact	Risk Significance of Residual Impact/Risk
	activities will be planned for the dry period. - Deep ploughing will be applied following construction all along the construction strip.	
Soil Pollution and accidental spills	- Work Site Management Plan including Spill Handling Plan - If existing pollution is encountered, assessment of the potential risks, including soil sampling as necessary - Segregation of the excavated contaminated soil and management as hazardous waste	Insignificant or low
Reduced soil productivity	- There are no definite preventative measures planned.	Insignificant or low

After construction is completed, the changed soils will evolve in accordance with their subsequent use and vegetation cover formed during the construction period. Due to the increased danger of erosion, it may not be possible to restore the soil cover to its previous condition along the changed sections in elevated places. However, vegetation will eventually rebuild itself organically, albeit extremely slowly due to the poor soils, exposed terrain, and steepness of these regions.

Decommissioning will either leave residual repercussions from construction unchanged or exacerbate them, particularly if the pipeline is removed from the ground and construction activities are conducted in reverse order. If the pipeline is left in place, the soil conditions that have developed over the estimated 50-year lifespan of the Project will continue to exist. In the event that the PRS station and BVSs are abandoned by removal, artificial soil profiles will be left at the footprints following restoration. Depending on the composition of the replaced subsoil and topsoil layers, these profiles are anticipated to be acceptable vegetation habitats.

10 Waste

This section provides supplementary information for the potential impacts and mitigation measures associated with waste management, in accordance with EBRD E&S (2019) policy PR3 and national legislation.

10.1 Baseline

The ESIA provides information on administrative, organizational and operational arrangements on waste management for the municipalities affected by the project (Gevgelija, Bogdantsi, Demir Kapija and Negotino). As outlined in the ESIA, only the sanitary landfill in Municipality of Gevgelija is compliant with EU standards and has capacity to accept project generated waste.

Supplemented baseline data was based on desktop research and site visit in order to ensure zero status of project AoI on waste management. Additional surface and groundwater quality as well soil quality measurements were also carried out to serve as a benchmark for waste management in further phases of the project development.

Following the site visit, no illegal dumpsites have been identified along the pipeline route in expropriation zone.

Surface water bodies, presented in the ESIA are noted as primary sensitive receptors. Moreover, considering the impacts of improper waste management designated areas, protected habitats described in the biodiversity assessment are considered to be sensitive receptors along the RoW.

Hazardous waste in North Macedonia (except of medical waste) is primarily managed private licensed companies. Nearby project area there are several licensed companies for different kind of hazardous waste streams such as waste motor oil/lubricants, contaminated soil, waste tires, batteries and accumulators, electronic and electric waste.

Scoping

Generation of inert, non-hazardous and hazardous waste - Expected sources and types of waste to be generated during the construction phase include:

- Waste from clearing of the terrain - vegetations waste;
- Communal waste from the workers office camps;
- Construction materials such as wood, metal and paint;
- Packaging waste, including paper, plastic and glass (recyclable fractions);
- Waste tires from construction mechanization;
- Accumulators and batteries (hazardous waste);
- Waste oils, fuels, lubricants, paint as well some chemicals (hazardous waste);
- Oil contaminated soil, filters, PPEs, adsorbents, packaging etc. (hazardous waste).

Temporary storage of hazardous materials and hazardous waste - Improper waste management, especially liquid hazardous waste and materials nearby sensitive receptors, may lead to contamination of environmental media and impact on the flora, fauna, habitats, agriculture as well humans. Hence, collection, temporary storage, transport and disposal of the waste streams shall be strictly controlled and well managed.

10.2 Impact Assessment

The project construction activities will result in the generation of a wide range of wastes that require proper planning from the outset to ensure a system of coordinated management between the contractors, the engineer/supervisor, public communal enterprises and/or private licensed companies on waste management (which have the competency to check compliance with project provisions

regarding the storage, transportation, and final disposal of waste, and also to sanction deviations from legal framework).

Generation of inert, non-hazardous and hazardous waste during construction

Construction contractor will be responsible for proper management of construction solid, liquid, sanitary, hazardous and non-hazardous wastes in conformance with regulations and good international practice.

There will be no surplus excavation material generated during construction activities i.e. the material will be reused for backfilling as well for leveling within RoW. Thus, there is no need for permanent storage areas along the pipeline route.

All activities involving hazardous waste and materials is expected to be moderate magnitude of impact (negative, direct, reversible, local, immediate, medium term and likely) near low to medium sensitive receptors resulting with moderate **significance**. Handling hazardous waste nearby highly sensitive receptors (such as surface water bodies and natural protected areas) is expected to be with high magnitude of impact resulting with **high significance**.

Managing activities of communal and other type of non-hazardous waste presents low to moderate impact (negative, direct, reversible, local, immediate, short term and certain) with **low to moderate** significance.

Temporary storage of hazardous materials and hazardous waste during construction

Temporary storage disposal materials have been elaborated in section **Error! Reference source not found.** of the supplementary ESIA.

No additional waste is expected during weld joints examination since on the Project ultrasonic examination will be represented based on propagation of ultrasonic waves through the object to be examined, and monitoring either the transmitted signal (termed the transmission technique), or the signal reflected or diffracted from any surface or discontinuity (termed the pulse echo technique).

An associated activity with temporary storage of hazardous materials and hazardous waste is with moderate magnitude impact (negative, direct, reversible, local, immediate, medium term, likely) near low to medium sensitive receptors classified with **low to moderate** significance, while nearby high sensitive receptors (such as surface water bodies and natural protected areas) may be a risk with **high** significance.

Waste generated during operations

Minor quantities of inert, non-hazardous and hazardous waste will be generated during operations phase.

Small quantities of process waste (pipeline condensates) will be generated at the pressure reducing station. The process condensate will be collected in concrete drain pits and transported off site out in tanks to specialised treatment facilities.

Waste impact during operation phase is expected to be of low significance.

10.3 Mitigation Measures and Monitoring

The following mitigation measures have been identified in the supplementary assessment.

10.3.1 Mitigation Measures during Construction

A **Waste Management Plan** (WMP) will be developed by the construction contractor and approved by NER/supervising engineer prior commencement of any construction activities. The WMP will implement procedures for waste minimisation, recycling, treatment and disposal in accordance with National and EU requirements (including EBRD PR1, PR3 and PR4) and will cover the following issues/mitigation measures:

- Classification of different waste types according to the National List of Waste;

- Separation of hazardous from non-hazardous waste streams;
- Hazardous waste should be managed according national standards and good international practice, including collection, separation, temporary storage, transport, disposal. All activities will be performed by licensed companies;
- Non-hazardous waste will be managed according national standards and good international practice, including collection, separation (recyclable and non-recyclable), temporary storage, transport, disposal at municipal landfills. All activities will be performed by municipal waste enterprises and licensed companies;
- Full records of the type of waste stream generated, quantity composition, origin, disposal destination and method of transport for all different waste streams will be kept be available for inspections; and
- The Training should be organized for workers for proper waste management with all generated waste streams.

Moreover, **Hazardous Materials Management and Spill Prevention Plan (HMSPP)** shall be developed and implemented by the Contractor during construction phase, reviewed and approved by the Engineer and NER. Such plans should address minimum but no limited on the following issues / mitigation measures:

- Identification of all chemicals and hazardous material enter the construction area of gas pipeline (lubricants, fuels, insulation material, technical gases for welding, acetylene, oxygen, etc.). Recording the quantities, recording the SDS and handling, storage according the recommendations of the chemical producers;
- Storage consideration to be minimum 300 meters from any sensitive receptors along Aol;
- All roads and hard standings will be kept clean and tidy to prevent the build-up of oil and dirt that may be washed into a watercourse or drain during heavy rainfall;
- The spill kits will be located close to the construction sites in case there is an accidental spill, so that it can be immediately cleaned up;
- No refueling, storage, servicing or maintenance of the equipment will take place within 300 m of water courses, irrigation channels, designated areas or other sensitive environmental resources. If these activities had to be done at the construction site, all precautionary measures shall be taken to prevent leaks or spills from reaching the soil or nearby water courses;
- These activities (refueling, storage, servicing or maintenance) will take place in designated repair and maintenance third party sites adequately prepared for these purposes (adequately lined for preventing any soil and groundwater contamination);
- Washout of the concrete trucks shall be performed at the concrete batching plant camp, where appropriate facilities will be provided;
- The proper handling and storage of lubricants, solvents will be organized as well proper usage of construction equipment;
- The storage of substances that are harmful to soils and waters (e.g. fuels for construction machinery) on the construction site will be minimized. All hazardous substances either products to be used or waste, shall be stored in adequate places, at least 300 meters from sensitive areas (e.g. water courses, habitats with a rich biodiversity). All tanks, drums and other storage containers which contain hazardous materials shall be contained within an embankment, a chemical-resistant concrete berm, or an equivalent containment structure, capable of holding 110% of the largest container plus 20% of all other containers, adequately equipped to prevent any soil, surface water or groundwater contamination i.e. secondary containment system; and
- Vehicles and construction machinery will be subject to regular preventive maintenance so as to reduce leakages of lubricants, motor oil and fuel.

10.3.2 Mitigation Measures during operations

No additional mitigation measures are envisaged.

10.3.3 Monitoring

Monitoring requirements for construction phase will be set up in WMP as well HMSPP. Monitoring program should be conducted, but not limited to the Aol, with regime should include a minimum of:

- Visual monitoring on site (including crops along RoW) and temporary storage locations;
- Keeping records on type and amount as well mode of disposal of different waste streams;
- Type and amount of hazardous material transport to the storage locations;
- In case of accidentals spills or leakages, depending if the type of leakage, follow-up measurements on soil/water/groundwater quality should be performed in accordance with the Contractor's spill procedure.

Key Performance Indicators: Key Performance indicators will be set for both environmental and social management of key issues. These will be discussed and set with contractors during the tender process and will be integral NER's monitoring of the contractor's environmental and social management performance.

10.4 Residual Impacts

If the relevant mitigation measures outlined above are implemented no significant residual impacts caused by poor waste management are expected from the project activities.

11 Biodiversity and Nature Conservation

Based on the due diligence report recommendations a supplementary biodiversity assessment has been performed resulting in two documents: Biodiversity & Critical Habitat Assessment and Biodiversity Action Plan.

The documents represent an update on the ESIA prepared by CONNECTA /Mott MacDonald in 2020 and are designed to be read in conjunction with that document.

11.1 Baseline

Additional studies were undertaken to assess the potential impacts of the project including:

- An updated desktop assessment;
- Field validation of areas not previously surveyed (biodiversity survey and mapping of habitats is a 1,000-m wide corridor on the central line of the proposed gas pipeline);
- Biodiversity seasonal field surveys for various taxonomic groups: plants, birds, fish, herpetofauna, mammals, fungi, insects etc. within a timeframe of 4 months;
- Conducting targeted surveys for habitats such as: river Vardar and its tributaries, ponds, forests (oak, riparian), forest clearings, meadows, pastures, limestone grounds, rocky grounds;
- Complete PBF and CH identification and mapping as per EBRD PR6 criteria;
- Invasive species identification and management plan; and
- Generating an expanded Habitats Map for all ecosystems and species that are a priority for conservation - Ecologically Appropriate Area of Analysis (EAAA).

These studies were undertaken by competent biodiversity experts and involve specialists for the different taxonomic groups. The findings of the studies above will help to: (1) identify if further pipeline route adjustments are necessary; (2) inform the impact assessment; and (3) define species and habitat specific mitigation measures.

Based on the above analysis, the following CH/PBF Triggers have been identified:

Criterion	Critical Habitat	
1. Threatened ecosystems - PR6 paragraph 14-i		
EAAA is habitat type listed in Annex 1 of EU Habitats Directive marked as "priority habitat type"	91AA* Eastern white oak woods	<p>A Priority Habitat according to EU HD. Oak forest belt is characterised by a range of forest communities developing in the area. It belongs to the community <i>Quercus-Carpinetum orientalis</i>. It comprises the following important species:</p> <ul style="list-style-type: none">— 3 nationally protected species of fungi (<i>Amanita caesarea</i>, <i>Boletus aereus</i>, <i>Craterellus cornucopioides</i>)— 1 insect (ground beetle <i>Carabus convexus</i>) listed as Corine species;— a number of nesting birds with unfavourable conservation status;— 4 amphibians (<i>Rana dalmatina</i>, <i>Pelophylax ridibundus</i>, <i>Hyla arborea</i> and <i>Bufo viridis</i>);— 7 reptile species (<i>Zamenis longissimus</i>, <i>Vipera ammodytes</i>, <i>Testudo hermani</i>, <i>Pseudopus apodus</i>, <i>Podarcis erhardii</i>, <i>Lacerta viridis</i>, <i>Dolichophis caspius</i>)— 6 mammals EUHDA4 (<i>Dryomys nitedula</i>, <i>Myotis mystacinus</i>, <i>Pipistrellus pygmaeus</i>, <i>Miniopterus schreibersii</i>, <i>Canis lupus</i>, <i>Felis silvestris</i>). <p>It is possibly the most widespread habitat type in the country, which is largely cut and degraded in the project area.</p>

Criterion	Critical Habitat	
	6220* Pseudo-steppe with grasses and annuals of the Thero-Brachypodietea	<p>A Priority Habitat according to EU HD. It contains hill pastures developing on siliceous substrate and dominated by annual plants. This habitat is not rare in the country, and it occurs in the most arid regions, in thermophile, dry and sundrenched areas. In the pipeline corridor, the habitat is present in several places along the pipeline route, mainly in lowland part, on hilly pastures or near agricultural land. It comprises the following important species:</p> <ul style="list-style-type: none"> — 2 Balkan endemic plants (<i>Centaurea grisebachii</i>, <i>Centaurea finnazeri</i>) — 2 amphibian species (<i>Bufo bufo</i> and <i>Bufo viridis</i>) and additionally two more with lower frequency of occurrence — Immense diversity of reptiles with 14 important species (<i>Zamenis longissimus</i>, <i>Vipera ammodytes</i>, <i>Testudo hermanni</i>, <i>T. graeca</i>, <i>Pseudopus apodus</i>, <i>Podarcis muralis</i>, <i>P. erhardii</i>, <i>Lacerta viridis</i>, <i>L. trilineata</i>, <i>Malpolon insignitus</i>, <i>Dolichophis caspius</i>, <i>Elaphe quatuorlineata</i>, <i>Coronella austriaca</i>, <i>Anguis fragilis</i>) — A number of bird species with the most important nesting birds in this habitat as follows: <i>Alectoris graeca</i>, <i>Coturnix coturnix</i>, <i>Lanius senator</i>, <i>Lanius collurio</i>, <i>Melanocorypha calandra</i>, <i>Calandrella brachydactyla</i>) — 2 mammals (<i>Myotis mystacinus</i>, <i>Canis lupus</i>)
IUCN Red-List EN or CR ecosystems	EAAA ≥5% of global extent of an ecosystem type with IUCN status of CR or EN	None
EAAA is ecosystem determined to be of high priority for conservation by national systematic conservation planning	Nature Monument - Demir Kapija	<p>The area covers the Demir Kapija Canyon and extends from the populated area Demir Kapija to the village of Udovo in the south. It is characterized by the presence of significant thermophilic communities and hazmophytic vegetation. Interesting riparian vegetation develops in the canyons from the plane-tree communities. Very rare species of plants can be found on the calcareous rocks and stony fields. The area is widely known for its importance for the birds of prey and many Mediterranean species can be found as well. One of the three North Macedonian colonies of griffon vulture, booted eagle, golden eagle, Egyptian vulture, black stork can be found here. Especially noteworthy is the cave fauna of Bela Voda represented by several troglobiont and troglophilic species. Endogean habitats are also known to have several endemic species. The caves are also important because of the bat colonies that can be found in there. Interesting species of invertebrates live in the small tributaries of the river Vardar (Iberian crab, caddisflies, Epallage fatime), and also several species of fish spawn</p>
2. Priority Species and their Habitats - PR6 paragraph 14-ii		
1) EAAA for species and their habitats listed in Annex IV of the Habitats Directive	Mammals	
2) EAAA for important concentrations of a nationally or regionally listed EN or CR species	<p><i>Wolf, Canis lupus</i> (GRL- LC, NRL – NT)</p> <p><i>Wild cat, Felis silvestris</i> (GRL- LC)</p>	<p>The wolf is a common species occurring throughout the country, inhabiting various types of habitats. The wolf is mostly found in the forested mountainous habitats, but occasional presence can also be detected in plains and valleys. The population size in the country is estimated to be 400-1,000 individuals. Although its occurrence was confirmed only at two sites, the wolf is a common species in the area of interest.</p> <p>The wild cat is a common and widespread species that mostly inhabits the forested areas. The population size of wild cat is unknown. Its presence along the pipeline was validated at three sites in Marijanska Planina Mt.</p>

Criterion	Critical Habitat	
	<i>Euroasian otter, Lutra lutra (GRL-NT, NRL – VU)</i>	The Eurasian otter inhabits most of the existing major water bodies in N. Macedonia. The population size is estimated at 350-400 individuals. Otters are strongly dependent on riparian vegetation and availability of denning sites (holts). Most otter activity occurs in a narrow strip along the water's edge but they may be found up to 1 km away from water. In the broader area of the pipeline corridor, presence of Eurasian otter was recorded at a number of locations along the rivers Vardar, Boshava, Doshnitsa and Stara Reka
	<i>Schreiber's bent-winged bat (Miniopterus schreibersii), (GRL-VU)</i>	In the project area, there are 8 bat species in total (all are Annex IV species). The most important is the Schreiber's bent-winged bat (Miniopterus schreibersii). There are no data about the precise distribution and population size in N. Macedonia, but it is deemed widespread. This species favours hardwood forest-rich habitats, and it mainly roosts in colonies in karst caves, mines and cellars with other cave-dwelling species. Along the pipeline corridor, the species was recorded at one location in Demir Kapija
	<i>Whiskered bat (Myotis mystacinus)</i>	Whiskered bat (Myotis mystacinus) is considered to be widespread in N. Macedonia. It is found in a variety of habitats, including: forests, woodland edge, shrubland, open meadows, wooded landscape near to water, gardens and urban areas. Along the pipeline corridor, the species has been recorded at one location near v. Prdejtsi.
	<i>Common pipistrelle (Pipistrellus pipistrellus)</i>	Common pipistrelle (Pipistrellus pipistrellus) is widespread species throughout the country. It forages in a wide range of habitats, such as open woodlands, over wetlands, farmland, semi-deserts and urban areas. Along the pipeline corridor, the species has been recorded at three locations near v. Bogoroditsa, v. Gjavato and Demir Kapija.
	<i>Soprano pipistrelle (Pipistrellus pygmaeus), (GRL-LC, ERL-LC)</i>	There are not many data on the distribution of Soprano pipistrelle (Pipistrellus pygmaeus) in N. Macedonia. It forages mainly close to riparian forests and waterbodies, as well as in villages and city parks. Along the pipeline corridor, the species has been recorded at one location in Demir Kapija.
	<i>Kuhl's pipistrelle (Pipistrellus kuhlii), (GRL-LC, ERL-LC) and Nathusius' pipistrelle (P. nathusii)</i>	Kuhl's pipistrelle (Pipistrellus kuhlii) and Nathusius' pipistrelle (Pipistrellus nathusii) are common species in N. Macedonia. Kuhl's pipistrelle is found in both agricultural and urban habitats and is often associated with human settlements. Nathusius' pipistrelle favours habitats of riparian forests, mixed woodlands and often close to waterbodies, but is also found in urban areas. Echolocation calls of both species have been recorded on several locations along the pipeline corridor.
	<i>European free-tailed bat (Tadarida teniotis)</i>	European free-tailed bat (Tadarida teniotis) is recorded at only several localities in N. Macedonia. The species occurs in mountainous regions, but also near water, in urban areas and cultivated landscapes. Along the pipeline corridor, the species has been recorded at one location in Demir Kapija.
	<i>Savi's pipistrelle (Hypsugo savii)</i>	Savi's pipistrelle (Hypsugo savii) is common and widespread species throughout the country. It forages over open woodland, pasture and wetlands, and often feeds at lights in rural and urban areas. The species has been recorded at two locations between v. Stojakovo and v. Bogorodica.
	<i>Forest dormouse (Dryomys nitedula), (GRL-LC, ERL-LC)</i>	Forest dormouse (Dryomys nitedula) is widespread in western parts of N. Macedonia and along Vardar valley. The species mainly prefers forested areas, but also found in rocky areas, evergreen shrubland (including Mediterranean-type shrubland) and wood-steppe. Along the pipeline corridor, the species has been recorded at one location on the right bank of Vardar, near

Criterion	Critical Habitat	
		Gevgelija.
	Birds	
	<i>Neophron percnopterus</i> , the Egyptian vulture (GRL- EN)	One pair of Egyptian Vultures is found breeding in Demir Kapija Gorge, in the wider area of the pipeline (outside 2 km corridor), but it uses the project area for foraging. No significant impact is expected on this breeding pair. Five more historically known territories are present in the wider region of Demir Kapija, which are now all unoccupied.
	Amphibians	
	<i>Bombina variegata</i> , fire belly toad (GRL- LC, NRL – LC)	The fire belly toad is Annex II and Annex IV species to the EU Habitat Directive. It is considered abundant in N. Macedonia, with a patchy, fragmented distribution pattern. According to some authors, the subspecies <i>Bombina variegata</i> ssp. <i>scabra</i> is considered endemic in the Balkans. It occurs in suitable habitats throughout the project area, in temporary and permanent ponds.
	<i>Rana graeca</i> , (GRL- LC, NRL – NT)	The Greek stream frog is an Annex IV species, widespread across the country but it is nevertheless limited to its appropriate habitats of forest and high-mountain streams and rivers. Within the project area, it is normally related to the tributaries of river Vardar, and along the Boshava and Doshnitsa rivers.
	<i>Rana dalmatina</i> , agile frog (GRL- LC, NRL – NT)	The agile frog is an Annex IV species. It occurs in glades and open sites within light deciduous woodland (oak, beech, hornbeam, etc.), and it is less frequent in meadows and thickets. This species may be found in the meadows near the noteworthy water bodies representing tributaries of river Vardar, as well as along the Boshava and Doshnitsa rivers.
	<i>Hyla arborea</i> , European tree frog (GRL- LC, NRL – NT)	An Annex IV species, but with a wide distribution, common in suitable habitats in the country. The species is not so widely abundant in the area of interest, and its distribution is associated with larger rivers and springs.
	<i>Bufo viridis</i> , green toad (GRL- LC, NRL – LC)	This species is considered moderately abundant to common over large parts of its range in the country. A couple of monitoring studies from the last four years hint that the species population trends across the country are stable. It is widely abundant throughout the affected area.
	Reptiles	
	<i>Testudo hermanni</i> , Herman's tortoise (GRL- NT, NRL – VU)	An Annex IV and Annex II species to EU Habitat Directive. According to the National Red List of Reptiles of North Macedonia (2021), it is categorised as Vulnerable. The Hermann's tortoise prefers shrubs or openings in thermophilic forests, in our country most often oak or degraded forests of predominantly Jerusalem pine and/or false acacia. In the project area, it is present at lower altitudes (up to 800 m), in hilly and open forest places.
	<i>Testudo graeca</i> , Greek tortoise (GRL- VU, NRL – VU)	An Annex IV and Annex II species to EU Habitat Directive. According to the IUCN Global Red List of Threatened Species and National Red List of Reptiles of North Macedonia (2021), it is categorised as Vulnerable. It is much more thermophilic than the Hermann's tortoise. In the project area, it is present at lower altitudes with a preference for open habitats of small bush and shrub, degraded secondary growth habitats or sandy slopes, rather than forests.
	<i>Lacerta trilineata</i> , the Balkan green lizard (GRL- LC, NRL – LC)	The Balkan green lizard occurs in a broad range of habitats, usually with plenty of vegetation, such as forest edges, open woods, hedgerows along roads and paths, scrubland, overgrown fields, and gardens. It is widely dispersed in the country as well as in the project area at lower altitudes (up to 1,200 meters) on hilly and open forest sites.

Criterion	Critical Habitat	
	<i>Lacerta viridis</i> , green lizard (GRL- LC, NRL – LC)	The green lizard is a ubiquitous species in N. Macedonia, present in many habitats and localities, and it can be found within the boundaries of or around man-made habitats. It is very common in the country and in the project area at lower altitudes (up to 1,200 meters) in hilly and open forest locations.
	<i>Podarcis muralis</i> , the common wall lizard (GRL- LC, NRL – LC)	An Annex IV species, but with a wide distribution, tolerance of a broad range of habitats, presumed large population. The common wall lizard is a ubiquitous species in N. Macedonia, present in scores of habitats and localities, and it is one of the most successful species in man-made habitats. It is widely distributed in the project area.
	<i>Dolichophis caspius</i> , the Caspian whip snake (GRL- LC, NRL – LC)	The Caspian whip snake is found in dry areas of open scrubland and woodland, steppe and other grasslands, rocky hillsides, overgrown areas, vineyards, rural gardens, stone walls, and ruins. It is extensively distributed in the country as well as in the project area at lower altitudes (up to 900 m) in meadows, and on hilly sites.
	<i>Coronella austriaca</i> , smooth snake (GRL- LC, NRL – LC)	An Annex IV species, but with a wide distribution, tolerance of a broad range of habitats. It is the most common in upland or montane areas, and overall in hilly terrain. In the project area, it occupies various habitats from the plains all the way to forest areas and stony peaks.
	<i>Zamenis longissimus</i> , the Aesculapian snake (GRL- LC, NRL – LC)	The Aesculapian rat snake is widely distributed in the country. It is by and large found in arid, open woodlands, forested ravines, rocky outcrops, field edges, orchards, stone walls, and old buildings. In the project area, it occurs in forest and riparian belts.
	<i>Natrix tessellata</i> , dice snake (GRL- LC, NRL – LC)	The dice snake is widely distributed in North Macedonia. It is highly aquatic, nearly always found close to or in bodies of water. It tends to occupy larger water bodies when it coexists with grass snake. Within the project area, it is habitually connected to greater rivers, such as the river Vardar, the Boshava and Doshnitsa rivers.
	<i>Vipera ammodytes</i> , the nose-horned viper (GRL- LC, NRL – LC)	The nose-horned viper is very widespread in the country. This species is associated with rocky areas but it tends to be opportunistic in other habitats. It occurs in dry, often rocky habitats, including open woodland and scrub, sand dunes, hillsides, screes, stone walls, traditionally cultivated land, etc. It equally favours man-made or natural rock formations. This species is also broadly dispersed in the project area, occupying various habitats.
	Invertebrates	
	<i>Zerynthia polyxena</i> , The southern Festoon.	The southern Festoon (<i>Zerynthia polyxena</i>) is a butterfly species listed in Annex IV of the EU Habitats Directive. In North Macedonia, it is distributed throughout the country with most of the records in the valley or rivers Crn Drim, Treska, Crna Reka, Kriva Reka and Vardar. It inhabits meadow, especially along rivers as well as forest clearings. Only one specimen was observed in a oak forest clearing at the locality Manastirska Cuka which is cca 4 km away from the pipeline (outside of any project impact).
EAAA supports ≥ 0.5% of the global population AND ≥ 5 reproductive units of a CR or EN species	<i>Helix philibinensis</i> (GRL-LC; south- Balkan endemic)	<i>Helix philibinensis</i> is only known from a small area in the Central Balkan, from the region around the Ohrid Lake to the east as far as the Island of Thasos. Interestingly, it inhabits a wide range of habitats, from the lowlands up to mountain peaks which reach almost 2000 m altitude. In the area of interest it was recorded in dry grasslands (6220* Pseudo-steppe with grasses and annuals of the Thero-Brachypodietea), between Negotino and Demir Kapija. Common species in these habitat types in the whole Vardar valley. Its AOO is estimated at 80km ² , while EOO is

Criterion	Critical Habitat
	40000km2 (Páll-Gergely 2011)
EAAA supports globally significant population of VU species necessary to prevent a change of IUCN Red List status to EN or CR, and satisfies threshold	None

Criterion	Priority Biodiversity Feature
1. Threatened ecosystems - PR6 paragraph 12-i	
EAAA is habitat type listed in Annex 1 of EU Habitats Directive or Resolution 4 of Bern Convention	<p>6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco brometalia) (*important orchid sites)</p> <p>1 habitat of pan-European interest, listed in Annex I to the HD, but widespread in Macedonia; 6 plant species of biogeographical significance; 3 fungal species, 1 Least Concern (GRL); 1 Near Threatened (NRL); 1 new for the country; 1 regionally endemic insect (ground beetle); 3 nesting birds with unfavourable conservation status: 2 are Least Concern and 1 is Near Threatened (GRL and ERL); all are EUBDA1; 2 Least Concern reptiles (snakes) (GRL, ERL and NRL), EUHDA4. 4 mammals EUHDA2; EUHDA4; all are Least Concern (GRL and ERL); The current habitat is largely distributed in the country. The plant communities affiliated with this habitat type are secondary phytocoenoses derived from permanent degradation of forest associations, particularly in the oak belt.</p> <p>92A0 Salix alba and Populus alba galleries</p> <p>1 habitat of pan-European interest, listed in Annex I to the HD, but widespread in N. Macedonia. The riparian willow-poplar belt is present at the point where the pipeline traverses the river Vardar. In the willow and poplar belt, the False indigo-bush tree occurs at a number of spots as an invasive species.</p> <p>92C0 Platanus orientalis and Liquidambar orientalis woods</p> <p>1 habitat of pan-European interest, listed in Annex I to the HD, but widespread in N. Macedonia. The riparian willow-poplar belt is present at the point where the pipeline traverses the streams Drenska Reka, Gabreshka Reka, Zuica, Doshnitsa, Boshava and Kovanska Reka</p> <p>Rivers and streams (3260)</p> <p>1 habitat of Pan-European interest in an average condition; Presence of the restricted-range Danube barbel (<i>Barbus balcanicus</i>) is both categorised in Annex II and Annex V to the Habitat Directive. The European otter, near threatened (NT) in Europe and the Mediterranean Basin, EUHDA2, EUHDA4.</p>
EAAA < 5% of the global extent of an ecosystem type with IUCN status of CR or EN	None
2. Priority Species and their Habitats - PR6 paragraph 12-ii	
	Birds
	<i>IUCN VU species</i>

Criterion	Priority Biodiversity Feature	
<p>1) EAAA supports VU species</p> <p>2) EAAA for species and their habitats listed in Annex II of Habitats Directive, Annex I of Birds Directive, or Resolution 6 of Bern Convention</p>	<i>Aquila heliaca</i> , <i>Imperial eagle</i> (GRL- VU; ERL – LC)	One pair of Imperial Eagles used to breed on a pylon in vicinity of Negotino (Dubrovo). The pair is not present for the last two years, but it cannot be excluded that it has changed breeding location and is still present in the region. Non-breeding birds are occasionally observed in the southern parts of the project region, during dispersion/migration. Temporary habitat loss/disturbance are likely to affect eventually breeding birds.
	<i>Streptopelia turtur</i> , the <i>European turtle dove</i> (GRL- VU; ERL – VU)	The Turtle Dove is common breeding bird species in the area of interest, with densities from 2 pa/km ² , but locally reaching up to 7 pa/km ² . Although point data are shown, it is actually present along the entire pipeline corridor. Although the European population is in steep decline, Macedonian breeding population still seems stable (or experiencing smaller decline). It will be affected by habitat loss and disturbance. On short term, but ground clearing will provide new feeding possibilities in the overgrown habitats. No specific mitigation measures might be implemented.
	<i>Bird Directive Annex I species</i>	
	<i>Alectoris graeca</i> , <i>the rock partridge</i> (GRL- NT; ERL- NT)	The Rock Partridge is an common species in rocky and scrubby areas in North Macedonia, and although it has been only sporadically registered in the study area, it should be regarded as more common. The effect from the project implementation will be small to negligible.
	<i>Apus apus</i> , (GRL- LC; ERL- NT)	The Common Swift has decline populations throughout Europe, but its national situation is not well known. It is connected to urban centers for breeding and is an aerial hunter, and therefore will not be affected by the project implementation.
	<i>Coturnix coturnix</i> , (GRL- LC; ERL- NT)	The Quail is another species declining in Europe, related to arable land and pastures. It has good populations in the southern part of the project areas (Gevgelija fields), about 2 pa/km ² , that will be affected by the project implementation. The effects will be temporary and the population is expected to recover within one-two breeding seasons.
	<i>Caprimulgus europaeus</i> , the <i>European nightjar</i> (GRL- LC; ERL-LC)	The Nightjar is common species in the woodland habitats along the pipeline (densities of about 1 pa/km ²) and its habitat will be affected on a medium-scale timeline, until the surface vegetation is recovered. No specific mitigation measures are possible, except avoiding the construction activities in the breeding period (April-June) to minimize disturbance and nest losses, which is general proposed measure.
	<i>Ciconia ciconia</i> <i>the white stork</i> (GRL- LC; ERL- LC)	The White Stork is one of the triggering species for identification of the IBA Southern Vardar, and has good populations in the villages Bogorodica and Stojakovo in Gevgelija region (about 60 pairs breed in this region, (Putlin, Stamkoska et al. 2020). The pipeline is foreseen to pass through feeding areas near Stojakovo (Gevgelija), and season restrictions Mar-Aug. are needed.
	<i>Ciconia nigra</i> , the <i>black stork</i> , (GRL- LC; ERL- LC)	The Black Stork breeds in Demir Kapija Gorge and uses Vardar river and its tributaries for foraging. During migration it can be expected along the entire corridor. It is highly sensitive to disturbance and habitat loss, but no nest is known in the vicinity of the corridor.
	<i>Ixobrychus minutus</i> , (GRL- LC; ERL-LC)	Few pairs of the Little Bittern might be breeding in the sections of Lower Vardar river, where reed-beds exist. It will not be significantly affected by the construction of the pipeline.
	<i>Circaetus gallicus</i> , the <i>short-toed snake eagle</i> (GRL- LC; ERL-LC)	The Short-toed Snake-eagle is common species in the Mediterranean woodland, especially on calcareous substrate, and several pairs (at least five) are found along the project corridor. They will be adversely affected by the pipeline construction, which will cause some disturbance and especially (foraging) habitat loss, which might reflect on the breeding success. These negative effects are expected to be of temporary nature, and their effects will likely become negligible within several years.
	<i>Circus pygargus</i> , <i>Montagu's harrier</i> (GRL- LC; ERL- LC)	One or two pairs of Montagu's Harriers breed in the field near Gevgelija, and will be temporary affected by the construction work (both disturbance and habitat loss). Under assumption that agriculture habitat will be restored anyway, avoidance of construction work between May 1st and

Criterion	Priority Biodiversity Feature	
		July 30th is the only possible mitigation measure.
	<i>Coracias garrulus</i> , the European roller (GRL- LC; ERL- LC)	Few pairs of Rollers scarcely breed in the riparian forests in Lower Vardar section. It might be affected only locally, near Gevgelija, if large poplar or plane trees are fallen for the project implementation. Therefore, as a mitigation measure, this practice should not be allowed (which will have positive impact for other species as well).
	<i>Dendrocopos medius</i> , the middle-spotted woodpecker (GRL- LC; ERL- LC)	The Middle Spotted Woodpecker in the study area is connected with the riparian forests, and will be insignificantly affected by the project implementation. Its population seems already depleted in the pipeline corridor.
	<i>Dendrocopos syriacus</i> , the Syrian woodpecker (GRL- LC; ERL- LC)	The Syrian Woodpecker is connected to orchards and is very common species in North Macedonia. Effects on its population from the project implementation will be negligible and temporary.
	<i>Emberiza hortulana</i> , Ortolan (GRL- LC; ERL- LC)	The Ortolan Bunting is locally common species in Macedonia, and also along the project corridor. It is not expected to be significantly impacted by the project implementation, and the effects are going to be only temporary.
	<i>Falco naumanni</i> , (GRL- LC; ERL- LC)	The Lesser Kestrel is one of the trigger species for the IBA Tikvesh Region. Its population in the pipeline corridor still seems to be strong (estimated to about 40 pairs), and will be negatively affected by habitat destruction (loss of foraging areas). This will lead to decline in the breeding success. Mitigation measures should include avoidance of the construction works in the pastures between April 1st and July 15th, and also reduction of other threats, as the likely electrocution on dangerous electricity poles in the region, which might be insulated as a compensatory measure.
	<i>Falco peregrinus</i> , (GRL- LC; ERL- LC)	One pair of Peregrines breed in the wider are of the pipeline, in Demir Kapija Gorge, and individual birds are observed in the fields of Gevgelija in the breeding season. It will not be significantly impacted by the project implementation.
	<i>Lanius collurio</i> , the red-backed shrike (GRL- LC; ERL- LC)	The Red-backed Shrike is common species in the habitats with bushes in North Macedonia and along the project corridor. Its population will be directly affected by habitat loss, but not substantial mitigation measures can be proposed.
	<i>Lanius minor</i> , the lesser grey shrike (GRL- LC; ERL- LC)	The Lesser Grey Shrike is locally present along the pipeline corridor. Effects on its population are going to be temporary only. The national population is quite strong.
	<i>Lanius senator</i> , (GRL- LC; ERL- NT)	The Woodchat Shrike is common and widespread species in the open woodlands and bushes and in the arable habitats along the project corridor (reaching 3-4 pa/km ²) and in North Macedonia. The European populations are declining. Although the project implementation will cause temporary habitat loss, the population will recover and will benefit from the newly-established open areas along the pipeline.
	<i>Lullula arborea</i> , the woodlark (GRL- LC; ERL- LC)	Some habitat loss is expected to affect the local population of the Woodlark, but the species is common and abundant in the appropriate habitats elsewhere in North Macedonia.
	<i>Accipiter brevipes</i> , (GRL- LC; ERL- LC)	The Levant Sparrowhawk is typical bird of prey for the Lower Vardar region (both Demir Kapija and Gevgelija) and this area is the core of its population in North Macedonia. The national population is small, possibly no more than 60 pairs. It breeds in the riparian forests, and some pairs will likely be affected by habitat loss and disturbance. Therefore, minimal destruction of the riparian forest should be secured throughout pipeline

Criterion	Priority Biodiversity Feature	
		construction, both at Boshava-Doshnitsa rivers and at Lower Vardar.
	<i>Alcedo atthis</i> , (GRL- LC; ERL- LC)	Few pairs possibly breed along Vardar river in Gevgelija region, and might be locally affected by disturbance. Destruction of steep banks along the river, where this species breed (and the Sand Martin Riparia riparia have colonies) should not be allowed during project implementation.
	<i>Aquila chrysaetos</i> , (GRL- LC; ERL- LC)	Active nest of one pair of Golden Eagles exist along one of the proposed alternatives of the pipeline (at Vrvot) and this alternative is to be abandoned. The construction will cause habitat loss and disturbance to this breeding pair, but the effect is expected to be temporary.
	<i>Bubo bubo</i> , (GRL- LC; ERL- LC)	At least one territory of Eagle Owls is known in the project corridor, but the species is likely more common. Temporary disturbance and habitat loss are expected, but no significant impact in long term.
	<i>Buteo rufinus</i> , (GRL- LC; ERL- LC)	Two to four pairs of Long-legged Buzzard are to be found along the project corridor, but will unlikely be affected by the project implementation, as they benefit from open habitats. Nest are not near to the projected corridor.
	<i>Curruca nisoria</i> , (GRL- LC; ERL- LC)	The Barred Warbler is locally found in the project corridor, and its national population will be insignificantly affected by the project implementation.
	<i>Gyps fulvus</i> , (GRL- LC; ERL- LC)	Colony of the Griffon Vultures exist near the project corridor (above village Klisura, Demir Kapija), and one of the pipeline alternatives passes very close to the colony (at locality Vrvot). This alternative is to be avoided. The other alternative, due the topography of the terrain, will not be affect the colony. Although birds from the colony rarely use the corridor area for foraging, they will not be significantly affected by habitat loss and disturbance.
	<i>Hieraaetus pennatus</i> , (GRL- LC; ERL- LC)	Two to three pairs of Booted Eagles are to be found in the forests between Dren and Gabrovo, and one-two more around Stojakovo village. The construction will cause habitat loss and disturbance for this rare bird of prey which requires mature forest stands for breeding. Mitigation measures should include avoidance of the forest stands and avoidance of the construction work in the period March 15th – July 31st in the breeding areas for this species.
	<i>Melanocorypha calandra</i> , (GRL- LC; ERL- LC)	The Calandra Lark is locally abundant in the fields near Negotino and Gevgelija, and will be affected by habitat loss. Effects are going to be temporary and the population will recover within 2 years.
	<i>Milvus migrans</i> , (GRL- LC; ERL- LC)	One or two pairs of the extremely rare Black Kite breed in the wider region of Demir Kapija, but will unlikely be affected by the project implementation as it is related to preserved forest stands which are not to be found along the project corridor. It however forages in sections of the pipeline corridor, so, some negative effect is still to be expected.
	<i>Calandrella brachydactyla</i> , (GRL- LC; ERL- LC)	The Short-toed Larks locally breeds in the regions of Negotino and Gevgelija, but its main national strongholds are in the central and dry parts of North Macedonia, thus the project will have insignificant negative effect on the national population, which will also be temporary.
	<i>Pernis apivorus</i> , (GRL- LC; ERL- LC)	One pair of Honey Buzzard probably breeds in the in the Lower Vardar region, and will likely be unaffected with the construction works.
	<i>Sternula albifrons</i> , the Little Tern (GRL- LC; ERL- LC) and <i>Sterna hirundo</i> , the Common Tern, (GRL- LC; ERL- LC)	Lower Vardar region is the only known breeding site for these Annex I species - the Little Tern and the Common Tern in North Macedonia, and will therefore require protection. mixed colony is located on a small island near village Gjavato, about 2 km from the foreseen project pipeline. The colony is about 30 pairs in total, equally divided between both species. Construction will cause foraging habitat loss and disturbance. Ideally, construction activities should be implemented in the period between August and March, to avoid any impact on the colony. Breeding on other river islands cannot be excluded. Therefore, no alterations in the river bed are to be made with the construction works.

Criterion	Priority Biodiversity Feature	
	Fish	
	Danube barbel, Barbus balcanicus (GRL – LC)	Barbus balcanicus is both categorised in Annex II and Annex V. In the Global Red List (IUCN), in addition to in the European and the Mediterranean Red Lists, the Danube barbell is categorised as a Least Concern species (LC). It is a range restricted, but common fish in the Vardar watershed.
	Insects	
	Morimus funereus, the long-horned beetle (GRL – NT)	The longhorn beetle Morimus funereus is a saproxylic insect (Coleoptera, Cerambycidae) listed in Annex II of the EU Habitat Directive. It is also considered as Vulnerable species (VU) on the global IUCN red list of threatened species. It has dominantly European distribution. Morimus funereus inhabits well preserved forest ecosystem in North Macedonia with preference to oak forests, however it frequently occurs in riparian and beech forests. During the survey in 2022, only one specimen was recorded in the riparian forest [92C0: Platanus orientalis and Liquidambar orientalis woods (Platanion orientalis)] at the confluence of the rivers Doshnitsa and Boshava.
3. Range-restricted species - PR6 paragraph 12-ii		
EAAA for regularly occurring range-restricted species	None	
4. Migratory and congregatory species - PR6 paragraph 12-ii		
EAAA identified per Birds Directive or recognized national or international process as important for migratory birds (esp. wetlands)	None	
5. Significant biodiversity features identified by a broad set of stakeholders or governments - PR6 paragraphs 12-iii		
IBA Tikvesh region	The area is important because of the presence of two Egyptian vultures (Neophron percnopterus) in its southern part, and also because of the presence of 230 to 250 nesting pairs of the lesser kestrel (Falco naumanni), which is nesting only in the villages and it is present in the northern part of the area. In the northern part of the area, 1-2 pairs of imperial eagle (Aquila heliaca) are nesting, as well as at least one pair of lanner falcon (Falco biarmicus). Also, the largest colony (60 to 90 pairs) of grey heron (Ardea cinerea) exists in this region. The line gas pipeline corridor penetrates more than 10 KM in the area (point KM 57+000).	
IBA Demir Kapija Gorge	The Demir Kapija Canyon is one of the richest ornithological reserves in Europe by the presence of rare birds of prey: griffon vulture (Gyps fulvus), Egyptian vulture (Neophron percnopterus), golden eagle (Aquila chrysaetos), short-toed snake eagle (Circaetus gallicus), long-legged buzzard (Buteo rufinus), various falcons (Falco peregrinus, F. naumanni), as well as some less common species of birds such as Hieraaetus pennatus, Milvus migrans, Falco biarmicus, Cerchotrichas galactotes etc. The gas pipeline corridor intersects the area between KM 47+250 to KM 48+800 and from KM 50+800 to KM 52+250, in the total length of 3 KM.	

Criterion	Priority Biodiversity Feature
IBA Lower Vardar	The area has been identified as an important area for nesting of two species of terns (<i>Sterna hirundo</i> and <i>Sternula albifrons</i>), as a nesting area of almost 10% of the national white stork population (<i>Ciconia ciconia</i>) and as a potential bottleneck for migration of large floating species of birds (birds of prey, storks, etc.) In addition, the flood meadow of the Gjol area (in the vicinity of the village of Bogorodica) is an important stop-over site for many wintering species in this part of North Macedonia. This includes several species of duck and egret families, and the greater flamingo (<i>Phoenicopterus roseus</i>) has been spotted on several occasions. Also, this locality is crucial in the feeding of the breeding non-resident species such as the large nesting populations of white storks in the villages of Stojakovo and Bogorodica. The line gas pipeline corridor intersects the area between KM 0+000 and KM 9+500 and KM 10+500 and KM 13+000, in the total length of 12 KM.

11.2 Impact Assessment

A supplementary impact assessment was undertaken to quantify and characterise the potential impacts resulting from the project. The purpose is to assess additional impacts to biodiversity associated with the Project, noting that impacts associated with the project have already been assessed in ESIA. The BCHA includes:

- Critical Habitat Assessment;
- Characterisation of ecological conditions of rivers and streams in river Vardar basin;
- Comprehensive assessment of all direct, indirect and cumulative impacts of the pipeline construction/operation phases, including impacts of the access roads, material storage areas, quarries and individual river crossings;
- Comprehensive justification of sensitivity and magnitude ratings;
- Identification of impacts and risks on ecosystem services relating to forest clearance amongst others;
- Identification of required avoidance and mitigation measures as per the mitigation hierarchy; and
- Identification of potential risks, impacts and mitigation measures related to invasive species management.

These have identified the following species and habitats that require special conservation measures to be put in place for them:

- Designated sites: IBA Tikvesh, IBA Demir Kapija and IBA lower Vardar;
- Two critical habitats 91AA* Eastern white oak woods and 6220* Pseudo-steppe with grasses and annuals of the Thero-Brachypodietea;
- Significant Biodiversity features Rivers Vardar, Doshnitsa and Boshava;
- The Egyptian vulture (*Neophron percnopterus*); European turtle dove (*Streptopelia turtur*) eastern imperial eagle (*Aquila heliaca*) and some nesting species;
- Notable mammals including: European Otter (*Lutra lutra*), Grey Wolf (*Canis lupus*) and Bats;
- Notable Reptilians including Herman's turtle (*Testudo hermani*);
- Notable Amphibians including Bombinavariegata (Balkan endemic); and
- Notable Fish: *Barbus balcanicus* (EN)

Potential impacts on sensitive receptors within the Aol and PZI, have been assessed. A specific mitigation is provided in the Biodiversity Action Plan, only provided for Designated areas, sensitive Habitats and Species under impact, while impacts to other receptors is included within the GIP mitigation (Good International Practice). The zone of direct influence or project's physical footprint is the 25m (12.5 m of each side) along the project route. Indirect impacts are expected due to the construction of access roads, material storage areas, quarries etc. within 2km.

Impacts on **designated areas** have generally been limited through appropriate route selection. Avoidance has been made to Monument of Nature Demir Kapija, IPA Demir Kapija Canyon and the eponymous Emerald Area. Thus, the impact, primarily on the rare species of birds of prey, as well as

on rare and endemic plants, has been minimized in this region (as its stresses in the original ESIA). Even so, due to the presence of many rare birds of prey in the IBA Tikvesh, IBA Demir Kapija and good bird population in IBA Lower Vardar, **the impact in the Construction phase is assessed as medium.**

A number of **notable habitats** have been assessed as having the potential to be impacted by the construction. These include woodlands and notable grasslands. The route has largely been selected to avoid impacts to these areas (e.g. by following existing oil pipeline routes, HDD etc.), however impacts, including habitat loss, fragmentation and degradation and potential pollution impacts, do require mitigation.

Construction impacts to CH 6220 may impact ~4.9 ha, which represents $\approx 0,019\%$ of the habitat's EAAA (25,225 ha). This impact is not considered likely to compromise the habitat's integrity across the EAAA given the relatively small area. There are no global estimates for 6220* available, but the habitat occurs mainly in Europe. European estimate (EU only) of 6220* – 706,122 ha. Mediterranean estimate (EU only) – 693,747 ha (98% of EU total), there is no National estimate of 6220*. This impact is not considered likely to compromise the habitat's integrity. The impact magnitude is therefore considered to be **low**.

Construction impacts to CH 91AA may impact ~0.075ha. The habitat is likely the most widespread habitat type in N. Macedonia, extending to three climate-zonal areas. The project activities will lead to habitat loss and fragmentation. The impact in the Construction phase is **assessed as low to medium**.

Construction impacts to 92C0 *Platanus orientalis* and Liquidambar orientalis woods (Platanion orientale).(PBF) are expected to result in a loss of ~1.275 ha. This impact is not considered likely to compromise the integrity of habitat across the EAAA given these low losses. Due to the importance of this habitat the impact magnitude to this PBF is therefore considered to be **low to medium**.

Construction impacts to riparian willow belts (PBF) are expected to have impact of ~0.3 ha. This impact is not considered likely to compromise the integrity of habitat across given these relatively low losses. The impact magnitude to this PBF is therefore considered to be **low**.

A number of **notable species**, have been assessed as having the potential to be impacted by the construction. These include amphibians, reptiles, birds, mammals, fish, insects. 29 were assessed as trigger CH and 37 being Priority Biodiversity features in line with PR6. The route has largely been selected to avoid impacts to these species (e.g. by following existing oil pipeline routes, HDD etc.), however impacts, include direct mortality from the construction works, from fragmentation of habitats, visual and noise disturbance and impacts from pollution. The impact magnitude is therefore considered to be **low to medium**.

11.3 Mitigation Measures and Monitoring

11.3.1 Revised Mitigation Hierarchy Application and Compensatory Measures

It is the recommendation that additional mitigation measures be added to those previously prescribed in the original ESIA. Using mitigation hierarchy, a generic and habitat/species specific mitigation measures for potentially significant impacts on all PBFs and CHs have been provided. Restrictions for sensitive areas and periods are discussed.

Biodiversity Action Plans have been prepared for each of the above CH/PBF to help ensure that the Project results in “no net loss” with regards to the conservation value of these habitats and species. For other habitats and species, use of GIP (Good International Practice) during construction works will prevent or reduce impacts wherever practical. The plans contained within this document include a set of actions that together will help support the long-term conservation of the specific habitat or species of concern. The actions build on, but do not duplicate, the general biodiversity mitigation and compensation measures included within the Project ESIA and associated Environmental and Social Management Plans (ESMPs).

Each specific action plan includes information on objectives, project activity, impacts, management measures, resources and monitoring to enable the Project to mitigate residual impacts and achieve no net loss (or net gain where required). The BAP outlines a programme of reforestation and reinstatement of vegetation cover within the pipeline ROW and beyond.

A total of 12 specific action plans have been developed:

- Action Plan for the Designated Area “IBA Demir Kapija Gorge”;
- Action Plan for the Designated Area “IBA Lower Vardar”;
- Action Plan for the Designated Area “IBA Tikvesh”;
- Action plan for water crossings;
- Action plans for notable mammals (Otter, grey wolf and bats);
- Action plans for notable amphibians and reptiles;
- Action plan to Net Gain of Critical Habitat (habitats 91AA and 6220);
- Action plan to No Net Loss of Priority Biodiversity Features (habitat 92C0);
- Action plan for invasive species management;
- Program for reforestation and reinstatement of vegetation cover.

11.4 Residual Impacts

If the relevant mitigation measures outlined above are implemented no significant residual impacts on soil are expected from the project.

12 Cultural Heritage

A summary of key findings from the supplementary cultural heritage assessment is provided in this section. The supplementary cultural heritage impact assessment is provided in a separate report – refer to 0.

12.1 Baseline

The baseline assessment of the cultural heritage in the ESIA was supplemented with: data gathering, additional field surveys, description of cultural heritage receptors, re-evaluation of impacts and mitigation measures, monitoring and residual impacts.

Gathering of Additional Data

The following additional data supported the supplementary assessment:

- Published data – archaeological map and a suite of published works relevant to the Aol;
- Unpublished data (Spatial Plan of the Republic of Macedonia, Ministry for Environment and Spatial Planning, 2011); and
- Infrastructure project (urban approval submission document package for the project).

Additional Field Surveys

Several field surveys were conducted in April/May 2022 by team of cultural heritage specialists along the route in order to analyse its correlation with the registered as well as the recorded archaeological sites and buildings. Field activities gathered current data for the assessment, as well as for mapping and visualization of affected cultural sites and objects.

12.2 Impact Assessment

The supplementary cultural heritage assessment followed the methodology of the Supplementary ESIA. The impact assessment included evaluation of the individual cultural localities and values in the vicinity of the planned route which might be affected directly or indirectly. All sites along the route are in early stages of investigations by relevant institutions, they have been only recorder or registered, with no further activities undertaken to-date in terms of excavations or public presentation.

It is considered that in the area of municipalities of Gevgelija, Bogdantsi, Negotino and Demir Kapija there are more than 250 registered and recorded archaeological sites.

From the 250 registered and recorded archaeological sites in the broader region, 21 are located near the proposed pipeline route. Basic details for these sites are shown in the table below.

	Name and location	Type / period of the site	National status	Proximity to projected gas pipeline/ chainage	Sensitivity	Potential to extend in the RoW
Municipality of Gevgelija						
1.	Goli Rid – v.Smokvitsa	Settlement / Late Roman	Protected	50 m / Km 19+500 – 20+200	High	Likely
2.	Glavitsa – v.Prdejtsi	Settlement / Eneolithic and Roman; Church and necropolis / Medieval	Protected	50 m / Km 15+500	High	Likely
3.	Keramidarnica – v.Prdejtsi	Late bronze age settlement	Protected	50 m / Km 11+00	High	Likely

	Name and location	Type / period of the site	National status	Proximity to projected gas pipeline/ chainage	Sensitivity	Potential to extend in the RoW
4.	Gradishte – v.Gabrovo	Medieval fortress	Protected	100 m / Km 27+00	High	Likely
Municipality Demir Kapija						
5.	Kalugerska Chuka – v.Dren	Fortification and church / Late Roman and Medieval	Protected	900 m/ Km 40+500	Medium	Unlikely
6.	Buka – v.Dren	Necropolis/ Roman	Protected	700 m/ Km 46+000	Medium	Unlikely
7	Crkvište – v.Dren	Church and settlement/ Late Roman and Medieval	Protected	50 m/ Km 48+900	High	Likely
8	Goren Zmeovec – v.Dren	Sanctuary/ Hellenistic and Roman	Protected	1300 m/ Km 48+000	Medium	Unlikely
9	Orizarski Grobišta – v.Dren	Settlement/ Late Medieval	Protected	400 m/ Km 50+300	High	Likely
10	Padinata – v.Chiflig	Settlement/ Roman and Late Roman	Protected	400 m/ Km 51+000	High	Likely
11	Orizari - v.Chiflig	Settlement / Roman and Medieval	Protected	1000 m/ Km 50+250	Medium	Unlikely
12	Ilimov Rid - v.Chiflig	Settlement / Late Roman	Protected	300 m/ Km 51+700	High	Likely
13	Sveti Atanasij - v.Chiflig	Early Christian Church / Late Roman – Early Byzantine	Protected	100 m/ Km 52+500	High	Likely
14	Orizarsko Pole – Staro Selo – Modra Stena – Besvichko Pole - v.Chiflig	Settlement and necropolis / Roman and Late Roman	Protected	50 m/ Km 52+500-53+000	High	Likely
15	Penov Kamen – v.Chiflig – Demir Kapija	Settlement / Late Roman	Protected	900 m / Km 51+000	Medium	Unlikely
16	Bo(u)gdashna (Bogatishina) Glava – v.Przdevo	Settlement / Iron Age	Protected	50 m/ Km 59+000	High	Likely
Municipality Negotino						
17	Atanasica – v.Tremnik	Settlement and necropolis/ Late Medieval	Registered	50 m/ Km 61+500	high	Likely
18	Ormankov Grob - v.Tremnik	Necropolis and Church (?) / Hellenistic and Late Roman Period	Protected	1000 m/ Km 61+000	Medium	Unlikely

	Name and location	Type / period of the site	National status	Proximity to projected gas pipeline/ chainage	Sensitivity	Potential to extend in the RoW
19	Jaka Cheshma – Crkvar - v.Tremnik	Sanctuary, aqueduct and Necropolis / Roman and Late Medieval	Protected	800 m/ Km 61+200	Medium	Unlikely
20	Chair Rid - v.Tremnik	Settlement and Necropolis / Prehistoric, Hellenistic and Roman	Protected	1700 m/ Km 63+500	Medium	Unlikely
Municipality Bogdantsi						
21	Rudina – Shipkov Dol –v.Stojakovo	settlement from Hellenistic times and a necropolis from late antiquity	Protected	50 m / km 5+000	high	Likely

The supplementary assessment found no direct physical endangerment of any recorded cultural monument along the entire route. Expected significance of impact (tangible and visual) by the construction of the gas pipeline by region is as follows:

- Municipality of Gevgelija and Bogdantsi – “**low**” to “**moderate**”; and
- Municipality of Negotino and Demir Kapija – “**insignificant**” to “**moderate**”.

The overall pressure on the cultural heritage is negligible to moderate.

12.3 Mitigation Measures and Monitoring

The following mitigation measures are recommended:

For the region Demir Kapija and Negotino:

- Mandatory archeological supervision of the route from 48 to 53 km, from 58 to 58.5 – 61 km;
- Mandatory archeological excavations on the area of Block Station BVS-I3, in the volume of 20% of the construction area, with obligatory excavations during the drilling archeological structures are discovered.

For the region Gevgelija and Bogdantsi:

- Mandatory archeological supervision of the route from 19,5 to 20 km and from 10,5 to 11,5 km.

Mandatory archaeological supervision during construction is proposed at these sections of the pipeline as the cultural heritage sites are located closer to the axis of the pipeline compared to other sites, and the density of sites in these sections is higher. In addition, the sites have only been surveyed and the perimeter of the sites has not yet been established.

In accordance with the Law for protection of cultural heritage, if a cultural heritage site is found during construction of the pipeline, the construction work shall immediately cease, the relevant cultural protection institution must be notified in order to make determination in relation to further conservation works before construction work can recommence.

The construction supervision should include cultural heritage experts from archaeological background with relevant education and experience in cultural heritage conservation work in the area of Gevgelija, Demir Kapija and Negotino. This requirement should be included in the construction management plan.

Monitoring

An appropriate monitoring program will be developed in compliance with national regulations. This should be included in the construction management plan.

Key Performance Indicators: Key Performance indicators will be set for both environmental and social management of key issues. These will be discussed and set with contractors during the tender process and will be integral NER's monitoring of the contractor's environmental and social management performance.

12.4 Residual Impacts

If the relevant mitigation measures outlined above are implemented no significant residual impacts on cultural heritage resources are expected from the project.

13 Social

This section provides supplementary information on the potential social impacts and mitigation measures in accordance with the EBRD ESP (2019).

The supplementary socio-economic assessment provides an update on community profile, and includes gathering of additional primary and secondary data, and quantification of socio-economic information about the Project Affected People (PAPs) by economic displacement, vulnerable groups, specific gender risks and impacts.

Supplementary assessment activities included combination of key informant interviews and small group discussions with a representative sample in each municipality. The aim was to gather information about:

- history of land ownership;
- presence of tenant farmers and use of formal/informal tenancy agreements;
- role of women in agricultural activities and in a typical farming household;
- key challenges on agriculture as a result from project activities;
- potential ways the project could support farmer's access to alternative land plots to assess their level of dependence on land to be impacted from the project household income and alternative (non-agricultural sources);
- details of vulnerable people in the project area who could be disproportionately impacted (including informal farm workers such as Roma); and
- details of the social organisation of land users and historical conflicts between groups over access to land, water etc.

13.1 Baseline

13.1.1 Demography

Municipality of Gevgelija

The municipality of Gevgelija has an area of 485 km². The Town of Gevgelija is an urban and community center, and the municipality comprises 17 villages. Additional socioeconomic survey was performed in the villages Gabrovo, Mrzentsi, Negortsi, Prdejtsi and Smokvitsa.

According to the Census in 2002 State Statistical office database (Makstat), the number of inhabitants in municipality was 22,988 with the average population density was 47 inhabitants per km², which is significantly less than the population density in the Republic of North Macedonia. While according the Census in 2021 population is 21,582 inhabitants and 44.5 inhabitants per km².

Number of households is 19,195 (<https://makstat.stat.gov.mk/-Census> 2021). below provides a demographic overview of Town of Gevgelija and affected villages according to the Census 2002, since the data is not available for towns and villages separately in Census 2021.

Table 13-1: Demographic overview of the municipality of Gevgelija (Census 2002)

Place	Population	Women	Men
Gevgelija	15,685	8,150	7,535
Gabrovo	20	10	10
Mrzentsi	461	230	231
Negortsi	2,047	997	1,050
Prdejtsi	514	257	257
Smokvitsa	263	126	137

Figure 13-1 below outline demography, gender and the age structure in Municipality of Gevgelija, according the Census in 2021.

Total resident population in the Republic of North Macedonia by 5-year age groups and sex, by municipalities, Census 2021

Municipality	Sex	10-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69
Gevgelija	Sex - TOTAL	1076	1009	1050	1182	1340	1694	1600	1573	1515	1597	1706	1516
Gevgelija	Men	547	515	534	603	685	872	832	831	773	800	827	681
Gevgelija	Women	529	494	516	579	655	822	768	742	742	797	879	835

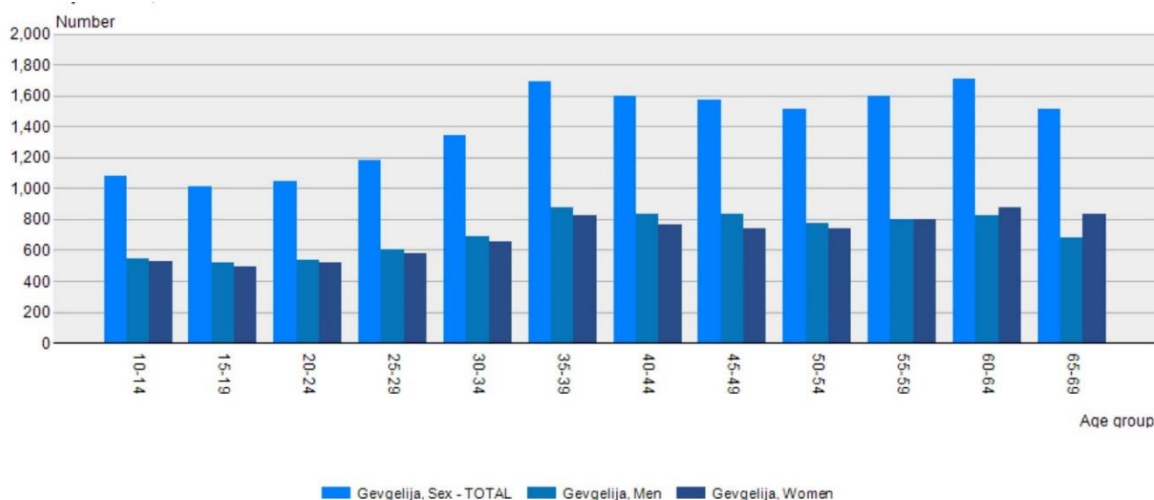


Figure 13-1 Age structure in the municipality of Gevgelija (<https://makstat.stat.gov.mk/-Census> 2021)

Municipality of Bogdantsi

The municipality of Bogdantsi has an area of 115 km² and comprises only four settlements, where the town of Bogdantsi is a central urban, while settlements of Stojakovo, Selemli and Gjavato are rural areas. Additional socio-economic surveys were performed in Stojakovo.

According to the Census in 2002, the municipality population was 8,707, i.e. an average of 76 inhabitants per km² while according the Census in 2021 is 7,339 inhabitants accordingly 64 inhabitants per km². Number of households is 5659 (<https://makstat.stat.gov.mk/-Census> 2021).

Figure 13-2 below outlines demography, gender and the age structure in Municipality of Bogdantsi, according the Census in 2021.

Total resident population in the Republic of North Macedonia by 5-year age groups and sex, by municipalities, Census 2021

Municipality	Sex	10-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69
Bogdanci	Sex - TOTAL	305	355	378	412	476	521	519	513	587	635	632	513
Bogdanci	Men	157	181	203	214	263	273	283	278	307	306	320	241
Bogdanci	Women	148	174	175	198	213	248	236	235	280	329	312	272

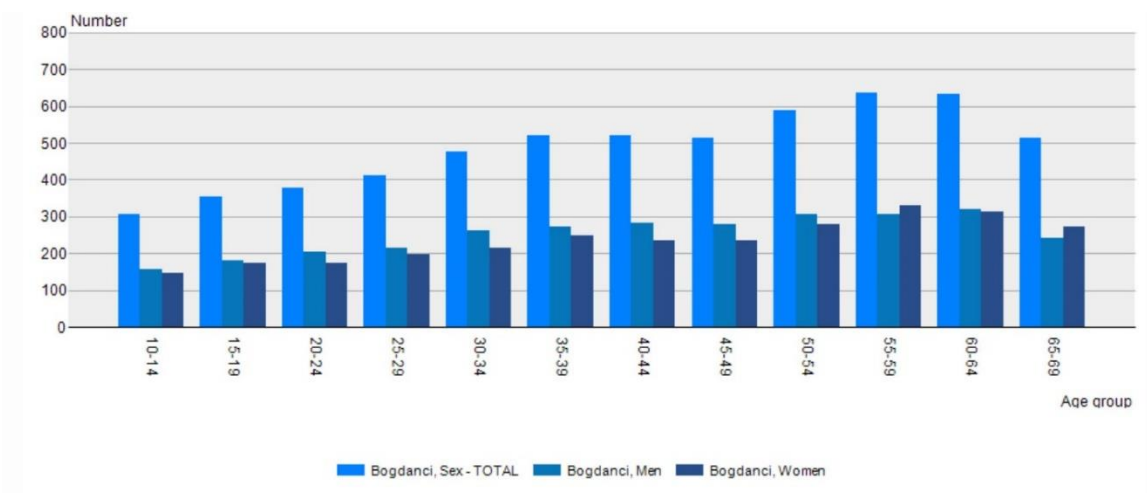


Figure 13-2 Age structure in the municipality of Bogdanci (<https://makstat.stat.gov.mk/-Census> 2021)

Municipality of Demir Kapija

The municipality of Demir Kapija has an area of 309 km². It consists of the Town of Demir Kapija and 14 villages. In Dren, Przdevo, and Chiflik additional socio-economic surveys were performed.

According to the estimation in 2016 from State Statistical office, in municipality of Demir Kapija the number of inhabitants is 4545 and population density is 15 inhabitants per km², while according the Census in 2021 number of inhabitants is 3707 and population density is 12 inhabitants per km². The number of Households is 3662.

Table 13-2 below provides a demographic overview of Town of Demir Kapija and villages according to 2002 Census as there is no separate data for villages and towns from Census 2021.

Table 13-2 Demographic Overview of the municipality of Demir Kapija

Place	Population
Demir Kapija	3 275
Dren	94
Przdevo	235
Chiflik	90

Figure 13-3 below outline demography, gender and the age structure in Municipality of Demir Kapija, according the Census in 2021 (<https://makstat.stat.gov.mk/-Census> 2021).

Total resident population in the Republic of North Macedonia by 5-year age groups and sex, by municipalities, Census 2021													
Municipality	Sex	10-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69
Demir Kapija	Sex - TOTAL	182	181	193	234	238	214	266	289	285	279	305	267
Demir Kapija	Men	93	89	100	128	132	116	129	171	154	146	154	131
Demir Kapija	Women	89	92	93	106	106	98	137	118	131	133	151	136

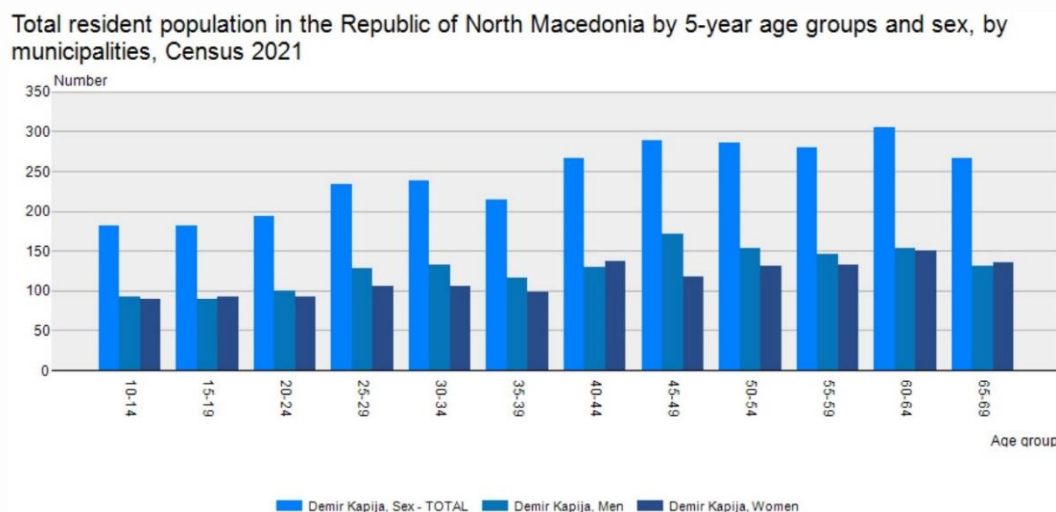


Figure 13-3 Age structure in the municipality of Demir Kapija (<https://makstat.stat.gov.mk/-Census 2021>)

Municipality of Negotino

The municipality of Negotino covers an area of 414 km² and the Town of Negotino is the urban centre of the municipality that consists of 21 settlements. According to the Census in 2002 and the State Statistical Office, the population density in the municipality is 46.5 inhabitants per km².

According the census in 2021, there are 18,194 inhabitants and 13,745 households, and the population density is 44 inhabitants per km². Additional socio-economic surveys were performed in the village Tremnik.

Table 13-3 below provides a demographic overview of Town of Negotino and village Tremnik.

Table 13-3 Demographic Overview of municipality of Negotino

Place	Population
Negotino	13,104
Tremnik	829

Figure 13-4 Age structure in the municipality of Negotino (<https://makstat.stat.gov.mk/-Census 2021>) below outlines demography, gender and the age structure in Municipality of Negotino, according the Census in 2021.

Total resident population in the Republic of North Macedonia by 5-year age groups and sex, by municipalities, Census 2021													
Municipality	Sex	10-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69
Negotino	Sex - TOTAL	925	1000	1019	1101	1217	1290	1328	1273	1357	1318	1334	1198
Negotino	Men	483	488	522	570	605	671	736	663	686	661	655	604
Negotino	Women	442	512	497	531	612	619	592	610	671	657	679	594

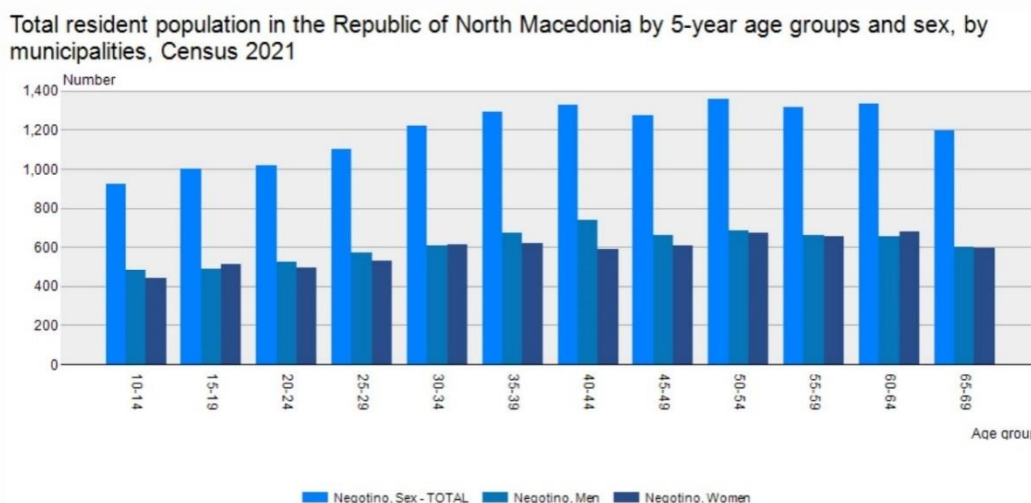


Figure 13-4 Age structure in the municipality of Negotino (<https://makstat.stat.gov.mk/-Census 2021>)

Data according to ethnic affiliation in the affected Municipalities, based on Census 2021 (<https://makstat.stat.gov.mk/-Census 2021>), is provided in the following tables

Table 13-4: Total enumerated population, total resident population and total non-resident population – Census2021 in Bogdantsi Municipality

		Total enumerated population			Total resident population		
		Sex - TOTAL	Men	Women	Sex - TOTAL	Men	Women
Bogdanci	Ethnic affiliation - TOTAL	7 535	3 833	3 702	7 339	3 722	3 617
	Macedonians	6 844	3 450	3 394	6 665	3 353	3 312
	Albanians	6	3	3	1	-	1
	Turkish	38	20	18	38	20	18
	Romas	12	8	4	12	8	4
	Vlachs	5	2	3	4	1	3
	Serbians	279	167	112	275	163	112
	Bosniaks	1	1	-	1	1	-
	Other	48	33	15	44	29	15
	Undeclared	4	3	1	3	2	1
	Unknown	3	2	1	1	1	-
	Persons for whom data are taken from administrative sources	295	144	151	295	144	151

Table 13-5: Total enumerated population, total resident population and total non-resident population – Census 2021 in Gevgelija Municipality

		Total enumerated population			Total resident population		
		Sex - TOTAL	Men	Women	Sex - TOTAL	Men	Women
Gevgelija	Ethnic affiliation - TOTAL	22 182	11 027	11 155	21 582	10 700	10 882
	Macedonians	20 348	10 048	10 300	19 778	9 736	10 042
	Albanians	21	4	17	20	4	16
	Turkish	60	38	22	59	37	22
	Romas	21	11	10	21	11	10
	Vlachs	269	158	111	266	156	110
	Serbians	223	127	96	217	125	92
	Bosniaks	8	5	3	8	5	3
	Other	177	96	81	162	87	75
	Undeclared	4	3	1	2	2	-
	Unknown	4	2	2	2	2	-
	Persons for whom data are taken from administrative sources	1 047	535	512	1 047	535	512

Table 13-6: Total enumerated population, total resident population and total non-resident population – Census 2021 in Demir Kapija Municipality

		Total enumerated population			Total resident population		
		Sex - TOTAL	Men	Women	Sex - TOTAL	Men	Women
Demir Kapija	Ethnic affiliation - TOTAL	3 937	2 034	1 903	3 777	1 949	1 828
	Macedonians	3 208	1 655	1 553	3 076	1 584	1 492
	Albanians	14	1	13	14	1	13
	Turkish	397	217	180	376	208	168
	Romas	38	21	17	37	20	17
	Vlachs	2	2	-	2	2	-
	Serbians	133	68	65	130	66	64
	Bosniaks	1	-	1	1	-	1
	Other	27	14	13	26	14	12
	Undeclared	-	-	-	-	-	-
	Unknown	2	2	-	-	-	-
	Persons for whom data are taken from administrative sources	115	54	61	115	54	61

Table 13-7: Total enumerated population, total resident population and total non-resident population – Census 2021 in Negotino Municipality

		Total enumerated population			Total resident population		
		Sex - TOTAL	Men	Women	Sex - TOTAL	Men	Women
Negotino	Ethnic affiliation - TOTAL	18 786	9 478	9 308	18 194	9 149	9 045
	Macedonians	16 213	8 115	8 098	15 698	7 833	7 865
	Albanians	73	37	36	42	17	25
	Turkish	358	190	168	349	185	164
	Romas	495	251	244	493	250	243
	Vlachs	14	9	5	14	9	5
	Serbians	355	214	141	344	208	136
	Bosniaks	1	-	1	1	-	1
	Other	274	155	119	252	142	110
	Undeclared	-	-	-	-	-	-
	Unknown	5	4	1	3	2	1
	Persons for whom data are taken from administrative sources	998	503	495	998	503	495

According to the 2021 Population Census, the Republic of North Macedonia has 1,836,713 inhabitants, which is 223,081 persons or 10.8% less compared to the population estimates in 2016, and 236,989 persons or 11.4% less compared to 2011. Regarding the age structure, the Macedonian population is increasingly ageing. In the period 2011- 2021, the share of the old population (age group 65 and over) grew from 11.8% to 17.2%.

The same trend occurs in the affected municipalities. According to the Census data, the population of the affected municipalities had a decreasing trend in the previous years. Comparing the data from the Census performed in 2002 and last Census in 2021 the figures showed a decrease of population of 6.1 % in Gevgelija, 15.5 % in Bogdantsi, 16.9 % in Demir Kapija and 5.2% in Negotino (data published by State Statistical Office https://www.stat.gov.mk/PrikaziPublikacija_en.aspx?id=27&rbr=854). The data for decrease of the population in affected municipalities is presented in the following table.

Municipality	Population in 2002 (Census 2002)	Population in 2021 (Census 2021)	Decrease	Decrease %
Gevgelija	22,988	21,582	-1,406	-6.1 %
Bogdantsi	8,707	7,339	-1,368	-15.7 %
Demir Kapija	4,545	3,777	-768	-16.9 %
Negotino	19,212	18,194	-1,018	-5.2 %

Summary

One of the main reasons for population decline is the low fertility rate, which is due to the delayed marriage of young people and the smaller number of children in the family, which is related to the problems of unemployment and job insecurity, and the low standard of living. Another reason is that the young working population, which is in the optimal reproductive age, moves to the Skopje region or abroad. These negative demographic trends are worrying for the future development of the Municipalities and affected villages, because in the next 15-20 years the number of able-bodied populations will decrease, the young population even more, and the number of old populations will grow. This is especially pronounced in the municipalities and villages in the municipalities of Demir Kapija and Bogdantsi so they are placed in the top ten on the list of municipalities with the largest decrease in population in the Republic of North Macedonia.

Macedonian population is increasingly ageing. In the period 2011- 2021, the share of the old population (65 and over) grew from 11.8% to 17.2%. The distribution of population by age structure in the affected municipalities shows the same pattern where the share of old population over 60 years is the largest.

The descending trend of population is reflected also in the age distribution of the people in the affected communities. According to discussions with key informants in surveyed settlements the largest age group of the household members is composed of elderly people, over 60 years old.

13.1.2 Supplementary Socio-Economic Survey

Administratively, the planned gas pipeline will pass through four Municipalities: Negotino, Demir Kapija, Bogdantsi and Gevgelija. In particular, the following settlements are affected by the project:

- village Tremnik (Negotino);
- Town of Demir Kapija, and villages Dren, Chiflik and Przdevo (Demir Kapija);
- village Stojakovo (Bogdantsi); and
- villages Prdejtsi, Negortsi, Mrzentsi, Smokvitsa, Gabrovo (Gevgelija).

Additional site visits and consultations with local authorities and communities were performed during April and May 2022, as follows:

Municipality	Details
Negotino	<ol style="list-style-type: none"> 1. Discussions with representatives of Municipality administration 2. Discussions with the Local Community focus groups and key informants in affected village Tremnik (4 households, village leader and women focus group) 3. Discussions with the focus group of landowners and land users during SE
Demir Kapija	<ol style="list-style-type: none"> 1. Discussions with representatives of Municipality administration 2. Discussions with the Local Community focus groups and key informants in affected villages Chiflik (3 households, village leader, women focus group), Dren (3 households, village leader), Przdevo (4 households women focus group, village leader, Roma focus group) and Demir Kapija town (landowners focus group, 4 households) 3. Discussions with the focus group landowners and land users
Gevgelija	<ol style="list-style-type: none"> 1. Discussions with representatives of Municipality administration 2. Discussions with the Local Community focus groups and key informants in affected villages Mrzentsi (4 households, village leader, women focus group), Negortsi (6 households, village leader), Prdejtsi (5 households, village leader), Smokvitsa (3 households, village leader) and Gabrovo (3 households, women focus group, village leader) 3. Discussions with the focus groups of landowners and land users
Bogdantsi	<ol style="list-style-type: none"> 1. Discussions with representatives of Municipality administration 2. Discussions with the Local Community focus groups and key informants in affected v. Stojakovo (4 households, Roma focus group, village leader) 3. Discussions with the focus group of land owners and land users during SE

Field work observations for the project area suggest low population density, negative demographic trends, underdeveloped infrastructure and rural poverty and unemployment in some communities. The causes of depopulation are primarily migration to urban areas and the age structure of the remaining population, particularly in rural areas.

During the socio-economic survey and discussion with focus groups of land owners as well with village leaders was it was informed that there is no informal use of the land because agriculture is a low-income activity, and at the same time the villages and towns in the Project area are highly affected by economic emigration.

The settlements where additional socio-economic surveys were performed are presented in Figure 13-5, Figure 13-6 and Figure 13-7. An overview of the characteristics of each settlement is provided in Table 13-8 .



Figure 13-5 Settlements along the route - Tremnik, Przdevo






Figure 13-6 Settlements along the route - Demir Kapija, Chiflik, Dren









Figure 13-7 Settlements along the route – Smokvitsa, Prdejtsi, Negortsi, Mrzentsi, Stojakovo



Note: It should be noted that the data on population numbers given in the table below is the official data from the most recent national census conducted in 2002 and there are no other official data or estimates for these settlements. The national census was performed in autumn 2021 and data is still unavailable, so based on depopulation trends the population number is even lower now than in 2002.



Table 13-8 Community characteristics



Community	Key characteristics	Photographs
Village Tremnik	<p>Village Tremnik belongs to the Municipality of Negotino and it is located in the southern part of the territory of the Municipality, 10km away from the town of Negotino. The village has lowland landscape at an altitude of 120 meters. The area of Tremnik covers 12.8km², it is dominated by arable land which covers an area of 812 ha, and the pastures cover 290ha. According to the 2002 census, the village has 827 inhabitants, of which 618 were Macedonians, 121 Serbs and 85 Turks and 3 others. Note: there is no data from the Census in 2021.</p> <p>The settlement is a compact whole, organized around the central part where the shop, the primary school, and small central square are located. The houses are built close to each other. The residential part of the village is surrounded by arable land.</p> <p><u>The interconnector is located at a distance of 1 km from the village.</u></p> <p>The most common branches of agriculture are cereals, viticulture and gardening (peppers, tomatoes, cucumbers, onions, garlic, lettuce, carrots, spinach, leeks, watermelons and melons). On average, families own 1.5- 2ha of land. Poultry farming (chicken and turkey) is well developed and there is no livestock.</p> <p>A large number of mostly young residents work in the newly opened factory "Drexler Meyer" for production of car electronics in Kavadarci. Some of the residents of Tremnik are also engaged in other service activities such as road transport of passenger and freight vehicles, masonry, construction, and tiling and in the factories and plants in Negotino town. There are two companies for grapes trading in the village.</p> <p>About 40% of the population in Tremnik earns income on two bases: engaging in agriculture and employment in non-agricultural activities. There is no informal use of land due emigration and low income from agriculture.</p> <p>There are several shops and service facilities in Tremnik. There is orthodox church, but no mosque for Turkish Muslim minority. Turkish minority is well integrated in the community, they own land and as well have employment in the towns around.</p> <p>In terms of social institutions, there is a primary school up to 5th grade, House of Culture, medical center.</p> <p>Drinking water and water for and irrigation in</p>	 <p>Primary School in v. Tremnik</p>  <p>Village Tremnik</p>  <p>Agricultural area at v. Tremnik</p>




Community	Key characteristics	Photographs
	<p>Tremnik is supplied from the hydro-ameliorative system "Tikvesh" and there is no sewerage system. Part of the streets in the village are paved. There is organised collection of waste from the public utility company of Negotino Municipality. There is no organised transport to town of Negotino.</p> <p>There is a Roma group of 15-20 members, seasonal migrating from other regions to work as hired workers for local farmers in agriculture. The Roma are accommodated in temporary sheds that they build themselves in the center of the village for a period of several weeks. They are well received by the local population because the population understands Roma way of life.</p> <p>Village Tremnik is affected by migration especially of young population (30% of villagers migrated within last 10 years), and many are planning to leave in near future..</p>	
Village Przdevo	<p>The village Przdevo is located in the western part of the territory of the Municipality of Demir Kapija, 12 km away from the town of Demir Kapija, and 10 km from the town of Negotino. The village is set on a hilly terrain, at an altitude of 230 m. The settlement is a compact whole, organized around the central part where the shop and small central square are situated. The houses are built close to each other. The residential part of the village is surrounded by arable land.</p> <p>The area of the village covers an area of 22.4 km², of which arable land predominates on an area of 1243ha, 630ha fall on pastures, and there are no forests. According to the 2002 census, there were 235 inhabitants in the village of Przdevo, of whom 210 were Macedonians, 23 Turks, 1 Serb and 1 remaining. Note: there is no available data from Census 2021.</p> <p>The village has a regional primary school to 5th grade, and House of Culture. Part of the streets are paved, drinking water and water for irrigation of agricultural fields is supplied from their own wells. There is no sewerage system. Waste collection is managed by public utility company of Demir Kapija Municipality. There is no organised transport to Demir Kapija.</p> <p><u>The interconnector is located at a distance of 500 m from the village.</u></p> <p>The village is one of the largest producers of red pepper and there is factory for processing, drying and production of pepper. Another important agricultural activity in the village is viticulture and there is also vinery in the village. A few families are beekeepers. Only one family has a livestock business with 50 cows (Roma family).</p> <p>The site visit found there is Roma population who declare themselves sometimes as Turks, sometimes as Roma. Roma representatives</p>	 <p><i>Village Przdevo view</i></p>  <p><i>Cattle breeding farm in v. Przdevo</i></p>  <p><i>Beekeeping activity in v. Przdevo</i></p>

Community	Key characteristics	Photographs
	<p>informed that there are around 10 Roma families in the village. The village is affected by emigration, especially young people leave, and as a result of that, elderly people remain in the village. The Roma population is also affected by emigration. Key informants say that in recent 10 years 40% of the population has moved away from the village.</p> <p>On average, families own 1.5 h of land.</p> <p>About 60% of the population in Prздево earns income on two bases: engaging in agriculture and employment in non-agricultural activities.</p> <p>There is lack of organised transport to nearby towns, and lack of health and social care institution. The shop for food is not well supplied. The income from agriculture is very low and unsecure.</p> <p>There is a special ritual of making a tower of players, only men, that is taking part every year at Easter celebration in Prздево. The event will not be affected by the Project, due to the distance from the area.</p>	 <p><i>Shop in v. Prздево</i></p>
<p>Town of Demir Kapija</p>	<p>Town of Demir Kapija is located in the southern part of the municipality and represents the administrative seat of the municipality Demir Kapija. The river Boshava flows through Demir Kapija into Vardar river not far from it. The altitude of Demir Kapija is 130m. The town has 3275 inhabitants, with an average population density of 15 inhabitants/ km². According to the ethnic basis, the most numerous are Macedonians 3161, then Serbs 34, Albanians 19, Turks 19, Roma 16 and others 26. There is no data for the town from Census 2021.</p> <p>The town has a Home of Culture with a library and a cultural and artistic society, a drama theatre and a singing group. There is a primary school and a kindergarten, a health center in which primary health care is provided to the population in Demir Kapija and the surrounding settlements.</p> <p>Demir Kapija is situated close to the most important transport routes in the country: the international road E75 (Belgrade-Skopje) and the Belgrade-Skopje-Thessaloniki-Athens railway. The town has its own company for public transport.</p> <p>Demir Kapija receives water for irrigation from hydro system "Tikvesh", and drinking water is supplied from a tank with a size of 38 m³, which is of a local character and serves only the population of Demir Kapija. There is a sewage system without treatment plant covering only the town. There is one town landfill in the municipality (managed by public utility company "Boshava").</p> <p><u>The Interconnector is located about 2km from Demir Kapija town.</u></p> <p>Demir Kapija is part of the Tikvesh region, where the main activity of the population is</p>	 <p><i>DemirKapija center</i></p>  <p><i>View of Demir Kapija town</i></p>


Community	Key characteristics	Photographs
	<p>agriculture, ie cultivation of vines and wine production; in addition, there are cereals, horticultural crops (red pepper) and tobacco. Of the other economic branches, the excavation of sand and stone for construction is represented.</p> <p>Tourism is in development, and a special element for the future are the natural rarities of this area, ie. the speleological natural phenomena that were created in the limestone masses of the Demir Kapija's gorge.</p> <p>About 50% of the population in Demir Kapija earns income on two bases: engaging in agriculture and employment in non-agricultural activities. There is no informal use of land due emigration and low income from agriculture.</p>	
Village Dren	<p>The village of Dren is located in the southern part of the territory of the Municipality of Demir Kapija. The village is situated on hilly terrain at an altitude of 270m. An asphalt road leads to the village.</p> <p>Village area 16.5km². It is dominated by forests on an area of 1,406ha, 159ha of arable land and only 42ha of pastures.</p> <p>According to the 2002 census, the village of Dren had 94 inhabitants, of whom 90 were Macedonians and 4 Serbs. The village, basically, has an agricultural and forestry function and the main activity is viticulture. Village is heavily affected by depopulation, according to key informants 60% of population has migrated. There are around 30 people in the village, all elderly, there are no young people nor families with children.</p> <p>The income is from pensions and agriculture, only viticulture. Few families are beekeepers. There is no livestock, and nothing is grown except grapes, due to unsuitable soil and lack of water for irrigation. Households own about 2h land. There are no seasonal workers or Roma population. There is no informal use of land due emigration and low income from agriculture.</p> <p>In the village there is no health medical center, shop and organized transport to cities. Also, the waste collection is not organized and villagers dump the waste on surrounding area on some unlicensed village dumpsites. There is a village orthodox church. The water supply is from a spring, the water flows through pipes with a free fall. For irrigation Drenska River water is used, which flows through the village. There is no sewage in the village.</p> <p><u>Interconnector is located about 200m away from village Dren.</u></p>	 <p><i>Discussion with key informants v. Dren</i></p>  <p><i>Houses in v. Dren</i></p>

Community	Key characteristics	Photographs
Village Chiflik	<p>The village is located in the central part of the territory of the Municipality of Demir Kapija. It has lowland landscape at an altitude of 140m. An asphalt road from the town of Demir Kapija leads to the village. Village covers an area of 5.3 km². It is dominated by arable land on an area of 112ha, 90ha of forests and 75ha of pastures. The villagers are mainly active in agriculture. The village is small and populated with Macedonian population. According to the 2002 census, the village of Chiflik had 90 inhabitants (48 men and 42 women) of whom 89 were Macedonians and 1 other, and is heavily affected by depopulation; according to the key informants 80% of population has migrated, the remaining village population are all elderly, there no young people nor families with children. In recent years, the village has developed as a weekend settlement with cottages due to the pleasant climate and natural beauty.</p> <p>The village does not have a medical center, grocery shop etc. Also, there is no organized transport to other towns. There is a village orthodox church. The drinking water supply is used from collection reservoir, while for irrigation is used water from river Doshnitsa that flows through the village. There is organised waste collection.</p> <p><u>Interconnector is located about 500 m away from village Chiflik.</u></p> <p>Main activity of villagers are agriculture and livestock. About 50% of the population in Chiflik earns income on two bases: engaging in agriculture and employment in non-agricultural activities. There is no informal use of land due to emigration and low income from agriculture.</p>	 <p>Village Chiflik</p>
Prdejtsi	<p>Prdejtsi is located in the eastern part of the territory of the Municipality of Gevgelija and is 8Km away from the town of Gevgelija. It has lowland landscape at an altitude of 65m, and covers an area of 18.3 km². The arable land covers an area of 568ha, the pastures 559ha, and the forests 386ha. According to the 2002 census, there were 514 inhabitants (equally 257 women and men), 510 Macedonians, 2 Serbs and 2 others.</p> <p>The village has an access road, paved streets, water supply, sewerage, school, cultural center, kindergarten. There is a village church and a Home of Culture. There are several companies in the village with various activities, such as a factory for PVC pipes, a factory for canning vegetables, restaurants. Irrigation network "Vardarska Dolina" is used for agriculture. There is no medical center. Also there is no organized transport to towns.</p> <p><u>The Interconnector is located about 500 m from the village.</u></p> <p>A wide range of fruits and vegetables are grown, including figs, olives, ladybugs,</p>	 <p>Village Prdejtsi- center of the village</p>

Community	Key characteristics	Photographs
	<p>lemons, grapes, peanuts, kiwis and others. Municipality has a communication center where villagers can share their comments and questions for the municipality administration. There is no organised transport to Gevgelija. The village is affected by migration, especially young people, due to low income from agriculture. Only 10% of villagers have income solely from agriculture, and 90% have income from agriculture and non-agricultural activities.</p>	
Negortsi	<p>Negortsi is a village located in the central part of the municipality of Gevgelija, about 6 km north from Gevgelija town. An asphalt road leads to the village, which also leads to the Negorski mineral baths. The village has lowland landscape, located at an altitude of 80 meters. The village area is large and covers an area of 29.6 km², the arable land covers an area of 1067 ha, the forests account for 1289ha, and the pastures 366 ha.</p> <p>The village has 2047 inhabitants (997 women and 1050 men) and about 400 houses. According to the 2002 census, 2032 were Macedonians and 15 Serbs. To the west of the village are the last slopes of Kozuf mountain which are quite rich in water. Throughout the periphery of the village there are springs of good drinking water, also used for irrigation. There is agriculture, production of various vegetables cereals, viticulture.</p> <p>Negortsi has a primary school, post office, medical center, several shops and cafeterias. The village has a church located in the center. There is water supply but not sewerage. The village has a Home of Culture and a kindergarten. The waste collection organized by public utility of Gevgelija municipality. The village is affected by migration, especially young people.</p> <p><u>The Interconnector is located about 2.5 km from the village.</u></p> <p>The largest company in the village, employing almost 60% of the inhabitants, is DI-EM factory for processing and canning of vegetables and fruits. There is also a wood industry, grain mill, factory for plastic products. About 80% of the population in Negortsi earns income on two bases: engaging in agriculture and employment in non-agricultural activities. There is no informal use of land due emigration and low income from agriculture.</p> <p>Near the village is situated a psychiatric hospital "Negorci" - Gevgelija, specialized in mental health care where 50 people from Negortsi are employed.</p>	 <p><i>View of v. Negortsi</i></p>  <p><i>Center of v. Negortsi</i></p>

Community	Key characteristics	Photographs
Gabrovo	<p>This small village located in the northern part of the territory of the Municipality of Gevgelija. The village is located on the eastern slopes of Mount Kozuf, on hilly terrain at an altitude of 300 meters. The village is 31Km away from Gevgelija. Gabrovo has 20 inhabitants and all are Macedonians. It highly affected by migration.</p> <p>The village has a large area, which covers an area of 28.8 km². Forests with an area of 2227ha 137 ha fall on arable land, and only 3.5ha on pastures. The village has an agricultural and forestry function. Gabreshko Lake is near the village, Gabreshka River passes through the village.</p> <p>People have their own well for drinking water. There is no medical center, organised transport, waste collection, shops, school. There is village church. The village is almost abandoned.</p> <p><u>The Interconnector is located about 500m from the village.</u></p>	 <p><i>Centre of . Gabrovo village</i></p>
Mrzentsi	<p>The settlement is located in the southernmost part of the Municipality of Gevgelija, not far from the town of Gevgelija, due to which it belongs to its rural zone. Mrzentsi has about 461 inhabitants (231 males and 230 females) of which 458 Macedonians, 1 Serb, 1 Vlach and 1 other. The area of the village is small and covers an area of 6.8 km². Arable land covers an area of 320 ha, pastures 145 ha.</p> <p>The village has an access road, paved streets, and school up to 5th grade, water supply and sewage. There is a church located in the southern part of the village on a hill with a dominant position in relation to the rest of the village. Mrzentsi has no organised public transport due to its proximity to Gevgelija and there is medical centre.</p> <p><u>The Interconnector is located about 2.5 km from the village.</u></p> <p>The main agricultural activity is cultivation of vineyards, also leeks, cabbage tomatoes, onions and wheat. Several families work with sheep breeding, and there are a total of 200 sheep. About 90% of the population in Negortsi earns income on two bases: engaging in agriculture and employment in non-agricultural activities. Most of the people are employed in Gevgelija. There is no informal use of land due to low income from agriculture.</p> <p>Private companies situated in Mrzentsi are mainly textile companies. There are a few restaurants frequently visited by tourists due to vicinity of the roads to and from Greece. Mrzentsi functions as a suburb of the town of Gevgelija and has good living conditions, so it is not affected with migration as much as other villages in the region. Lately, many weekend houses are being built in the village.</p>	 <p><i>Women in village Mrzentsi</i></p>  <p><i>View of the village Mrzentsi</i></p>

Community	Key characteristics	Photographs
Smokvitsa	<p>The village is located in the northern part of the territory of the Municipality of Gevgelija. The village has lowland landscape, located at an altitude of 90 meters. It is 15 km away from town of Gevgelija. Village area covers 24.3 km². It is dominated by forests with an area of 1,716 hectares, pastures account for 293 hectares, and arable land 215 hectares. The village has a mixed agricultural economy. According to the 2002 census, the village of Smokvitsa had 263 inhabitants, (137 male and 126 female), all Macedonians.</p> <p>The village has an access road, paved streets, school up to 5th grade, water supply. There is no sewage and no medical center. Railway Skopje-Gevgelija passes through the village, there is a railway station "Smokvitsa".</p> <p><u>The Interconnector is located about 1km from the village.</u></p> <p>The main agricultural activity is cultivation of vineyards, and just only one family breeds cattle.</p> <p>About 90% of the population in Smokvitsa earns income on two bases: engaging in agriculture and employment in non-agricultural activities. Village is affected by migration, and most of the people that are staying in the village are employed in Gevgelija. There is no informal use of land due to low income from agriculture.</p>	 <p><i>View of the village Smokvitsa</i></p>  <p><i>Discussion with villagers from village Smokvitsa</i></p>
Stojakovo	<p>Stojakovo is a village in the Municipality of Bogdantsi. The village has lowland landscape, located at an altitude of 60m. It is about 7Km away from the town of Gevgelija and 5 Km from town of Bogdantsi.</p> <p>According to the 2002 census, the village of Stojakovo had 1,931 inhabitants (966 men and 965 women) , of whom 1,890 were Macedonians, 36 Serbs, 1 Vlax and 4 others.</p> <p>The village has a primary school to 9th grade and a kindergarten. There is also a medical center and a church. The village has water supply, sewerage, and organized waste collection by the public utility company from the municipality of Bogdantsi. Stojakovo is connected with asphalt roads to all settlements in the municipality but there is no organized public transport toward Gevgelija and Bogdantsi.</p> <p><u>The Interconnector is located about 500m from the village.</u></p> <p>Farmers grow vegetables and vineyards. There are private companies, mostly garment sewing textile factories. About 70% of the population in Stojakovo earns income on two bases: engaging in agriculture and employment in non-agricultural activities. Village is affected by emigration. There is no informal use of land due emigration and low income from agriculture.</p> <p>The village of Stojakovo is also known for the</p>	 <p><i>Discussion with villagers from village Stojakovo (Roma included)</i></p>  <p><i>View of the village Stojakovo</i></p>

Community	Key characteristics	Photographs
	<p>large stork population nesting due to the favorable climatic conditions and the availability of food. The inhabitants protect the birds and their nests.</p> <p>Residents of Stojakovo celebrate 1st of May (Labor day) with the racing event. Participants compete in a race with horses, a race with a donkey, a race with bicycles, running for 100 meters and running for 3,000 etc.</p> <p>There is one Roma family (6 members) who are registered and declare themselves as natives and nationality Macedonians. There is also a group of Roma who migrate from Strumica region (South-east part of North Macedonia) and are mainly seasonal workers. The group of 15-20 people live in the old abandoned state building (former army building) for free. They work as seasonal workers helping farmers in picking grapes and tomatoes, chopping wood, also collecting waste such as scrap metal. They stay in the village of Stojakovo for three months during the summer. During the rest of the year they reside in Strumica region where they have houses. The age structure is mixed, young people around 20- 25 years prevail. They are considered to be peaceful people and to cooperative with the local community. Local population is accepting well their presence, providing them with food and their clothing.</p>	 <p><i>Storks in village Stojakovo</i></p>

13.1.3 Gender Issues

Following outlines key data from State Statistical Office and various strategies:

- The gender structure for 2020 shows an approximately equal share of both genders in the country i.e. women make 49.96% and men 50.04% of the population.⁸
- In 2020 the employment rate for men was 55.9% and for women it was 38.4%, resulting in a high gender employment gap of 17.5%.⁹ Share of women in senior management positions in the country in 2020 was 21.3%.¹⁰
- Women (20-64 age) on average spend over 4 hours per day on household work, which is four times more compared to men who spend an hour per day on these tasks¹¹.
- Regarding the age structure, the Macedonian population is increasingly ageing. In the period 2007-2019, the participation of the young female population (age group 0-14) in the total population decreased from 18.2% to 15.8%, while the share of the old female population (age group 65 and over) increased from 12.5% to 15.8%. An increase in the number of women can be observed in the age group of 65 and over.

⁸North Macedonia in Figures 2021, State Statistical Office

⁹North Macedonia in Figures 2021, State Statistical Office

¹⁰ National Strategy for Sustainable Development 2009-2030

¹¹Time Use Survey 2014/2015, State Statistical Office

Gender-related indices for North Macedonia

According to the Gender Inequality Index (an index introduced by UNDP for measurement of gender disparity), North Macedonia was ranked 37th out of 162 countries in 2020. Female population with at least some secondary education made up 41.8% (data refers to 2015-2019) and the labour force participation rate for women was 43% (data for 2019). This Index reveals that the country has made significant progress in reducing gender inequality.

According to World Bank's "Women, Business and the Law" (2021) which analyses legal reforms that advance women's economic empowerment and identifies gaps that persist before men and women achieve equality before the law, North Macedonia scores 85 out of 100, which is higher than the regional average observed across Europe and Central Asia. The key findings of the analysis are as follows:

- The "workplace" indicator score is 100 (the highest possible score) which means full equality in employment and prohibition of sexual harassment in employment. Other areas where North Macedonia has the highest score are constraints related to women's freedom of movement, marriage, starting and running a business, and gender differences in property and inheritance; and
- However, when it comes to laws affecting women's pay, laws affecting women's work after having children, and laws affecting the size of a woman's pension, North Macedonia could consider reforms to improve legal equality for women. For e.g., one of the lowest scores is on the indicator related to laws affecting women's pay as there is no law mandating equal remuneration for work of equal value.

The most recent publication addressing gender issues is the Performance of Western Balkan economies regarding the European Pillar of Social Rights; 2021 review on North Macedonia. It confirms the findings of previous studies. Some of its key findings can be summarised as follows:

- There are large and persistent gaps in labour market participation between men and women. In particular, the gender employment gap for the population 20-64 in 2018 was 21.4 percentage points (almost double the EU-average). The gender employment gap is closely related to educational attainment:
- The employment rate for women in the Republic of North Macedonia in 2019 was 38.1%, which is significantly lower than the employment rate of 56.6% for men. Roughly 35% of the population aged 15-64 in North Macedonia is inactive, with inactivity much higher among females. In particular, 47.2% of working-age women do not participate in the labour market. While males in the economy have similar activity rates as their EU peers on average, females fare very poorly in comparison to their counterparts in the EU Member States; and
- The inactivity of females is mainly related to family responsibilities, i.e. caring for the home and caring for other members of the household. 23.2% of inactive women in 2020 stated that they are not active in the labour market precisely because of care of adults with disabilities or children and other family or personal reasons (compared to only 0.4% of inactive men who stated the same). In other words, the traditional role of women in North Macedonia in terms of home care, taking care of minors and adults who cannot take care of themselves, is a major obstacle to greater participation of women in the labour market. Studies show that the traditional division of household labour in which the burden of care for the household and its dependents automatically falls on women is an important impediment to women's higher labour market activity. Therefore, the main reasons for women's inactivity are household duties and the stereotypes about gender roles in the family and society.

Legislation

- Through the **ratification of the Convention on the Elimination of All Forms of Discrimination Against Women** in 1994, North Macedonia has committed itself to guarantee, protect and advance the rights of women and girls, and prevent and eliminate all forms of discrimination against women and girls across its territory. It also ratified the

Convention on Preventing and Combating Violence Against Women and Domestic Violence (Istanbul Convention) in 2017;

- The **Law on Labour**¹² prescribes that both women and men must be provided equal opportunities and treatment in relation to access to employment, including promotion, expert and professional on-the-job training, working conditions, equal pay for equal work, professional social security schemes, absence from work, work time and cancelling of employment contract;
- The **Law on Equal Opportunities for Men and Women**¹³ deals with the issue of gender equality and protection against discrimination based on sex and gender;
- The **Law on Prevention and Protection against Discrimination**¹⁴;
- The **Law on Protection from Harassment at Work**¹⁵ aims to specifically prevent and protect against psychological and sexual harassment in the workplace and ensure a healthy work environment; and
- The **Law on Prevention and Protection against Violence against Women and against Domestic Violence**¹⁶ defines violence against women in both private and public sector.

Project Related Data

Project related data related to gender structure in the affected municipalities according the Census 2021 are presented in Demography section. There is no available data separately for settlements in the area. Regarding the gender structure, the statistical data shows bigger number of male populations in all project affected municipalities.

According to the data from State Statistical Office women participate in the number of employees with only 35%, the disparity of women's employment compared to men in rural areas remains significant and is higher than that in urban areas where the participation is more balanced and is 43%.

The same pattern is followed in the affected municipalities, the unfavorable position of women in rural areas is evident, especially due to the high percentage of women who are unpaid family workers. Access to resources and opportunities for economic and social empowerment between men and women in rural areas is limited, so the number of women owners of holdings within the total number of farmers is only 10.4%, and only 12.01% of women are landowners with low participation in the decision-making process relevant to production activities.

The findings based on discussion with key informants are presented below:

- Access to education for children in rural areas is satisfactory, as far as primary schools are concerned, while in terms of secondary education, distance to schools has a negative impact, both for boys and girls;
- Some women in Municipality of Bogdantsi and Municipality of Demir Kapija face limited access to information from social institutions, because these municipalities do not have social workers and for obtaining information related to protection rights are forced to visit the regional center for social work;
- In rural areas, the non-existence of kindergartens, the non-existence of centers for care of persons with disabilities, the lack of transportation opportunities for persons with disabilities, the non-existence of care services for the elderly, etc. leads to the taking over of the overall

¹²Official Gazette of RSM, No. 167/2015 (consolidated text)

¹³ Official Gazette of RSM, No. 6/2012, 30/2013, 166/2014 and 150/2015

¹⁴ Official Gazette of RSM, No. 258/2020

¹⁵ Official Gazette of RSM, No. 79/2013

¹⁶ Official Gazette of RSM, No. 24/2021

care of the family members, which further increases their burden of caring for the family, and at the same time involvement in economic activities in agriculture;

- Most villages in the rural area of the project do not have access to public and medical infrastructure. They are therefore forced to seek health care away from their place of residence, and they are partially satisfied with access to health services. They especially emphasized the need for access to primary health care, ie rural doctor, access to a gynecologist, dentist, and the existence of emergency medical care is necessary;
- Women in rural areas in the project area feel that they face limited opportunities in every sphere of life, and that they do not have equal access to the rights and opportunities enjoyed by women in urban areas;
- Domestic violence in the project affected municipalities most often is not reported. Reporting domestic violence is a disgrace to both the victim and the whole family due to the reason that traditional values are especially important in these areas; and
- Access to information for employment and self-employment programs is inadequate.

13.1.4 Vulnerable Groups

Based on the discussions with local authorities and the socio-economic survey, the following groups are considered as having different degrees of vulnerability:

- Roma population;
- Elderly people living alone in rural areas; and
- Elderly or disabled persons unable to easily communicate their concerns and grievances to the project. Their mobility issue might prevent this category of PAPs to participate in stakeholder engagement, the assessment of land assets or damages incurred by the project, as well as communicate their concerns and grievances to the project easily.

13.1.4.1 Roma minority group

Legislation

The Strategy for the Roma in Republic of Macedonia 2014-2020 is part of the state public policy to ensure involvement and integration of Roma population. The Strategy identifies the following goals:

- Improvement of employment opportunities for the Roma community and its integration into the society;
- Raising the level of education of the Roma community;
- Reducing the gap in the quality of housing between Roma and non-Roma communities;
- Continuous improvement of the health status of the Roma community; and
- Development and promotion of Roma culture, language and tradition.

The Law on Promotion and Protection of the Rights of Communities Which Make Less Than 20% of the Population¹⁷ addresses:

- the rights in the area of employment according to adequate and equitable representation of members of minority communities;
- the right of minority communities to be informed in their own language through electronic and printed media;
- fulfilment of their cultural, educational, artistic and scientific goals; and
- use of symbols of minority communities.

¹⁷Official Gazette of RM, No. 92/2008

The *Performance of Western Balkan economies regarding the European Pillar of Social Rights, 2021 review on North Macedonia* report also addresses the issue of Roma communities in North Macedonia. It states that poverty and exclusion remain high among Roma. Implementation of Roma inclusion policies is slow. Roma face challenges in different areas of life, including: lack of proper documentation (no IDs); homeless families or children (living on the streets); high unemployment; poverty; widespread stereotyping and discrimination against Roma. The Roma employment rate stagnated between 2011 and 2017 despite the improving labour market, with Roma females in an especially difficult position. Their employment rate is only 13% with an unemployment rate of 58%. The large differences in educational and labour market outcomes for Roma and Non-Roma stem from their limited access to education and other services and are linked to widespread discrimination.

Project related data

In rural areas Roma groups are particularly dependent on agricultural labour. They are generally much more exposed to unemployment and poverty than other groups. There are no villages in the Aol inhabited exclusively by Roma population. There is Roma population in villages Tremnik, Przdevo and Stojakovo. In other villages there is no Roma population.

There is a Roma group of 15-20 members in **Tremnik**, of various ages, staying only seasonally during periods when the local farmers need additional workers on the agricultural fields. This Roma group originates from other regions and they do not own houses in Tremnik. They are accommodated for a period of several weeks in temporary sheds that they build themselves in the center of the village. They stay and work as hired workers for local farmers in agriculture. They are well received by the local population who understand the way of life of the Roma.

In **Przdevo** the Roma population represents about 10% of the population in the village. They are registered, have households in the village, and they declare themselves sometimes as Turks, sometimes as Roma. There are around 10 Roma families, in total around 30 people, they do not own agricultural land. Only one Roma family has a livestock business with 50 cows. Most of the Roma are working as employees in businesses in Demir Kapija or Negotino, both women and men equally. Also, some are engaged as seasonal workers in agriculture. They are well integrated with other nationalities also have active NGO for women rights and social issues. Roma women informed that they are not satisfied with quality of life in the village, there is a primary school to 5th grade only, no village medical center and no shops or other services. There is no organised public transport to Demir Kapija where they access different services like social care, medical care, school etc. There are a few families with 3 or more children. Most of the other families are elderly and their children migrated abroad or to the neighbouring cities.



Discussion with Roma women in v. Przdevo

In **Stojakovo** there is one permanent Roma family (6 members). They are registered and own a house, declare themselves as natives of Macedonian nationality. Additionally, there is also a group of Roma who migrate seasonally from the Strumica region (South-east part of North Macedonia). This group of 15-20 people lives in the old abandoned state building (former army building) for free. They stay in the village of Stojakovo for three months during the summer. During the rest of the year they

reside in Strumica region where they have houses. They work as seasonal workers helping farmers in picking grapes, tomatoes, chopping wood, but also collecting waste such as scrap metal. The age structure is mixed, young people around 20- 25 years of age are prevalent. They are considered to be peaceful people and cooperative with the local community. Local population is accepting well their presence, providing them with food and clothing.

13.1.4.2 Elderly People

The population in the project area tends to be elderly as most of the villages are affected by migration. Many young people migrate either to the nearby cities or abroad for work. The field survey indicated that the largest age group of the household members is composed of elderly people over 60 years old.

13.1.4.3 Disabled People

This is a vulnerable group that may be disproportionately affected by issues related to access and circulation due to project construction activities.

13.1.4.4 Summary

Observations during the socio-economic survey indicate that vulnerable people generally would not be present in the project area, but there may be specific exceptions that need to be identified during the Land Acquisition Planning (LAP) process. Identification of vulnerable group categories which are of particular relevance to the project will be carried out during the full census for LAP.

13.1.5 Public Consultations, Participation and Disclosure

This chapter describes the actions carried out by NER as part of their stakeholder engagement process. A detailed stakeholder mapping, based on desktop study and field surveys, was conducted by NER as part of the process to update the ESIA based upon the findings of the gap analysis with EBRD's PRs.

NER recognises as project stakeholders various individuals, groups or communities who:

- Will be affected or are likely to be affected, positively or negatively, and directly or indirectly by the Project ("Project affected parties"), particularly those directly and adversely affected by project activities, including those who are disadvantaged or vulnerable; or
- May have an interest in the Project and/or the ability to influence its outcomes, either positively or negatively ("other influential/interested groups").

NER has identified the following as affected stakeholders for the project:

- Citizens and administration in municipalities in the Project area of influence (Negotino municipality, Demir Kapija municipality, Gevgelija municipality, Bogdantsi municipality);
- Villages in the Project area of influence (Negotino: Tremnik, Przhdevo; D emir Kapija: Demir Kapija, Chiflik, Dren; Gevgelija: Gabrovo, Smokvitsa, Prdejtsi, Negorci, Mrzentsi; Bogdantsi: Stojakovo);
- Owners and users of the land plots impacted by land acquisition and/or access restrictions;
- Vulnerable groups in the project area;
- Public utilities/ operators of the infrastructures that will be crossed by the pipeline;
- National and Regional Government Bodies/ Departments, Regulatory agencies, directorates and public institutions;
- Main National and Local NGOs and civil society associations; and
- Local and national media.

Stakeholder engagement actions included public consultation meetings in affected Municipalities.

As part of supplementary ESIA activities for stakeholder engagement, from April to June 2022 a total of 12 public consultation meetings were organised and held in the municipalities crossed by the Interconnector, reaching more than 250 participants.

Four meetings were organized on the premises of the municipalities administrative center and consultation with the administration and public. The additional eight were held in selected affected settlements in the community centers and effort was made to invite and engage with affected stakeholders (mainly landowners).

No.	Public consultations with municipality administration	Public consultations with stakeholders in affected settlements	Date / number of participates (excluding NER or NER consultants)
1	Municipality Gevgelija		19.04.2022/ 7
2	Municipality Bogdantsi		19.04.2022/ 5
3	Municipality Demir Kapija		19.04.2022/ 4
4	Municipality Negotino		19.04.2022/ 5
5	-	Village Petrovo	04.05.2022/ 20
6	-	Demir Kapija town	11.05.2022/ 23
7	-	Negotino town	11.05.2022/ 17
8	-	Gevgelija town (village Gabrovo)	18.05.2022/ 15
9		Village Negortsi	04.05.2022 75
10		Village Mrzentsi	04.05.2022/ 30
11		Village Stojakovo	05.05.2022/ 20
12		Village Prdejtsi	05.05.2022/ 43

NER staff and resources were made available to the municipalities hosting the public consultation participated in order to ensure that representatives of both affected stakeholders take part. NER developed different project information tools that were used to disclose accurate information to stakeholders, such as maps, project information leaflet, grievance mechanism leaflet, presented in the Appendix to Supplementary Environmental and Social Assessment.

Affected stakeholders, landowners, land users, men and women from the affected municipalities, vulnerable groups as well as NGOs took part in the consultations. NER representatives in the consultations included specialists for design, environment, legal, so that a broad range of possible questions coming from the public could be addressed.

The used presentation techniques facilitated the viewing of the route of the project by pointing out some major aspects such as: the technical parameters of the project, the financing sources, land access, grievance mechanism, and construction technology, etc.

The key information transmitted during the consultations included the purpose of the project, advantages and local and national benefits, environmental and social impacts, mitigation measures, risks and opportunities. Minutes from meetings and list of attendance are available from meetings with focus groups, landowners, users and common public and are presented in the Appendix to Supplementary Environmental and Social Assessment.

Examples of most frequently asked questions during the consultations:

- ✓ "When will the construction of the interconnector start?"
- ✓ "Which are the characteristics of the pipeline and the route in the locality?"
- ✓ "Where are located the block stations (BSs) and when the settlement will be connected to the distribution lines in future?"
- ✓ "What benefits will the project bring to the landowners/producers?"
- ✓ "Will they be informed about project development?"
- ✓ "How will the land of each owner be affected?"
- ✓ "What level of compensations will be granted per lands and per crops?"
- ✓ "What happens to the local infrastructure especially the roads- will the infrastructure be improved?"
- ✓ "How they will be engaged during construction in order the level of impacts to soil and crops on their land plots to be minimized?"

Additionally, the municipalities and NER disclosed the information about the project with summary including technical information, developer, project contact persons for further questions, comments on their bulletin boards and web sites.

The web links are following:

Municipality of Gevgelija:

<https://www.gevgelija.gov.mk/images/PDF/eopstina/brosura.pdf>

Municipality of Demir Kapija:

<https://opstinademirkapija.gov.mk/oglasna-tabla/informaci%d1%98a-za-proektot-interkonektiven-gasovod-severna-makedoni%d1%98a-grci%d1%98a/>

Municipality of Bogdantsi:

<https://bogdanci.gov.mk/%d0%b8%d0%bd%d1%84%d0%be%d1%80%d0%bc%d0%b0%d1%86%d0%b8%d1%98%d0%b0-%d0%b7%d0%b0-%d0%bf%d1%80%d0%be%d0%b5%d0%ba%d1%82-%d0%b8%d0%bd%d1%82%d0%b5%d1%80%d0%ba%d0%be%d0%bd%d0%b5%d0%ba%d1%82%d0%b8%d0%b2/>

NER:

<https://mer.com.mk/mk-MK/News/Detail/1079>

13.2 Impact Assessment

Supplementary assessment was carried out based on the impact assessment methodology presented in section 2.2.

Potential negative impacts and mitigation measures were analysed with respect to the following aspects:

- Land use
- Livelihood
- Vulnerable Groups

Table 13-9 Social Impact Assessment

Aspect	Potential impact/risk	Magnitude	Sensitivity	Significance	Mitigation measures
Land use	Temporary difficulties for land owners/users/workers to access their land. (including animal grazing)	Low	Low	Low	A Stakeholder Engagement Plan (SEP) will be implemented to ensure regular consultation with communities and local authorities on the status of construction works, crossing areas over open trenches and special crossings for vehicles and animals. Grievance mechanism will be established and continuously monitored.
Land use	Decrease of soil quality and productivity due to improper restoration of the top soil during construction, and/or improper rehabilitation of disturbed land after due to soil contamination during construction.	Moderate	Medium	Moderate	Proper management of topsoil will be applied during, and adequate reinstatement at the end of construction, in accordance with Construction Management Plan, Reinstatement Plan (included in the ESMP). The Monitoring Plan for Reinstatement to require contractors to provide evidence of land owner acceptance of satisfactory reinstatement.
Land use	Decrease of property value due to the restrictions imposed by the project for land plots in affected areas	Moderate	Medium	Moderate	The SEP will describe appropriate engagement measures for regular consultations with landowners and land users. Compensation system will be in compliance with national legislation and EBRD requirements as outlined in the Livelihood Restoration Framework (LRF). Grievance mechanism will be established and continuously monitored.
Livelihood	Temporary/permanent loss of livelihood, income, land use rights for owners, users and workers due to land-take by the project	High	Moderate	Moderate or High	The SEP will describe appropriate engagement measures for regular consultations with landowners and land users. Compensation system will be in compliance with national legislation and EBRD requirements as outlined in the LRF. A Land Acquisition Plan (LAP) will be implemented to deal with land acquisition aspects. Compensation will be paid to land owners and users for the permanent loss of asset and income, including loss of structures (i.e. fences, irrigation systems). Grievance mechanism will be established and continuously monitored.
Livelihood	Reduced compensation due to lack of property transactions data in the area	Low	Low	Low	NER will make sure that the evaluation will be performed in compliance with national legislation and EBRD requirements as outlined in the LRF.
Vulnerable Groups	Temporary or permanent loss of livelihood as a result of land acquisition for persons depending on affected land	Moderate	Low	Low	Compensation system will be in compliance with national legislation and EBRD requirements as outlined in the LRF. Grievance mechanism will be established and continuously monitored.

Aspect	Potential impact/risk	Magnitude	Sensitivity	Significance	Mitigation measures
Vulnerable Groups	Increased risk, especially for children, to accidents caused by open trenches and construction equipment	High	Low	Moderate	SEP will be implemented to ensure communities are informed about the schedule of construction works. The SEP will describe de appropriate communication tools and the grievance mechanism. Health and Safety Plans to ensure appropriate construction safety measures including fences, clear signage and signalling. Grievance mechanism will be established and continuously monitored.
Vulnerable Groups	Limiting access for elderly people or disabled people	Moderate	Medium	Moderate	Good international construction practices will be implemented by the contractors to minimize inconveniences for elderly and disabled people. A grievance mechanism will be established as part of SEP and made available to all vulnerable groups.

13.3 Mitigation Measures and Monitoring

The following mitigation measures were identified in the supplementary assessment.

- SEP will be implemented to ensure regular consultation with communities and local authorities on the status of construction works, crossing areas over open trenches and special crossings for vehicles and animals.
- Grievance mechanism will be established and continuously monitored
- Compensation system will be in compliance with national legislation and EBRD requirements as outlined in the LRF.
- Community Health and Safety Plans to ensure appropriate construction safety measures against accidents, including fences, clear signage and signaling.
- Monitoring Plan for Reinstatement of topsoil to be implemented. MPR to require contractors to provide evidence of land owner acceptance of satisfactory reinstatement.

Key Performance Indicators: Key Performance indicators will be set for both environmental and social management of key issues. These will be discussed and set with contractors during the tender process and will be integral NER's monitoring of the contractor's environmental and social management performance.

13.4 Residual Impacts

With implementation of the proposed mitigation measures no significant residual impacts are expected from the project.

14 Supplementary Environmental and Social Management Plan

The Supplementary Environmental and Social Management Plan (ESMP) presented in Table 14-1 summarises the E&S impacts and mitigation measures identified in the supplementary ESIA.

The ESMP covers the following environmental media and areas for different phases of the project.

- Air
- Water
- Soil
- Waste
- Health, Safety and Security
- Biodiversity and nature conservation
- Cultural heritage
- Social

The project will create a number of specific management plans which will outline mitigation requirements that will be managed through the project E&S management system. The plans to be produced as part of the project E&S management system are listed below:

- Environmental & Social Management and Monitoring Plan
- Construction Environmental & Social Management Plan
- Operational Environmental & Social Management Plan
- Air Quality Management Plan
- Water Management Plan
- Water Crossing Management Plan
- Pollution Prevention Management Plan
- Waste Management Plan
- Hazardous Materials Management Plan
- Reinstatement Management Plan
- Biodiversity Management Plan
- Cultural Heritage Management Plan
- Stakeholder Engagement Plan
- Labour and Working Conditions Management Plan
- Emergency Response Management Plan
- Community Health and Safety Management Plan
- Traffic Management Plan
- Land Acquisition Plan

Table 14-1 Supplementary Environmental and Social Management and Monitoring Plan

Impact	Proposed Supplementary Mitigation Measures	Responsibility	Timing
Air			
Dust emissions	Vehicles will be washed prior to leaving a construction area to remove any dusty debris from the body and wheels	Construction contractor	During construction
Dust emissions	Vehicles carrying dirt or products from/to the building sites will be covered to reduce wind erosion	Construction contractor	During construction
Dust emissions	The speed of vehicles will be restricted, particularly during the dry season.	Construction contractor	During construction
Dust emissions	Access routes will be kept free of dusty materials or sprayed with grey water to keep the entire road surface wet	Construction contractor	During construction
Dust emissions	When necessary, the working area will be sprayed with water to prevent the formation of dust.	Construction contractor	During construction
Exhaust emissions	Proper maintenance of equipment.	Construction contractor	During construction
Exhaust emissions	Training of drivers and operators for careful driving/operation of equipment resulting with low emissions	Construction contractor	During construction
Water			
Water quality	For each crossing, a water Course Crossing Plan will be developed with standards for minimising sediment dispersion and impacts on water ecology, including riverbanks and riverine habitats	Construction contractor	Prior to construction
Water quality	Special precautions will be required for the containment and disposal of cuttings and bentonite fluid during HDD application.	Construction contractor	During construction
Water quality	Vehicles will be prevented from driving through waterways. To avoid this contact between equipment and surface water, portable bridges may be employed.	Construction contractor	During construction
Water quality	Maximum speed allowed for vehicles in the vicinity (100 m) of any surface water will be 20 km/h	Construction contractor	During construction
Water quality	All machinery will be inspected for leaks prior to being mobilised to cross watercourse	Construction contractor	During construction
Water quality	Access roads located near surface water, as well as the installation of suitable erosion and sediment control/drainage, will be paved or irrigated on a periodic basis	Construction contractor	During construction
Water quality	Excavated topsoil, subsoil stockpiled, and erosion control for topsoil/subsoil stockpiles will be irrigated on a periodic basis	Construction contractor/NER	During construction
Water quality	Dewatering released waters, if returned to streams or rivers, shall be discharged so as to minimise physical impacts on channel morphology, i.e. without turbulent flows and with sediment levels below receiving waters	Construction contractor	During construction

Impact	Proposed Supplementary Mitigation Measures	Responsibility	Timing
Water availability	Careful management and control of the groundwater table via monitoring holes will be conducted when dewatering is required to ensure the required water reduction level is met. The water will be discharged in accordance with all permissions and notices issued by proper authorities and landowners	Construction contractor	During construction
Water quality	Sandbags and settlement tanks or lagoons should be used to catch runoff from the operating corridor in order to minimise the suspended sediment load of the water before to its discharge into watercourses. Prior to release, the water may also be purified by passing it through a suitable membrane, such as a geotextile material. Filters, such as straw bales or 'sedimats' or silt fences, will be placed around dewatering sites to act as filters and trap any sediment that is released into the watercourse	Construction contractor	During construction
Water quality	All disturbed soil drainage features will be fully restored after construction. There will be no discharges without previous agreement and the authorities' consents and proper permitting procedure	Construction contractor	During construction
Water availability	In order to minimise the requirement for fresh water abstraction, water will be reused whenever possible. Prior to discharge, water will be analysed to ensure that its quality satisfies local and international standards for wastewater discharge. If necessary, local treatment (i.e. filtration) will be provided. There will be no discharges without previous agreement and the authorities' consents and clearances	Construction contractor	During construction
Water availability	Minimize water use as much as possible by training employees in personal water conservation and recycling techniques (such as not allowing water to flow when it is not in use, not discarding water but storing it for reuse when practical, etc.)	Construction contractor	During construction
Water availability and quality	Specific mitigation measures in construction camps will include bunding of all places where there is a risk of leaks or spills during plant and vehicle storage, repair, or refuelling, as well as storage areas for potentially polluting products. Bunded areas will be designed to contain at least 110% of the largest storage tank plus 10% of the aggregate volume of all storage tanks within the bunded area. Dangerous substances will be stored in impermeable bunded areas to protect groundwater from accidental spills.	Construction contractor	During construction
Soil			
Soil erosion	Soil stockpiles resulting from topsoil stripping will be around 1-2 m in height, depending on local soil characteristics, working strip width, and local coverage of the pipeline (i.e. required trench)	Construction contractor	During construction
Soil compaction	Temporary surface stabilising materials will be used in highly compaction sensitive soils to mitigate the compaction impact of heavy construction equipment (such as side booms with pipeline loads and line pipe delivery	Construction contractor	During construction

Impact	Proposed Supplementary Mitigation Measures	Responsibility	Timing
	trucks).		
Soil compaction	Deep ploughing (subsoil decompaction) will be undertaken on the construction zone and temporary construction facilities (such as pipe yards and construction camps) following project construction and during restoration	Construction contractor	During construction
Soil productivity	Management of topsoils and reinstalment of fertile layer material during backfilling	Construction contractor	During construction
Soil productivity	Soil restoration and land reclamation including seeding, hydroseeding and other soil revegetation	Construction contractor	During construction
Soil erosion	Appropriate compaction to avoid soil loss during earthworks	Construction contractor	During construction
Soil erosion	Site/location specific slope stabilisation engineered solutions	Construction contractor	During construction
Soil erosion	Trench erosion control for elevated incline sections	Construction contractor	During construction
Soil erosion	An appropriate procedure for the disposal of contaminated soil	Construction contractor	During construction
Soil erosion	Appropriate sediment and erosion controls at river crossings	Construction contractor	During construction
Soil erosion	Attenuation measures to minimise soil erosion through potential disturbance of sediments at river crossings	Construction contractor	During construction
Soil erosion	Site specific slope stabilisation solutions at river crossings	Construction contractor	During construction
Soil erosion	Trench erosion control for elevated incline sections at river crossings	Construction contractor	During construction
Soil erosion	An appropriate procedure for the disposal of contaminated soil	Construction contractor	During construction
Soil erosion	A monitoring program of soil conditions to include periodic checks for surface erosion (hilly areas, river crossings)	Construction contractor/NER	Construction and operation
Waste			
Generation of waste Storage of materials	Waste Management Plan to be implemented	Construction contractor	During construction
Generation of waste Storage of materials	Hazardous Materials Management and Spill Prevention Plan to be implemented	Construction contractor	During construction
Generation of waste Storage of materials	Hazardous and non-hazardous waste should be managed according national standards and good international practice	Construction contractor	During construction
Generation of waste Storage of materials	Classification of different waste types according to the National List of Waste	Construction contractor	During construction
Generation of waste Storage of materials	Separation of hazardous from non-hazardous waste streams	Construction contractor	During construction
Generation of waste Storage of materials	Full records of waste management to be kept for inspection	Construction contractor	During construction

Impact	Proposed Supplementary Mitigation Measures	Responsibility	Timing
Generation of waste Storage of materials	Identification of all chemicals and hazardous material and record quantities	Construction contractor	During construction
Storage of materials	Storage consideration to be minimum 300 meters from any sensitive receptors along Aol	Construction contractor	During construction
Generation of waste	All roads and hard standings will be kept clean to prevent build-up of oil and dirt that may be mobilized into a watercourse or drain	Construction contractor	During construction
Generation of waste Storage of materials	Spill kits to be located close to the construction sites for immediate cleaned up response	Construction contractor	During construction
Generation of waste Storage of materials	No refuelling, storage or maintenance of equipment within 300m of water bodies, designated areas or other sensitive resources.	Construction contractor	During construction
Generation of waste Storage of materials	Washout of the concrete trucks shall be performed at the concrete batching plant camp, where appropriate facilities will be provided	Construction contractor	During construction
Generation of waste Storage of materials	The proper handling and storage of lubricants, solvents will be organized as well proper usage of construction equipment	Construction contractor	During construction
Generation of waste Storage of materials	Vehicles and machinery will be subject to regular preventive maintenance to reduce leakages of lubricants, motor oil and fuel	Construction contractor	During construction
Generation of waste Storage of materials	Monitoring programs to be part WMP and HMSPP.	Construction contractor/NER	Construction and operation
Biodiversity			
Biodiversity CH/PBF	Develop Biodiversity Action Plan	NER	Prior to construction
IBA Areas	Implement designated action plan	Construction contractor	During construction
Ecological function	Implement designated action plan for water crossing	Construction contractor	During construction
Species	Implement designated action plan for species	Construction contractor	During construction
Critical habitats	Implement designated action plan to Net Gain	Construction contractor	During construction
PBF	Implement designated action plan to No Net Loss	Construction contractor	During construction
Biodiversity	Implement program for reforestation and reinstatement of vegetation cover	Construction contractor/NER	Construction and operation
Social			
Land use	Implement stakeholder engagement plan. Grievance mechanism will be continuously monitored.	NER/ construction contractor	Prior to construction
Land use	Proper management of topsoil removal and reinstatement.	Construction contractor	During construction

Impact	Proposed Supplementary Mitigation Measures	Responsibility	Timing
Land use	System in place for compensation of land owners and land users.	NER	Prior to construction
Livelihood	LRF/LAP developed and implemented.	NER	Prior to construction
Vulnerable groups	LRF/LAP developed and implemented. Grievance mechanism will be continuously monitored.	NER	Prior to construction
Vulnerable groups	SEP to be implemented to follow community health and safety. Support elderly and disabled people, and people with health issues. Grievance mechanism will be continuously monitored.	Construction contractor	During construction
Health, Safety and Security			
Community and occupational H&S	Confirmation of design compliance with EN1594 and other applicable standards	NER	Prior to tendering
Community and occupational H&S	Complete HAZOP and SIL studies	NER	Prior to tendering
Occupational H&S	Occupational Health & Safety Plan to be implemented	Construction contractor	During construction
Community and occupational H&S	Implement corporate H&S policy and set a corresponding budget for staff visiting construction sites.	NER	Prior to construction
Community H&S	Implement Community Health & Safety Plan	Construction contractor	During construction
Community and occupational H&S	Implement a Traffic Management Plan ensuring traffic safety	Construction contractor	During construction
Community and occupational H&S	Implement a Construction Security Management Plan	Construction contractor	During construction
Occupational H&S	Implement a Social Facilities and services plan for workers	Construction contractor	During construction
Community and occupational H&S	Ensure compliance with regulatory requirements related to handling of explosive materials and devices.	Construction contractor	During construction
Occupational H&S	Implement an Operational Phase OHS plan and procedures	NER	During operations
Community and occupational H&S	Implement an Emergency Preparedness and Response Plan	Construction contractor/NER	Construction and operations
Community and occupational H&S	Implement an Operations Security Management Plan	NER	During operations
Cultural Heritage – Archaeology			
Direct impact on tangible visual heritage	Mandatory archaeological supervision for the following route sections: <ul style="list-style-type: none"> from 10.5km to 11.5km from 19.5km to 20.0km from 48.0km to 53.0km 	Construction contractor	During construction

Impact	Proposed Supplementary Mitigation Measures	Responsibility	Timing
	<ul style="list-style-type: none"> from 58.0km to 61.0km 		
Direct impact on tangible and visual heritage	Mandatory archeological excavations on the area of Block Station BVS-I3, in the volume of 20% of the construction area, with obligatory excavations during the drilling archeological structures are discovered.	Construction contractor	During construction
Direct and indirect impact on tangible and visual heritage	The construction management plan to include supervision of cultural heritage by experts from archaeological background with relevant education and experience in cultural heritage conservation work in the area of Gevgelija, Demir Kapija and Negotino..	Construction contractor/NER	During construction

15 Addendums

(Separate files)

Addendum I. Supplementary Biodiversity Critical Habitat Assessment

Appendix to Addendum I: Biodiversity Action Plan

Addendum II. Supplementary Cultural Heritage Impact Assessment

Appendix to Addendum II: Impact Assessment for Archaeological sites
along the route

Appendix to Supplementary Environmental and Social Assessment
Photographs from Stakeholder Meetings