



Ecoline
International

NORTH MACEDONIA – REGIONAL GASIFICATION PROJECT

ENVIRONMENTAL AND SOCIAL ASSESSMENT, NON-TECHNICAL SUMMARY

September 2022

NORTH MACEDONIA – REGIONAL GASIFICATION PROJECT

ENVIRONMENTAL AND SOCIAL ASSESSMENT, NON-TECHNICAL SUMMARY

Prepared by:



**Ecoline
International**

**Ecoline International Ltd.
(Sofia, Bulgaria)**

Director: Dr. Maia Gachechiladze-Bozhesku

Mobile: +38095 11 00 727

E-mail:

mgachechiladze@ecoline-int.org



SE SOLUTIONS
Advancing Environmental Sustainability

SE Solutions (Pty) Ltd. (South Africa)

Director: Sean O'Beirne

Tel: +27 (0)12 643 0190

Mobile: +27 (0)82 903 9751

E-mail:

sobeirne@tiscali.co.za

Prepared for:

European Bank for Reconstruction and Development

© Ecoline International Ltd., 2022

All rights reserved.

Any use of the full text or any part thereof requires acknowledgement of document as a source.

DETAILS OF DOCUMENT PREPARATION AND ISSUE:

Version	Prepared by	Reviewed by	Authorised for issue	Issue Date	Description
1	Sean O'Beirne Maia Gachechiladze-Bozhesku Olga Demidova Kamila Sakipova Iuliia Marukha	Sean O'Beirne	Maia Gachechiladze-Bozhesku	2 September 2022	Draft version for the EBRD's review
2	Sean O'Beirne Maia Gachechiladze-Bozhesku Olga Demidova	Sean O'Beirne	Maia Gachechiladze-Bozhesku	11 September 2022	Final version for disclosure

LIST OF ABBREVIATIONS

E&S	Environmental and social
EBRD	European Bank for Reconstruction and Development
EIA	Environmental Impact Assessment
EIB	European Investment Bank
ESAP	Environmental and Social Action Plan
ESIA	Environmental and Social Impact Assessment
EU	European Union
HAZOPS	Hazards and Operability Study
IPA	Important Plant Area
JSC	Joint stock company
LRF	Livelihood Restoration Framework
MoEPP	Ministry of Environment and Physical Planning of North Macedonia
NER	National Energy Resources JSC
NTR	Non-Technical Summary
OHS	Occupational health and safety
SCADA	Supervisory Control and Data Acquisition System
SEP	Stakeholder Engagement Plan

TABLE OF CONTENTS

1	INTRODUCTION	4
2	PROJECT RATIONALE	6
3	PROJECT DESCRIPTION.....	6
3.1	Project Pipeline Sections and Background.....	6
3.2	Overview of Project Implementation.....	10
3.3	Consideration of Alternatives	12
3.4	Project Land Needs	13
4	SUMMARY OF THE ENVIRONMENTAL AND SOCIAL REVIEW OF NER'S CAPACITY AND PERFORMANCE	13
5	ENVIRONMENTAL AND SOCIAL BASELINE	14
5.1	Interconnector.....	14
5.2	Sveti-Nikole Veles Section	17
6	POTENTIAL E&S IMPACTS AND RISKS RELATED TO ROUTINE CONSTRUCTION AND OPERATIONS, MITIGATION AND RESIDUAL IMPACTS	20
7	EMERGENCY SCENARIOS AND ACCIDENTS	24
7.1	Construction Phase.....	24
7.2	Operations Phase	24
8	CUMULATIVE AND TRANSBOUNDARY IMPACTS.....	25
9	STAKEHOLDER ENGAGEMENT AND GRIEVANCE MECHANISM	26
10	E&S IMPACT AND RISK MANAGEMENT, MONITORING AND REPORTING.....	27
Annex 1.	Summary of Field Surveys	28

LIST OF TABLES AND FIGURES

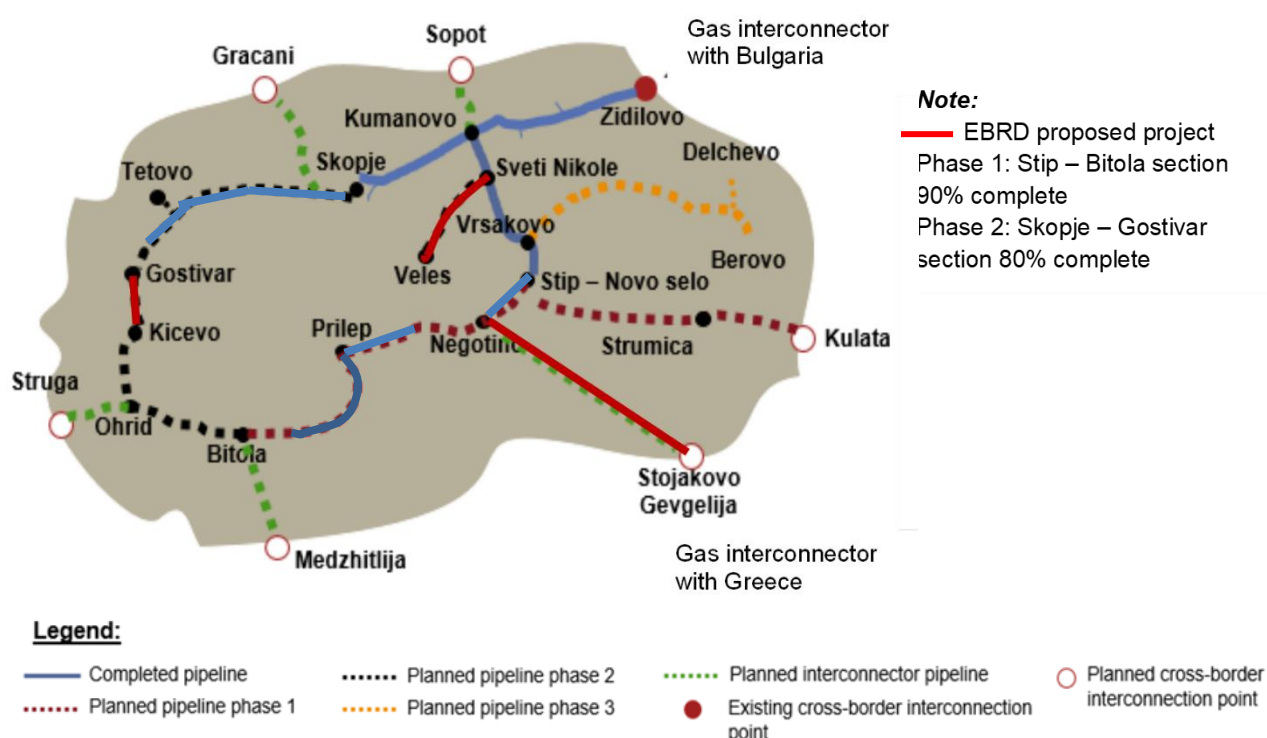
Table 1.	Construction Phase	21
Table 2.	Operational Phase	22
Table 3.	NER Contact Details for Raising Project-related Inquiries or Complaints.....	27
Figure 1.	Schematic Location of the Project Components, North Macedonia	4
Figure 2.	The North Macedonia Interconnector Route Map	7
Figure 3.	Location of the North Macedonian and Greek Sections of the Interconnector	7
Figure 4.	The Sveti Nikole-Veles Section Route Map	8
Figure 5.	Indicative Gostivar-Kicevo Section Route Map	10
Figure 6.	Schematic Illustration of the Pipeline Construction Process, with a Photograph on the Right-hand Side Showing Construction in Progress	11
Figure 7.	Schematic Diagram of a Typical Pipeline Construction Corridor (Example of the Sveti Nikole-Veles Section).....	12

1 INTRODUCTION

JSC National Energy Resources Skopje¹ (NER or “the Company”), the North Macedonian state-owned company responsible for the country’s gas transmission network, is planning to construct three underground gas pipeline sections (“the Project”) in North Macedonia (**Figure 1**):

- a 67-km North Macedonian section of the Greece-North Macedonia Interconnector,
- a 28-km Sveti Nikole-Veles Section, and
- a ca. 35-km Gostivar-Kicevo Section².

Financing for the Project is being sought from international financial institutions including the European Bank for Reconstruction and Development (EBRD) and the European Investment Bank (EIB - for the North Macedonian section of the Greece-North Macedonia Interconnector)) (together “the Lenders”).



Source: Adjusted from the National Strategy for Gasification of the Republic of Macedonia, Ministry of Economy, Republic of Macedonia. 2018³.

Figure 1. Schematic Location of the Project Components, North Macedonia

The Project is aligned with North Macedonia’s National Strategy for Energy Development⁴ (2019). The three pipeline sections are part of the country’s Gasification Plan, structured in three phases. Over the past four years, NER has been progressing Phase 1 gas transmission lines construction and recently embarked on Phase 2. The current Project is part of Phase 2 of the country’s gas network development plans.

¹ The Company’s website is <https://mer.com.mk/en-US/ForUs/ZaMer>.

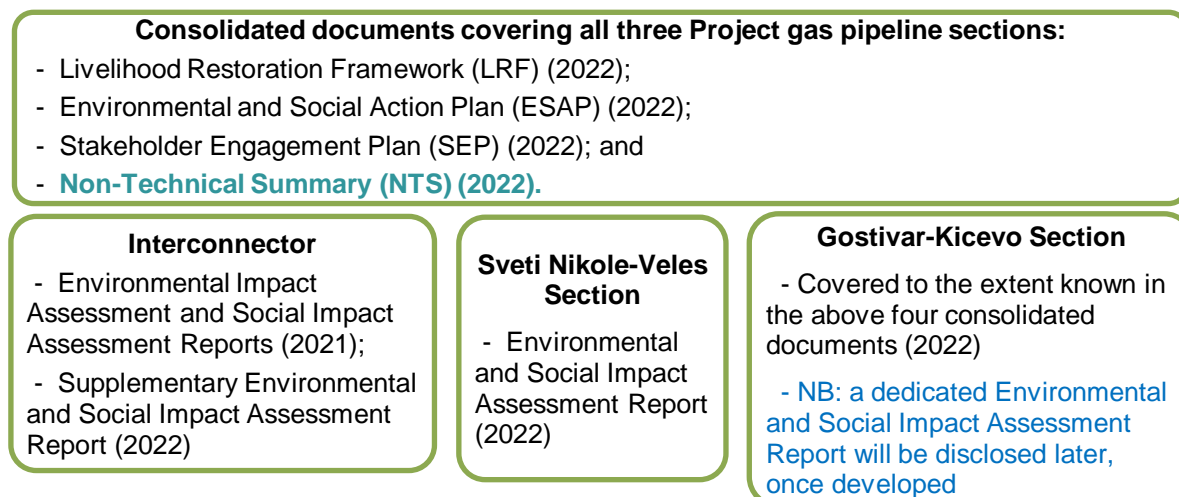
² As the route is being re-aligned, the length of the section might change.

³ https://www.energy-community.org/dam/jcr:436db091-3b1c-43c1-8dbb-66fcee79cfc/INFWS052018_FYRM.pdf

⁴ The Strategy for Energy Development of the Republic of North Macedonia until 2040. https://economy.gov.mk/Upload/Documents/Adopted%20Energy%20Development%20Strategy_EN.pdf

As the Project involves funding of greenfield gas pipeline sections, it has been assigned 'Category A' according to the EBRD Environmental and Social Policy (2019)⁵. This means that the Project is subject to an environmental and social impact assessment (ESIA) and a participatory disclosure and consultation process, including a 120-calendar-day disclosure of the Project's environmental and social (E&S) documents package.

Altogether, the following documents form the Project's E&S disclosure package:



As the three pipeline sections are in different development stages (see details in **Section 3**), their public disclosure per EBRD requirements and consideration for funding by the EBRD will occur in two stages:

- first, the E&S documents for the Interconnector and Sveti Nikole-Veles Sections (and the Gostivar-Kicevo Section at a high level, to the extent the section's details are known as of August 2022 in the consolidated documents) will be publicly disclosed for review by stakeholders in English and Macedonian, and
- second, the E&S documents for the Gostivar-Kicevo Section will be disclosed at a later stage, once developed. To reflect new information on the Gostivar-Kicevo Section, the consolidated documents will be updated and re-disclosed as well. These documents will also be made available in Albanian.

The EBRD will decide on financing for the Interconnector and Sveti Nikole-Veles Sections following the conclusion of the 120-day disclosure period. The Gostivar-Kicevo Section will be considered for financing by the EBRD only once its E&S documents have been prepared and disclosed for 120 days, at a later stage.

This document, the **Non-Technical Summary (NTS)**, has been produced by Ecoline International and SE Solutions (the E&S Consultant) as part of the ESIA package required by the EBRD requirements⁶. It provides an easy-to-understand summary of the information in the ESIA documents for the Project gas pipeline sections, for stakeholders and wider public understanding. The NTS is a simplified overview of the Project rationale, description, potential adverse E&S impacts/risks and mitigation proposed to avoid or reduce adverse impacts/risks and to enhance the benefits/positive impacts.

⁵ <https://www.ebrd.com/news/publications/policies/environmental-and-social-policy-esp.html>.

⁶ A separate SEP was prepared for the Interconnector in 2021 and disclosed on the EIB website. The 2021 SEP can be replaced by the current consolidated SEP covering all three Project sections.

2 PROJECT RATIONALE

North Macedonia has limited domestic energy sources and 63.7%⁷ dependency on energy imports. The country's power generation mix is largely outdated coal-fired generation (29.3%), oil (38.7%), and natural gas (10.8%). Renewables provide 13.5% of the country's electricity supply.

North Macedonia has only a single gas import route from Bulgaria and no other sources. To increase supply security, North Macedonia plans to develop other gas supply routes, diversify energy sources, switch to cleaner energy sources and develop gas transmission networks to improve the integration of the country's energy infrastructure⁸. The Project will be an important part of the country's gasification plans, with the interconnection with Greece being a vital component. The Project will:

- Facilitate improved regional air quality by diverting energy generation towards cleaner fuels in populated, industrial areas of the country;
- Enhance the living conditions, health and well-being of the country's population via stable cleaner energy access;
- Improve the country's energy efficiency by reducing heating energy loss; and
- Contribute to energy security through a more sustainable energy mix and by developing North Macedonia's gas infrastructure.

3 PROJECT DESCRIPTION

3.1 Project Pipeline Sections and Background

The **Project facilities** comprise underground pipelines of different diameter and surface facilities, such as block stations⁹, metering stations¹⁰, cleaning stations¹¹, pressure valves¹², cathodic protection units¹³, connections and other necessary structures for gas transportation. Additionally, the Project is likely to require temporary access roads to the construction sites, laydown and storage areas for construction materials and structures, and potentially a construction camp for the Interconnector.

The **North Macedonia Interconnector Section** starts near Idomeni village at the Greek border and goes to Negotino town (**Figure 2** and **Figure 3**). A 700 mm diameter pipeline with of around 67 km is planned. The Interconnector includes cleaning stations, a pressure valve, block stations, and cathodic protection. Alternatives were assessed to optimise the pipeline route during a Feasibility Study prepared by NER in January 2019.

The Greek section of the Interconnector is a 750 mm diameter, 55 km long underground high-pressure gas transmission pipeline running between Nea Messimvria in Greece and the border with North Macedonia (**Figure 3**). The section includes a border metering station, block valves and other facilities in Greece. The Greek section will not be financed by the EBRD.

⁷ State Statistical Office, Energy balances 2020: https://www.stat.gov.mk/pdf/2021/6.1.21.60_mk.pdf

⁸ The Strategy for Energy Development of the Republic of North Macedonia until 2040. https://economy.gov.mk/Upload/Documents/Adopted%20Energy%20Development%20Strategy_EN.pdf

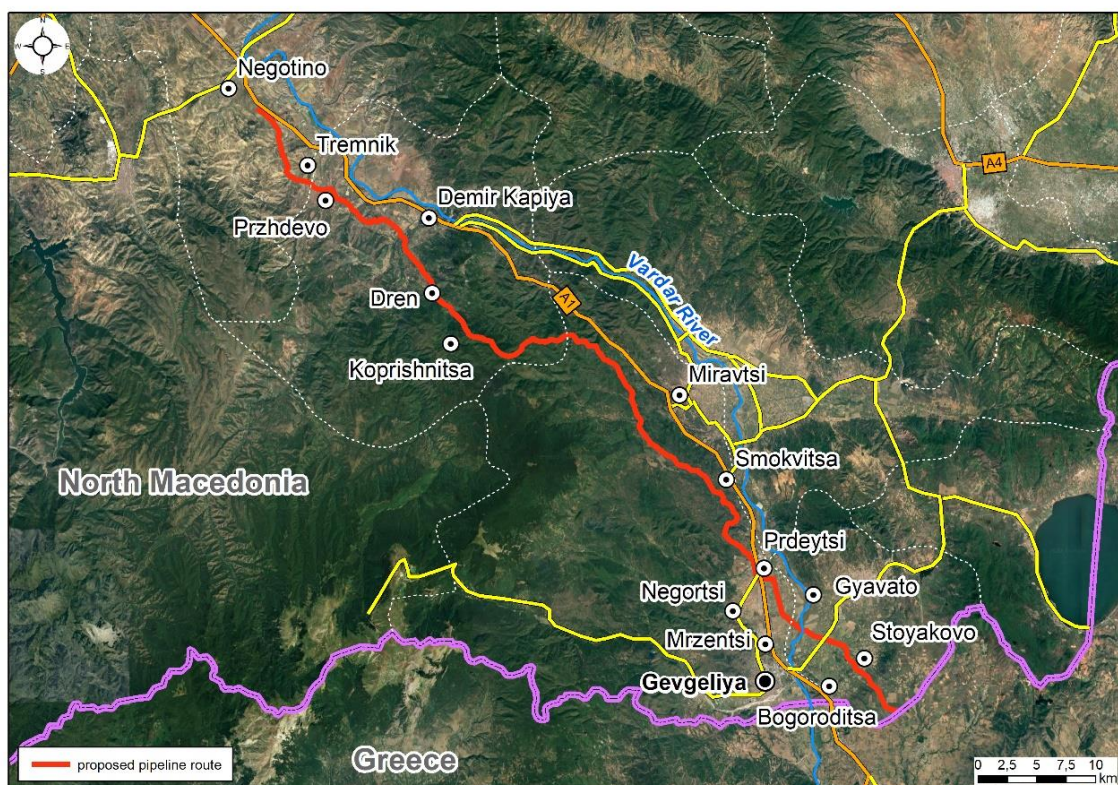
⁹ Block stations comprise block valves. Block valve is a part of a piping system that controls the flow; with block valves operators can isolate any segment of the line for maintenance work.

¹⁰ Metering station is a device used for a continuous and simultaneous analysis of the quantity and quality of natural gas being transported in a pipeline.

¹¹ Cleaning station is an element allowing for an effective way of cleaning the pipe without interrupting the gas flow.

¹² Pressure valves are devices that regulate pressure of gas in the pipelines to the required values.

¹³ Cathodic protection units are installations that use a low electrical current to prevent corrosion of metal pipelines. Corrosion is a natural process during which materials (usually metals) are gradually destructed by chemical or electrochemical reaction with their environment.



Source: Ecoline International based on NER's information.

Figure 2. The North Macedonia Interconnector Route Map



Source: Adjusted from the National Strategy for Gasification of the Republic of Macedonia, Ministry of Economy, Republic of Macedonia. 2018¹⁴.

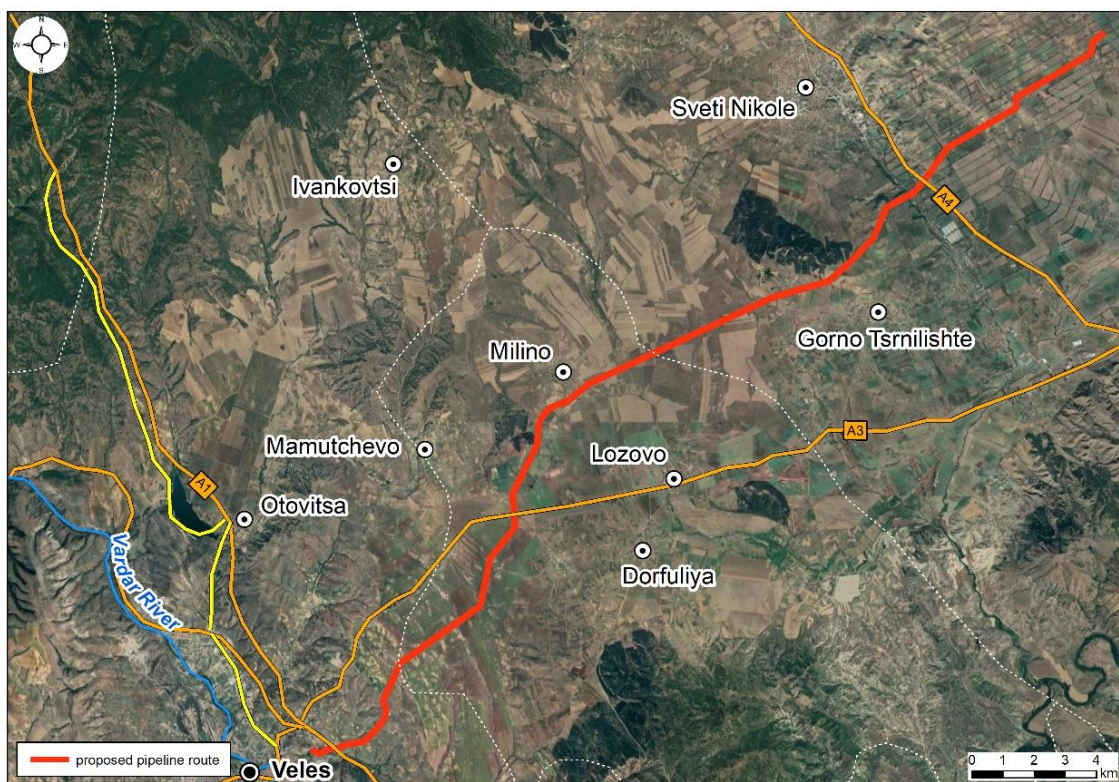
Figure 3. Location of the North Macedonian and Greek Sections of the Interconnector

¹⁴ https://www.energy-community.org/dam/jcr:436db091-3b1c-43c1-8dbb-66fcee79cfc/INFWS052018_FYRM.pdf

National Environmental Impact Assessment (EIA) procedures have been completed separately for the North Macedonia and Greek sections of the Interconnector in accordance with the national legislation of each country, and European Union (EU) requirements. NER commissioned Mott MacDonald and Connecta Consortium to complete an EIA compliant with EIB requirements using the 'Technical Assistance to connectivity in the Western Balkans EuropeAid / 137850/IH/SER/MULTI'. The Ministry of Environment and Physical Planning of North Macedonia (MoEPP) reviewed the Interconnector EIA and issued an environmental approval (decision) in January 2021.

The EIB approved partial funding for the Interconnector and disclosed the E&S documents on their website. When the EBRD was subsequently approached for co-funding, the bank commissioned an independent consultant (ESAS) to review E&S documents against the 2019 EBRD requirements and identify compliance gaps. Multiple gaps were identified and so a Supplementary ESIA was prepared by NER to address the gaps (see the disclosure package in [Section 1](#)). Gaps still not addressed in the Supplementary ESIA have been included in the Project ESAP, for the Project to achieve full compliance with EBRD requirements.

The Sveti Nikole-Veles Section (Figure 4) will be a 28 km long main gas pipeline with a 200 mm diameter. A block station will be constructed about 6 km east of Sveti Nikole to connect the new line to the existing gas pipeline in Sveti Nikole and the alignment will start at the block station. The pipeline will route south-east to end close to Veles town with another block station. A 386 m connection towards Sveti Nikole, two cleaning stations, two metering stations, cathodic protection and other necessary facilities are also planned. The section will supply gas to the central industrial region which still heavily relies on petroleum products that seriously degrade air quality.



Source: Ecoline International based on NER's information.

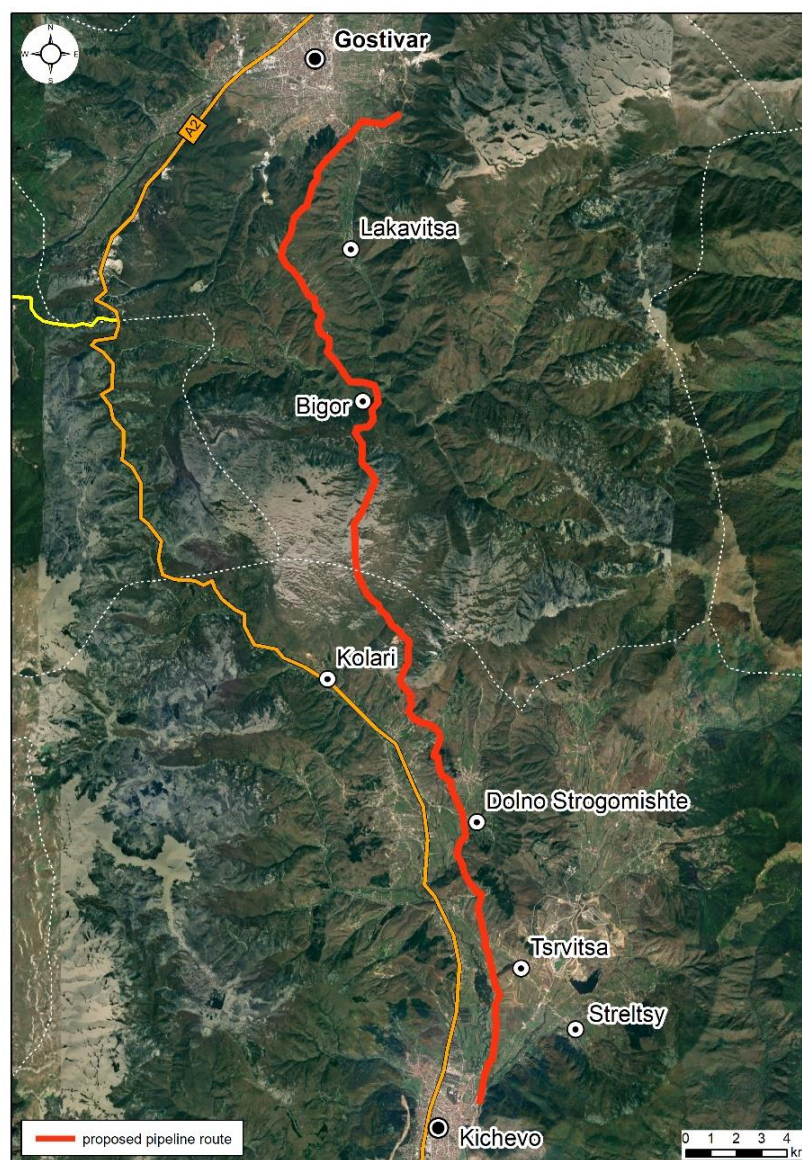
Figure 4. The Sveti Nikole-Veles Section Route Map

An Environmental Impact Study (Elaborate¹⁵) was prepared for this section in 2021 and submitted to the MoEPP, which approved it the same year. NER commissioned Civil Engineering Institute “MACEDONIA” J.S.C to prepare a draft ESIA in line with the EBRD’s requirements, using the feasibility study and detailed design. The ESIA was reviewed by the EBRD and the E&S Consultant, from which emerged specific actions in the Project ESAP to fully comply with EBRD requirements. In parallel the ESIA report was re-written and updated for inclusion in the EBRD disclosure package. The technical design documents are currently being finalised and NER expects the infrastructure project and construction approvals from the Ministry of Transport and Communication in late 2022.

The Gostivar-Kicevo Section (Figure 5) will be about 35 km long, with a 500 mm diameter gas pipeline. Surface structures include four block stations and two connections to existing gas pipelines. This pipeline will supply gas to the residential, commercial and industrial sectors in the Municipality of Kicevo currently relying on solid, predominantly coal- and petroleum-based fuels. The Gostivar-Kicevo section is an important backbone gas supply to the south-west of the country (cities of Ohrid, Struga, and Resen), completing the ring with Bitola and a planned interconnection with Albania. The pipeline section will connect to the Skopje-Tetovo-Gostivar line where construction is 80% complete.

The Gostivar-Kicevo Section was designed in 2010 as part of a larger project – Lot 5. Skopje-Tetovo-Gostivar-Kicevo (Figure 1). The national EIA for this section, as part of the larger scheme, was completed in 2011, so the environmental and construction approvals are now outdated. The EBRD accordingly commissioned a review of the E&S documents by an independent consultant (RINA). Compliance gaps identified in the review were used to compile ESIA Terms of Reference for NER to conduct. E&S actions for the pipeline have also been incorporated in the Project ESAP. Some 40-50% of the Gostivar-Kicevo Section is currently being re-designed by NER to avoid physical relocation of people in the southern part of the alignment and sensitive biodiversity in the northern part.

¹⁵ This is the so-called “environmental impact assessment elaborate” prepared as per Article 24 of the Law on Environment (<http://extwprlegs1.fao.org/docs/pdf/mac105107.pdf>). The national EIA and the ‘environmental elaborate’ are separate processes: an elaborate is to be prepared for the activities for which EIA is not required.



Source: Ecoline International based on NER's information.

Figure 5. Indicative Gostivar-Kicevo Section Route Map

The three proposed pipelines will cross aboveground infrastructure (motor roads, railway lines, overhead transmission lines, and irrigation systems), underground infrastructure (underground electric cables, existing oil/gas pipelines, telecommunication cables, water supply/sewage pipes) and water bodies (rivers, streams, canals). Construction of the Interconnector and Sveti Nikole-Veles Sections is scheduled to start in early 2023. Construction of the Gostivar-Kicevo Section is tentatively planned for mid-2023. Construction is expected to require two years for each pipeline section.

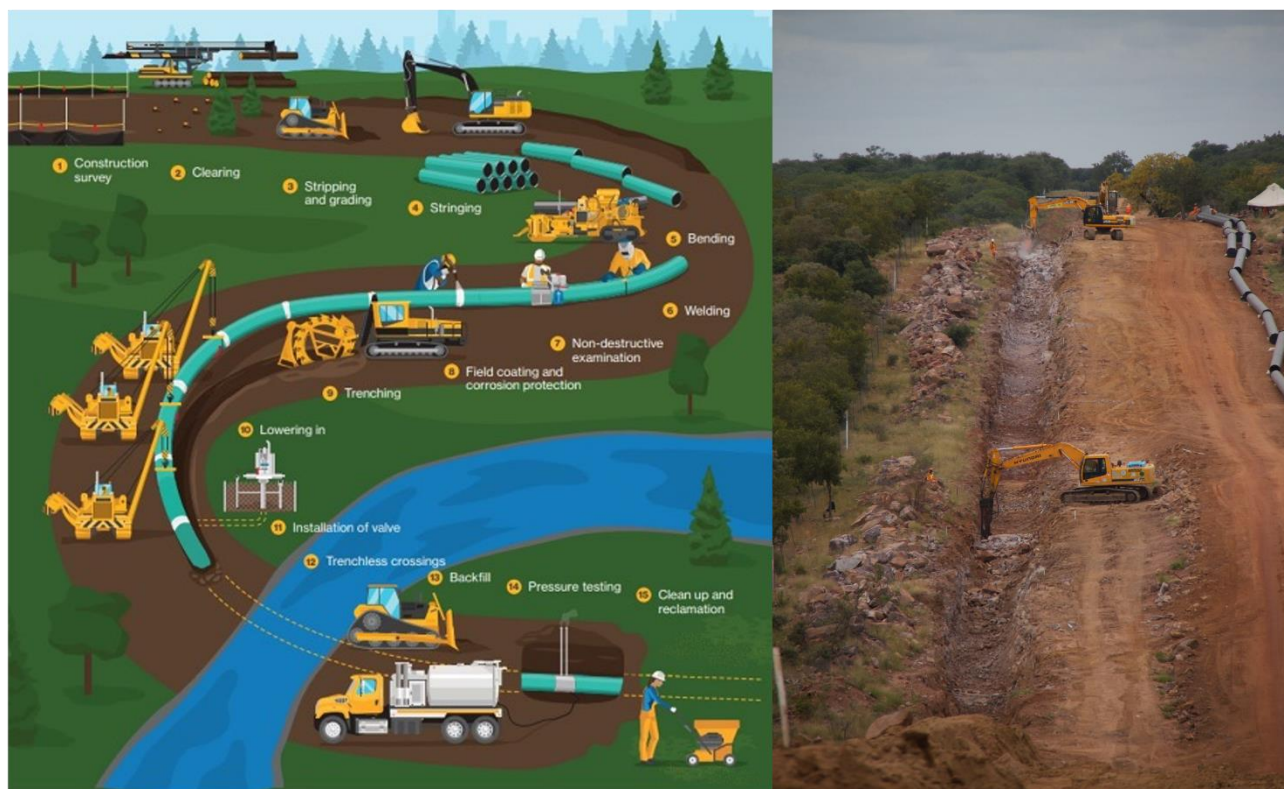
3.2 Overview of Project Implementation

3.2.1 Construction Works

The construction of the pipeline occurs sequentially as follows (**Figure 6**):

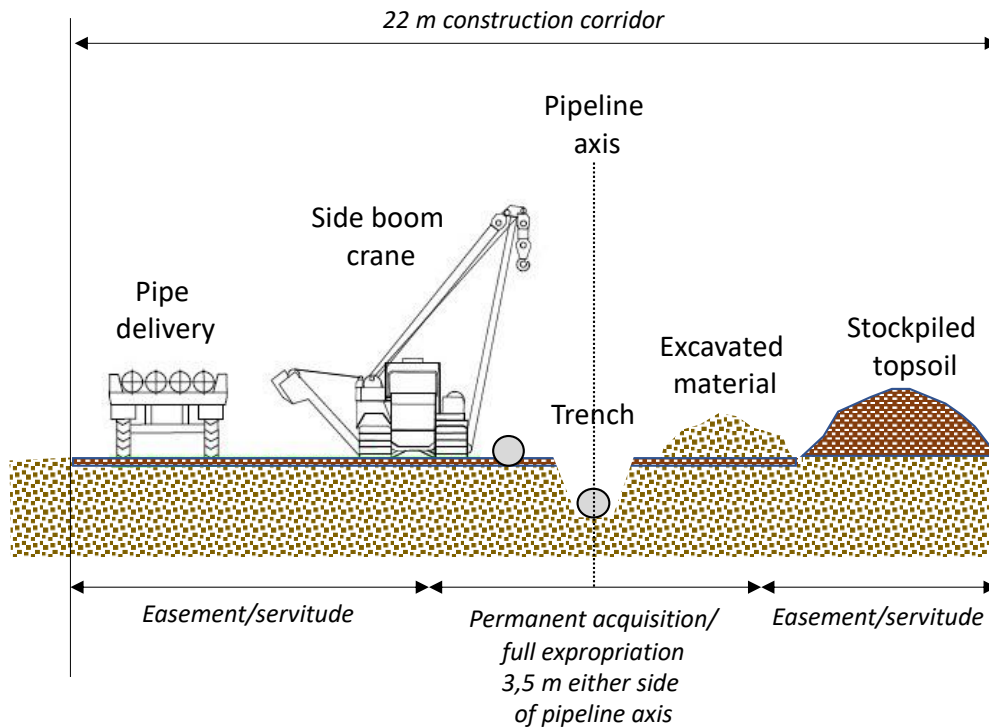
1. Pre-construction surveys are conducted ahead of the pipeline viz. following the direction of the pipeline.
2. Tree and bushes are then cleared within the construction corridor to ensure that there are no roots that could affect the pipeline.
3. All vegetation is stripped and the surface is graded

4. Sections of pipe are delivered and laid out informally in the pattern in which they will ultimately be placed in the trench. This is called pipe stringing.
5. The pipes are then bent using a pipe bending machine to follow the designed alignment
6. The pipes are then welded together using electrical arc welding.
7. Each weld is visually inspected to ensure its integrity.
8. Corrosion protection and insulation is applied to the pipeline.
9. A trench is excavated for the pipeline.
10. The entire section of the pipeline is then lifted using side boom cranes and place it into the construction trench
11. Valves for controlling the flow of the gas and managing pressure are installed in the pipeline.
12. Excavated material is placed back in the trench to bed the pipeline and ensure that it does not move in a manner that might damage it.
13. The pipeline is then pressure tested, normally using water.
14. All construction material and machinery are then removed from the construction corridor (**Figure 7**) and the topsoil layer reinstated across the entire construction footprint.
15. Finally, a vegetation layer is established to stabilise the topsoil and to re-establish the vegetation that was there prior to construction.



Source: Civil Engineering Institute "Macedonia" J.S.C Skopje (left) and SE Solutions own photo (right)

Figure 6. Schematic Illustration of the Pipeline Construction Process, with a Photograph on the Right-hand Side Showing Construction in Progress



Source: Ecoline International based on NER's information

Figure 7. Schematic Diagram of a Typical Pipeline Construction Corridor (Example of the Sveti Nikole-Veles Section)

3.2.2 Operations and Monitoring

Operation of the pipeline is fundamentally a process of transmitting gas through the pipeline to distribution networks where it is made available to consumers. It is also necessary to carefully manage the gas pressure within the pipeline. The pipeline is maintained to reduce the risk of leaks through frequent inspections and using intelligent pigs to both clean and inspect the pipeline from the inside. Pipeline operations are monitored and controlled from a central location through a supervisory control and data acquisition system (SCADA). Operational parameters such as flow rate pressure and temperature can be monitored and valves opened or closed as required, using the SCADA system.

3.2.3 Decommissioning

Three options exist for decommissioning, namely: suspension whereby the pipeline is isolated from the broader system and blinded at both ends, abandonment in place whereby the pipes are purged and cleaned and allowed simply to decay where they are, and finally removal, whereby underground structures are excavated. The last option is the least likely of the three.

3.3 Consideration of Alternatives

The most important pipeline alternatives are in routing to avoid built up areas, physical barriers and natural features that might pose a risk to pipeline integrity or are sensitive environments. Criteria for pipeline routing and site selection (for above-ground support facilities) have included restrictions from national and local authorities; avoidance of residential areas; shortest overall distance; safety distances from other infrastructure; avoiding protected areas and cultural heritage sites; land price; access, avoiding steep and large side slopes; avoiding watercourses, regional roads, motor ways, railroads, seismically risky areas, other large pipelines and overhead power lines. Also, use of state-owned land was preferred to minimise land acquisition from private land-owners/leasers.

The Interconnector: Specific route modifications for the Interconnector include avoiding houses near Rudina and in Prdeitsi and Przdevo villages, archaeological sites at km15+500,

28+00 and 55+000, an Important Bird Area Demir Kapiia and recreational and bike trails, fishponds and a campsite Akvatika.

The Sveti-Nikole Veles Section: Specific route modifications for the Sveti-Nikole Veles pipeline include avoiding the Nature Park "Gjuzumliska River", a typha reedbed and key biodiversity areas namely Taorska Klisura and Babuna-Topolka-lower Bregalnica.

3.4 Project Land Needs

Land is need for pipeline, supporting surface facilities (block stations, metering stations, cleaning stations etc.) and temporary construction-phase facilities including access roads to the construction sites (see [Section 3.1](#)). Construction will occur within a 22 m and 25 m wide so-called *construction corridor* for the Sveti Nikole-Veles Section and the Interconnector and Gostivar-Kicevo Sections respectively. The construction corridor includes a proposed *operations and maintenance corridor*, 3.5 m on either side of the pipeline axis. Land within this 7m corridor will be permanently acquired (full expropriation); land ownership rights for the corridor will be obtained by the Republic of North Macedonia and transferred to NER. A temporary right of easement will be established for remaining part of the construction corridor.

For **the Interconnector**, 1,094 land plots (495,092 m²) and 1,911 plots (1,168,671 m²) must be obtained permanently and temporarily, respectively. About 75% of the land needed permanently and about 80% of the land needed temporarily, is state-owned.

The Sveti Nikole-Veles Section requires 381 land plots (208,850 m²) permanently and 451 plots (413,670 m²) temporarily. The state owns about 71% of the land needed permanently and about 70% of that needed temporarily.

As the **Gostivar-Kicevo Section's** route is being re-aligned, there are currently only approximate land take estimates available. Tentatively, about 250,000 m² will be permanently acquired for the pipeline and appurtenant technical structures, and about 630,000 m² acquired temporarily. Some 50-60% of the needed land are supposed to be state-owned.

4 **SUMMARY OF THE ENVIRONMENTAL AND SOCIAL REVIEW OF NER'S CAPACITY AND PERFORMANCE**

A review of the E&S processes and management practices at NER was completed against the applicable E&S requirements of the North Macedonia, EBRD, and EU in mid-2022¹⁶. This review also built on the earlier E&S due diligence processes commissioned by the EBRD in 2021 (ESAS) and 2020 (RINA) for different elements of the Project.

The Company's performance was found to be in line with the requirements of the national legislation, with the only organisational non-compliance being related to the absence of an occupational health and safety (OHS) officer within NER.

Partial compliance and non-compliance was identified with regards to some EBRD requirements calling for corrective actions, for instance: i) an existing informal practice for raising grievances and concerns should be formalised and communicated to NER staff and its contractors, ii) an overarching Human Resource Policy will need to be developed that would apply to NER's contractors as well, iii) NER will need to prepare and implement a change management procedure, iv) both, Construction Contractors and Supervision Contractors to be engaged by NER via tenders should have dedicated E&S and OHS managers to implement and supervise the recommended E&S and OHS measures.

¹⁶ The E&S management capacity of JSC Ga-Ma, a gas transmission company, with which NER will be merged in late 2022, was not covered (<https://www.gama.com.mk/Default.aspx?id=1f2c26c4-2c78-4476-8c09-62ff9a6edad3>).

Further, NER structure and capacity was found to be in need of significant enhancement to meet the EBRD's E&S requirements. The establishment of an effective E&S management system, including relevant plans and procedures, as well as appointing and training key E&S, OHS and stakeholder engagement personnel, is fundamental to NER's E&S management capacity. Similarly important is that NER ensures that the Company level requirements are understood and fed into the relevant contractor management plans that will need to be monitored during the entire construction phase, and that a change management procedure is developed and implemented.

NER will also need to enhance its stakeholder engagement practices, to build stakeholder engagement capacity, and to upgrade the existing grievance mechanism to the EBRD requirements.

Detailed recommendations to address the identified issues of partial- and non-compliance are in the Project's ESAP. NER is aware of the gaps and is committed to implementing the ESAP. The ESAP will be annexed to the loan agreement between the Company and EBRD and is mandatory.

5 ENVIRONMENTAL AND SOCIAL BASELINE

This section presents the baseline information for the Interconnector and Sveti-Nikole Veles Sections only, as the Gostivar-Kicevo Section is being currently re-aligned. A summary of the field surveys undertaken to gather E&S baseline information required to inform the E&S assessments for the Interconnector and Sveti-Nikole Veles is provided in [Annex 1](#).

5.1 Interconnector

5.1.1 Climate

The area traversed by the gas pipeline experiences a Mediterranean and continental climate with hot summers and cool winters and an average annual temperature of 14.2°C. Average annual precipitation is from 660 to 745.2 mm with autumn the wettest season and summer the driest. Predominant winds are cold, continental northerly and warm, maritime southerly.

5.1.2 Relief

The gas pipeline starts on the Greek border (120 m), through predominantly agricultural land, climbs through slightly hilly terrain (135 m) after which it descends to the Vardar River (50 m). The pipeline then passes through the flat terrain of the Gevgelija Valley where, after crossing the Kovanska River it climbs to cross the Petrushka and Stara Reka (270 m) and more mountainous terrain to 700 m. The pipeline then heads to the peak Studena Glava (900 m) before descending to the Demir Kapija Valley (120 m) climbing again to Golemo Brdo (300 m) before ending with a connection to the existing gas pipeline (220 m).

5.1.3 Geology

The route crosses an initial area composed of proluvial diluvial forms, then alluvial and diluvial deposits mixed with gravel, where high groundwater levels are possible, requiring measures to prevent the pipeline from floating. From km 15+000 to km 50+000 the route is mostly located in mountainous terrain where diabbases and spilites are predominant. From km 50+000 to km 53+000 the route crosses landscape of alluvial and proluvial formations of colluvial sediments, large blocks, pebbles and gravel and then gravel-sandy loam soil, fine-grained grey sandstones, and multi-coloured clays. From km 63+000 to route end is flat terrain of diluvial formations composed of sharp-edged pieces of basic rocks, mixed with sandy-clay materials, and a thick humus layer. The region through which the pipeline will pass has high seismic risk.

5.1.4 Hydrology

The interconnector will be established in the Vardar River basin, the largest in North Macedonia. There are multiple tributaries, reservoirs and springs. Groundwater occurs mainly

in the valleys and is important due to its good quality but potential yields are not well understood. Although the Vardar is perennial, the flows in its tributaries are variable and often stop in summer. Most of the water is used for agriculture. There is a high organic load in the Vardar, and the river Luda Mara, which flows into the Vardar is highly polluted. Campaign water quality measurements in the area in which the pipeline will be built, indicate water of second and third class.

5.1.5 Air quality

No baseline air quality monitoring is conducted in the area through which the interconnector will pass. Campaign measurements of PM₁₀ at 11 sites along the pipeline route indicate elevated concentrations but not exceeding the 50 µg/m³ standard.

5.1.6 Noise

There is no routine noise monitoring and so noise was monitored at 11 sites along the proposed route. The noise measurements all complied with the limit values.

5.1.7 Soil

There are various soil types along the proposed pipeline route supporting different land use. Soil samples from 10 sampling points were not found to be contaminated when compared with the Dutch Soil Decree limit values.

5.1.8 Waste management

Each of the five municipalities that will be traversed by the interconnector have some form of waste collection services and landfills for the waste. Waste collection is better formalised and more effective in the urban areas and far less effective in the rural areas where waste is often disposed on illegal landfills. Waste segregation is limited.

5.1.9 Biodiversity

A significant part of the area in which the pipeline will be built area is modified and/or agriculturally abandoned or otherwise cultivated and/or urbanized. The pipeline will cross five broad habitat types namely fields and farmlands, kermes oak pseudomaquis, plane-tree zones along streams, well-developed oak- hornbeam forest, plane-tree and willow-covered zones along streams, alder community along the Bosava River and degraded oak forests and hilly pastures with sparse shrubs. One proposed protected area and three Important Bird Areas will be directly affected by the pipeline and there is one critical habitat namely alder, plane-tree and willow-covered riparian zones.

5.1.10 Demography and ethnicity

The Interconnection will pass through four municipalities of North Macedonia: Gevgelija and Bogdanci in the South-East Statistical Region, and Negotino and Demir Kapija in the Vardar Statistical Region. The municipalities host four urban centres and 56 settlements, of these the land of one town and ten rural will be crossed.

The population of the four municipalities has been slightly decreasing during the last ten year and is about 50,900 inhabitants as per the 2021 Population Census. The population density varies from 12 people/km² (Demir Kapija Municipality) to 64 people/km² (Bogdanci Municipality). Gender structure of the population is almost balanced.

About 80-90% of the population in the municipalities declare themselves Macedonians; other residents self-identify themselves as Turkish, Serbian, Albanian, and others. Roma population is present in the villages of Tremnik, Przdeto and Stojakovo.

5.1.11 Economy

Agriculture is an important source of income for the population in each municipality. In addition, viticulture and winemaking are an important business activity in Negotino and Demir Kapija Municipalities. Whereas manufacturing is more developed in Gevgelija and Bogdanci

Municipalities. It includes textile, milk processing, and canning plant. Among four municipalities, Gevgelija and Negotino have the highest number of registered enterprises in different sectors.

5.1.12 Unemployment, poverty, and vulnerable groups

The unemployment rate in Vardar Statistical Region was reported at 11.1% in 2020 (down by 4.8% compared to 2018); whereas the level of unemployment in Southeast Statistical Region was reported at 4.3% in 2020 (down by 6.6% compared to 2018). The unemployment rate in the urban areas is reportedly higher than in the rural areas for both regions. Vulnerable groups in the Project-affected municipalities include elderly, single parent families, household members with disabilities or chronic diseases, orphans, and Roma ethnic group.

5.1.13 Infrastructure

Water. Households in the settlements are supplied with drinking water in the urban and rural areas, however there are known problems with the supply – mainly, high average per capita consumption and water losses in the water supply system. The situation with the wastewater treatment is unsatisfactory. The settlements discharge it directly in the surface waters and agricultural land without prior treatment. An exception is the treatment plant in Gevgelija. There are septic tanks used in some rural areas, however their capacity is limited.

Waste is disposed on the local municipal landfills, which do not meet sanitary standards for safe waste disposal, i.e., lack protective bottom layer for soil and underground water protection. There are illegal landfills present in the municipalities.

Power. There are no hydropower capacities in the regions. There is a thermal power plant and Dubrovo substation for electricity transmission to/from Greece, both located in Negotino. In the surroundings there are many transmission lines, including a 400 kV Dubrovo-Stip overhead power line.

Transport. The national motorways A1 and A4 are passing through the municipalities, both in relatively good conditions. The A1 motorway (North-South) is the main national transit corridor, the traffic volumes are constantly increasing. The length of the local road network is shorter compared to the other regions. The pipeline will cross the railway line Skopje-Veles-Gevgelija-state border.

Healthcare. The country is divided into 'health regions'. Gevgelija Health Region includes Demir Kapija, while Negotino Health Region includes Bogdanci. Negotino Health Region is experiencing more load, with higher number of residents per doctor, less specialists and general practice doctors as compared to Gevgelija Health Region. The social survey conducted in the rural areas along the planned Interconnector showed that neither health facilities, nor doctors are available in some villages in the middle part of the planned route.

Educational. There are primary and high schools in each municipality, the majority of them are located in the urban centres. Some high schools offer various specialization – technical, medical, textile, hospitality etc.

5.1.14 Land use and livelihoods

The primary use of land in the territories crossed by the proposed pipeline is for agricultural activities. There are cereals fields, vegetable gardens, orchards, and vineyards. The livelihoods of the population vary and depend on the climate and available resources. At the beginning of the pipeline route the villages are located in the valley, thus the area is suitable for cultivation of agricultural products. The landscape in the middle part of the pipeline route is hilly, the villages are small, and population is engaged in livestock breeding and viticulture. The villages towards the end of the route have wheat, barley, corn fields, and vineyards. There are agricultural and automobile electronics factories in the area. In the rural areas, population is typically has income from two sources – from agricultural activities (and states that this income is low) and from employment in non-agricultural activities, including in public or service sectors locally or in the nearby towns.

5.1.15 Tourism and recreation

Gevgelija Municipality is known for favourable climate, presence of thermal waters, mountain landscape and proximity to the border with Greece. Negotino Municipality is famous for its vine production, the second largest winery in North Macedonia is located here. Thus, the tourism and hospitality sector has a potential for further development in the region.

5.1.16 Gender issues and themes of concern to women

In the rural areas, women and men work on farms. Whereas women in agriculture work on average 11.06 hours per day, 41.7% of that is unpaid. UN Women-supported research showed that only 12% of women in rural areas are landowners and less than 10% have decision-making roles related to land. The COVID-19 health crisis increased women's workload and access to health services and other support is challenging.

Gender issues and themes of concern to women revealed during the E&S assessments include limited access to information from social institutions, absence of kindergartens, lack of care facilities and public transport options for people with disabilities. These conditions further increase women's role in family care, and at the same time limit their opportunities for professional development. Access to public and medical infrastructure in rural areas is often limited. Cases of domestic violence in the municipalities most often are not reported.

5.1.17 Cultural heritage

There are more than 250 registered and recorded archaeological sites in the municipalities of Gevgelija, Bogdantsi, Negotino and Demir Kapija; 21 sites are located near the proposed pipeline route. An assessment found no direct physical impact on any recorded cultural monument along the entire route, however there is a potential that 13 site might extent underground to the construction corridor of the Interconnector.

The intangible cultural heritage of the villages in the region is of local community importance.

5.2 Sveti-Nikole Veles Section

5.2.1 Climate

Climate and relief dictate a continental – sub-Mediterranean climate up to 600 m above sea level. During summer, when anticyclonic conditions occur, there are long periods without precipitation, with high temperatures and dry winds. Mean annual air temperature ranges from 12.8°C to 13.6°C. Precipitation is generally light between 428.1 mm to 561.3 mm per year, with most occurring in the winter. Along the Vardar River valley the predominant winds are northerly and southerly throughout the year.

5.2.2 Relief

The Ovche Pole Valley has a specific morphological structure limited on all sides by ridges and sloping hills, which form a pronounced natural border with an area of 670 km². In Ovche Pole there are three separate geographical areas, alluvial plains with an average height of about 260 m, hilly areas called “bairi” and the edges of the valley or “mountains”. Most of the municipal areas of Sveti Nikole and Lozovo are between 250 to 320 m above sea level. Veles is in a large valley and surrounded by mountains and hills of different altitudes (from about 300 m to 675 m).

5.2.3 Geology

The gas pipeline will occur in terrain almost entirely being a sedimentary rock of Quaternary, Pliocene and Eocene ages, and to a lesser extent firmly bound rocks (marbles) which are closer to Veles. Hydrogeologically, the area has impermeable to poorly permeable sedimentary rocks with aquifers at depths greater than 60 m. The pipeline will be built in areas of incoherent rocks with low water permeability (deluvial, proluvial-sand silt, silty sand and gravel etc.) and material soil pollution is not considered likely. This part of North Macedonia has relatively low seismicity.

5.2.4 Hydrology

The region is sub-arid with weakly expressed hydrology. The main permanent watercourses are the Svetinikolska and Gjuzumliska Rivers, which have a very limited water flow, with the latter often drying up in summer. In the Ovche Pole Valley, weak springs are common and found in many villages and surroundings. Veles is in the Vardar River watershed. The Vardar has an annual average flow of 83.1 m³/s.

5.2.5 Ambient air quality

Air pollution in the Republic of North Macedonia is a concern because the limit concentrations set to protect human health, especially those for particulate matter, are greatly exceeded most frequently in the winter months. The most significant sources of PM are heating of homes and offices, using biomass (mostly wood) as fuel.

5.2.6 Noise

Environmental noise is primarily from industry and transport but there is no routine noise monitoring. Limited noise measurements on the pipeline route indicate baseline noise may exceed national limit values.

5.2.7 Soil

There are 11,000 hectares of naturally saline soils in the driest region of Ovche Pole but the intensity, size and condition of salinization is not known. Soil contamination is likely from fertilizers, pesticides, organic pollutants, heavy metals and oil, but there is no established soil monitoring system. Ovche Pole is a famous agricultural and livestock region because of high quality soils.

5.2.8 Waste management

The collection, transport and disposal of waste is provided by the Public Communal Enterprises, but no landfills comply with EU legislation. Spontaneous ignition of waste is also common. There are no hazardous waste disposal facilities.

5.2.9 Biodiversity

Habitats are mostly anthropogenic (agriculture) although some areas of fragmented natural habitats are present including degraded oak forests, grasslands, riparian areas and watercourses. Agricultural intensification has led to a decline in the abundance and diversity of natural habitat. A small fragment of reed belt (locality of Nezirlik Ardi) is important for especially amphibians. There is an Important Plant Area Ovche Pole – Bogoslovec, designated due to the presence of steppe-like vegetation.

Fragments of well-developed oak-hornbeam forests, occur at the end of the corridor near Veles (in a very degraded form). Semi-natural dry grasslands and scrubland facies on calcareous substrates has high significance as a myriad of orchid species occur there. Riparian habitats are found along the watercourses (92A0), with willow poplar trees occurring in small belts along Svetinikolska River. One habitat (pseudo-steppe with grass and annuals of *Thero-Brachypoditea*) has very high sensitivity and is considered critical habitat, two habitats (riparian willow – poplar belts, Semi-Natural Dry Grasslands and Scrubland Facies on Calcareous Subs) has high sensitivity and one habitat (Intermittent streams) moderate sensitivity.

5.2.10 Demography and ethnicity

The proposed pipeline crosses three municipalities namely, Sveti Nikole, Lozovo, and Veles, all in the Vardar Statistical Region, and therein – two urban and nine rural settlements with one (Novo Selo village) completely abandoned.

The total population in all three affected municipalities slightly decreased over the period of 2017–2020 and by 5% in 2021. The total enumerated population was 51,043 in Veles, 16,514 in Sveti Nikole and 2,384 in Lozovo municipalities. Women constitute some 48% of the total population in the three municipalities (2021). About 84% of the population in Veles and 76.5%

in Sveti Nikole Municipalities are urbanised whereas the entire Lozovo Municipality population is rural.

Most of the population in these municipalities declared themselves as Macedonians with Macedonian their mother tongue; in nine settlements of 11 more than 93% of the total population is Macedonian. The key minority groups are Albanians, Bosniaks, Turks, Vlachs, and Serbs. Only one of the affected settlements (Milino village) has diverse ethnicity: its population includes 10.5% Albanians, 10.2% Bosnyaks, and 6.3% Turks. Roma were registered only in Veles and Sveti Nikole municipalities.

5.2.11 Economy

In 2021 the Veles Municipality hosted 1,739 active businesses, the most of the three Project-affected municipalities. Most enterprises in Veles Municipality were in wholesale and retail trade, repair of motor vehicles and motorcycles sectors whereas in Sveti Nikole and Lozovo municipalities agriculture, forestry and fishery enterprises dominate. Some 98.5% of active businesses registered in three municipalities was micro and small-sized enterprises.

5.2.12 Unemployment, poverty, and vulnerable groups

Unemployment in the Vardar Statistical Region was 11.1% in 2020 (down by 4.8% from 2018). In 2020 total unemployment in the municipalities of Sveti Nikole and Lozovo was 1,566, 43.5% were women. Most unemployed are aged 60 and over and 55 to 59 years old and have secondary education. In the same year 5,181 unemployed persons were registered in Veles. Most unemployed in Veles are aged 60 and over and 55 to 59 years old and are without education or have completed only primary education.

Vulnerable groups in the affected municipalities include the elderly, single parent families, household members with disabilities or chronic diseases, orphans, and the Roma minority group.

5.2.13 Infrastructure

Most urban and rural households in the Project region are connected to centralised water supply. Sewerage networks cover up to 100% of urban areas but only between 0% to 70% in rural areas. Veles and Sveti Nikole Municipalities each have a municipal landfill waste from the Lozovo Municipality at the Veles landfill. No power is generated in the affected municipalities and so electricity is imported.

In 2020 Veles Municipality had 141 kms, Lozovo Municipality had 133 kms, and Sveti Nikole Municipality had 104 kms of local roads. Most roads in Veles and Lozovo Municipalities are gravel, but Sveti Nikole has asphalt and cobbled streets. Local transportation is rail, regular buses, taxis and private cars.

The Sveti Nikole Health Region and Veles Health Region are crossed by the pipeline. In the former there is one Health Centre, two healthcare facilities in the city and three clinics in the surrounding villages: Erdzelija, Mustafino and Gorobinci, under concession to private health facilities. The Veles Health Region has a wide network of private primary healthcare institutions, the Health Centre, the Centre for Public Health, the General Hospital, Special Hospital for Lung Diseases and Tuberculosis, as well as a network of pharmacies.

As of 2021, there were 18, 10 and 5 primary and lower secondary schools in Veles, Sveti Nikole and Lozovo Municipalities, respectively. There were five upper secondary schools and one university in Veles and one upper secondary school and one university in Sveti Nikole.

5.2.14 Land use and livelihoods

Agriculture covers 85% of the total area of the three affected municipalities with around one third of this being cultivated. From the total agricultural area of Veles, Sveti Nikole and Lozovo Municipalities arable land, gardens, orchards and vineyards comprise 25.4%, pastures and meadows – 74.6%. Small and large cattle are raised in the municipalities. Although the

dominant landscapes of the affected municipalities are agricultural, there are small forest parcels in the area.

Most residents in the settlements rely on two sources of livelihood: agriculture and employment at non-agricultural businesses.

5.2.15 Tourism and recreation

As of May 2022, most tourists visited the Veles Municipality (1,113 people, 433 domestic and 680 foreign) with none being registered in Sveti Nikole or Lozovo Municipalities. None of the affected municipalities can be considered popular touristic areas.

5.2.16 Gender issues

Male employment is higher than female in the project affected municipalities. More women are employed in the textile industry (especially, in Sveti Nikole Municipality), public services, trade, and so forth. The unadjusted gender wage gap is 17%. For the general information also refer to [Section 5.1.16](#).

5.2.17 Cultural heritage

There are more than 200 protected archaeological sites within Sveti Nikole, Lozovo and Veles Municipalities. Some 14 registered archaeological sites are within 3 km of the proposed pipeline route. The sites are settlements and necropolis mostly of late Antique and Roman times. Whilst all archaeological sites are outside the construction corridor, seven may extend into it underground and, therefore, be damaged during construction. The intangible cultural heritage of the villages in the region is of local community importance.

6 POTENTIAL E&S IMPACTS AND RISKS RELATED TO ROUTINE CONSTRUCTION AND OPERATIONS, MITIGATION AND RESIDUAL IMPACTS

A high-level summary of E&S impacts and risks, their initial significance rating, mitigation (including enhancement), and residual (i.e., 'post-mitigation') significance rating are summarised in [Table 1](#) and [Table 2](#)¹⁷. The findings are sourced from the EIA, SIA and Supplementary ESIA for the Interconnector and the ESIA for the Sveti Nikole-Veles Section (see the E&S disclosure package in [Section 1](#)) and presented as high-level summaries.

The key potential construction impacts of construction are damage to sensitive habitats and natural or critical habitats, most notably riverine habitat. Mitigation lies in avoiding these areas through judicious routing of the pipeline as far as possible and using HDD for river crossings to prevent damage to riverbeds and embankments. Soil fertility will also be lost in excavated areas but if attention is paid to reinstatement, that impact can be minimised. The other biophysical impacts can be effectively reduced through the mitigation defined in the ESIAs. Operationally, the most significant potential impact is fugitive gas emissions and the very low likelihood of catastrophic failure. Applying Good International Industrial Practice for ongoing pipeline maintenance would further reduce such risks.

No significant negative socio-economic impacts are expected from the Project construction and operation. The potential positive socio-economic impacts of construction would be enhanced local and national economies via procurement and tax revenues and increased employment opportunities. The same positive impacts are expected during operations, as well as development of tourism activities. The negative socio-economic impacts will relate to

¹⁷ The mentioned E&S documents were developed by different consultants, followed different structures and used slightly different descriptors and significance grading of risks/impacts. Thus, the initial and residual significance ratings in the two tables are not directly comparable. Where the initial or residual significance was not assessed in the Interconnector's E&S documents, the authors of this NTS applied their professional judgement to rate the risk/impact.

changes in land use and livelihoods, restricted access to assets, pressure on public utilities, services and infrastructure, nuisance to workers and community health and safety, and damage of known and undiscovered cultural heritage. Enhancement measures to increase and/or facilitate a wider spread of beneficial impacts and to mitigate the negative ones are to implement a Livelihood Restoration Plan, Recruitment Procedure including worker training and achieving targets for women employment, Procurement Plan, SEP, health and safety and other management plans and mitigation actions.

The beneficial impacts are presented below on top of **major socio-economic and environmental benefits** that have driven the Project, such as enhancing country's energy security, providing industrial users and population with stable gas supply, greening economy by shifting energy production from coal to gas, reducing air emissions, and improving living and sanitary conditions (see [Section 2](#)).

Table 1. Construction Phase

Pipeline Section	Risk/impact	Initial Significance	Mitigation	Residual significance
Environmental				
Interconnector	Air quality deterioration with associated risks of nuisance, adverse health and biodiversity impacts.	Minor	Limit dust and exhaust emissions from construction traffic and machinery.	Minor negative
Sveti Nikole-Veles Section		Moderate		
Interconnector	Water quality deterioration with associated risks to aquatic biodiversity	Moderate – minor	Prevent hazardous material spillages and soil erosion. Use only horizontal directional drilling for river crossings and Good International Practice for hydrotest water disposal.	Minor negative
Sveti Nikole-Veles Section		Moderate		
Interconnector	Habitat destruction and reduced biodiversity	Moderate-minor	Avoid biodiversity hot spots through judicious alignment. No net loss for natural habitat and net gain for critical habitat. Avoid very high sensitivity habitat	Moderate-minor negative
Sveti Nikole-Veles Section		Moderate		
Interconnector	Soil contamination and fertility reduction	Major-moderate	Prevent hazardous material spillages and soil erosion. Conserve topsoil and reinstate soil profile.	Minor negative
Sveti Nikole-Veles Section		Moderate		
Interconnector	Contamination of groundwater	Moderate-major	Prevent hazardous material spillages	Minor negative
Sveti Nikole-Veles Section		Moderate		
Interconnector	Risks to water resources through improper management of waste	Major-Moderate	Waste reduction at source, apply waste management hierarchy.	Moderate to minor negative
Sveti Nikole-Veles Section		Moderate		
Interconnector	Modified landscapes and reduced aesthetics as a result of visual impact of project	Moderate	Effectively implement all E&S management plans	Moderate-minor negative
Sveti Nikole-Veles Section				
Socio-economic				
Interconnector	Enhanced local and national economies	Moderate		Minor to negligible positive

Pipeline Section	Risk/impact	Initial Significance	Mitigation	Residual significance
Sveti Nikole-Veles Section	(procurement and tax revenues)	Negligible to minor	Implement a Procurement Plan focused on local suppliers	Negligible to moderate positive
Interconnector	Increased employment opportunities	Moderate	Implement a Recruitment Policy and a Construction Phase Recruitment Procedure; achieve targets for women employment, train workforce	Minor to negligible positive
Sveti Nikole-Veles Section		Minor		Minor positive
Interconnector	Changed land use pattern and land-based and non-land-based livelihoods, restricted access to assets	Minor to major	Prepare and implement a Livelihood Restoration Plan for each pipeline based on the principles and requirements set out in the EBRD-approved LRF for the Project; comply with national and EBRD standards when conducting land acquisition and livelihood restoration; implement SEP.	Negligible to minor negative
Sveti Nikole-Veles Section		Minor		No impact or negligible negative
Interconnector	Increased pressure on public utilities, services and Infrastructure	Negligible to moderate	Implement Road Safety Audit, Construction Traffic Management Plan, Waste Management Plan, SEP, and other management actions	Negligible to minor negative
Sveti Nikole-Veles Section		Negligible to moderate		No impact
Interconnector	Nuisance to / disruption of community health, safety and security	Minor to major	Implement the SEP, Community Health and Safety Plan, Construction Atmospheric Emissions Management Plan, Noise Management Plan, Site Operating Procedure, Traffic Management Plan, Worker Code of Conduct, Emergency Response Plans, and other management actions	Negligible to minor negative
Sveti Nikole-Veles Section		Varies from no impact to major for various categories of population		No impact to minor and moderate negative
Interconnector	Affected health and safety of on-site workers (occupation health and safety impacts)	Major	Implement Occupational Health and Safety Management Plans (including use of personal protective equipment), Emergency Response Plans, and other management actions	Negligible to minor negative
Sveti Nikole-Veles Section		Major		Minor to moderate negative
Interconnector	Damage or loss of known and undiscovered cultural heritage	Negligible to moderate	Commission a qualified Cultural Heritage Expert to be present during the earth works; arrange a mandatory archaeological supervision of certain sections of the routes, conduct pre-construction surveys and excavations at few locations; develop and implement a Chance Finds Procedure	No negative residual impact on completion of construction (increased scientific knowledge could be a positive impact)
Sveti Nikole-Veles Section		Minor to major		

Table 2. Operational Phase

Pipeline section	Risk/impact	Initial Significance	Mitigation	Residual significance
Environmental				
Interconnector		Negligible		Minor negative

Pipeline section	Risk/impact	Initial Significance	Mitigation	Residual significance
Sveti Nikole-Veles Section	Air quality deterioration with associated risks of nuisance, adverse health and biodiversity impacts	Moderate	Minimize fugitive gas emissions	Major positive
Interconnector	Air quality improvement due to fuel substitution	Major		
Sveti Nikole-Veles Section		Major		
Interconnector	Water quality deterioration with associated risks to aquatic biodiversity	Negligible	Prevent hazardous material spillages and soil erosion.	Minor negative
Sveti Nikole-Veles Section		Moderate		
Interconnector	Soil contamination	Minor	Prevent hazardous material spillages	Minor negative
Sveti Nikole-Veles Section		Moderate		
Interconnector	Contamination of groundwater	None	Prevent hazardous material spillages	Minor negative
Sveti Nikole-Veles Section		Moderate		
Interconnector	Risks to water resources through improper management of waste	Minor	Well formulated waste management programme for the few wastes that are likely to occur	Minor negative
Sveti Nikole-Veles Section		Moderate to minor		
Interconnector	Greenhouse gas emissions	Minor	Minimize fugitive gas emissions	Minor negative
Sveti Nikole-Veles Section				
Socio-economic				
Interconnector	Development of local and national economies (procurement and tax revenues)	Minor to moderate	Implement a Procurement Plan focused on local suppliers	Minor to negligible positive
Sveti Nikole-Veles Section		Negligible		Negligible to minor positive
Interconnector	Increased employment opportunities	Assumed negligible	Implement a Recruitment Policy for the Project; provide training / work reference; achieve targets for women employment	Negligible positive
Sveti Nikole-Veles Section		Minor		Minor positive
Interconnector	Changed land use pattern and land-based and non-land-based livelihoods, restricted access to assets ¹⁸	Minor	Implement Livelihood Restoration Plans and SEP	No negative residual impact; Tourism will (further) develop - a positive impact
Sveti Nikole-Veles Section		Minor to moderate		

¹⁸ Three types of buffer zones are established along the operational pipelines where various land use restrictions are applied: i) Restriction Zone 1 – a land corridor of 5m on both sides of the pipeline axis where it is forbidden to grow plants with roots deeper than 1m and to plough the land for deeper than 0.5m; ii) Restriction Zone 2 – a land corridor of 30m on both sides of the pipeline axis where it is forbidden to construct residential buildings; iii) Restriction Zone 3 – a land corridor of 200m on both sides of the pipeline axis where population density limits should be adhered to (refer to the LRF for details and to Rulebook on Technical Conditions and Norms for Safe Transport of Liquid and Gaseous Hydrocarbons with Main Oil and Gas Pipelines and with Oil and Gas Pipelines for International Transport (OG of RM No. 26/1985).

Pipeline section	Risk/impact	Initial Significance	Mitigation	Residual significance
Interconnector	Increased pressure on public utilities, services and Infrastructure	Negligible	n/a	Negligible negative
Sveti Nikole-Veles Section		Negligible		Negligible negative
Interconnector	Nuisance to / disruption of community health, safety and security	Minor	Implement the SEP, health and safety management actions, and Emergency Response Plans	Negligible negative
Sveti Nikole-Veles Section		Negligible		Negligible negative
Interconnector	Affected health and safety of on-site workers (occupation health and safety impacts)	Major	Implement occupational health and safety management actions for operations and maintenance/repairs, as well as emergency response plans	Minor to moderate negative
Sveti Nikole-Veles Section		Major		Minor to moderate negative
Interconnector	Damage or loss of known and undiscovered cultural heritage	No impact	Limit works to the 7m operation and maintenance corridor; apply a Chance Finds Procedure	n/a
Sveti Nikole-Veles Section		Negligible (routine operations) to moderate (larger repairs works)		No residual impact

7 EMERGENCY SCENARIOS AND ACCIDENTS

An emergency is an unplanned event when an activity loses or could lose control, of a situation that risks human health, property, or the environment, either within the facility or in the local community. Such events could include natural disasters or accidents on site.

7.1 Construction Phase

There are multiple sources of accident risk on site brought about by moving machinery and vehicles, excavation of trenches, lifting heavy loads, backfilling and others activities. Well organized construction management can reduce such risks, but there must be a dedicated health and safety management function on the project as well, that:

- Conducts safety risk assessments on all construction activities;
- Identifies and ranks safety risks;
- Develops mitigation to prevent or at least minimize all such risks to tolerable levels;
- Ensures site wide implementation of all safety mitigation;
- Ensures daily surveillance of potentially risky activities and ensures that activities are stopped where safety risks are present; and
- Continually reviews performance and seeks improvements that are implemented as needed.

7.2 Operations Phase

During pipeline operations the risk profile shifts significantly as the pipeline would now contain natural gas under high pressure. Such natural gas is highly flammable and indeed explosive and so presents significant potential safety risks. Natural disaster risk mitigation is included in the design of the pipeline, e.g., provision for seismicity and so forth.

Accident risks are mitigated through a sophisticated *Supervisory Control and Data Acquisition system* (SCADA) that controls flow and pressure, relief valves vent gas if a line becomes over pressured and regulators malfunction, and corrosion protection to prevent pipeline failure using cathodic protection, coatings and linings. Leak detection is also conducted regularly and the gas is odorised so that it can be smelled if it leaks. A Hazards and Operability Study (HAZOPS)

must be conducted to ensure that risks are identified and directly mitigated in the design and construction of the pipeline. Finally, but importantly, the projects must implement an Emergency Preparedness and Response Plan commensurate with the risks of the facility and associated activities for both construction and operations.

8 CUMULATIVE¹⁹ AND TRANSBOUNDARY²⁰ IMPACTS

For the Interconnector:

- Cumulative impacts are predicted to affect '91AA* Eastern white oak woods', 'Important Bird Area Demir Kapija Canyon' and Dren Reservoir due to the Interconnector's construction and operations coupled with planned construction and operation of three wind parks in the area, as well as with operations of an oil pipeline and a 400 kV transmission line²¹. The impacts were assessed as moderate-high for '91AA* Eastern white oak woods', low-moderate for 'Important Bird Area Demir Kapija Canyon', and insignificant for Dren Reservoir. Mitigation measures to address these cumulative impacts are, *inter alia*, as follows:
 - Reduce pipeline working area width from 25m to 10m where Critical habitat is located in the area as per habitat map in the Biodiversity Impact Assessment;
 - Contractor to develop procedures to avoid, monitor and control invasive species per the Invasive Species Management Plan included in the Supplementary ESIA/BAP;
 - Use existing access roads;
 - Meet with Investors of three wind parks in the region to discuss how to minimise the footprint of construction activities, especially on habitat 91AA*;
 - Inform construction and operation staff (including contractors) on the habitats of conservation value and protected and threatened plant and animal species;
 - Prevent and reduce hunting and logging in areas opened up through the creation of new or improved access roads;
 - Prohibit laydown areas or camps in the area, and clearly mark working areas;
 - Ensure clearance of forested areas under ecological supervision; and
 - Prohibit construction workers to access the forested areas for any purpose.
- During construction of the Interconnector, no significant negative impacts are expected that would have a transboundary character. Nonetheless, in accordance with the legal procedure for transboundary impact, the MoEPP of the Republic of North Macedonia informed the concerned country – Republic of Greece about the intention to carry out this project. Greece stated in response that they did not want to participate in the EIA because significant environmental impacts were not expected in Greek territory. No transboundary impacts are expected in the operational phase.

For the Sveti-Nikole Veles Section:

¹⁹ Cumulative impacts are E&S impacts that are the result of activities for implementation of the respective project in combination with other similar past, present or future activities within the observed area.

²⁰ Transboundary impact means any impact, not exclusively of a global nature, within an area of one country caused by a proposed activity the physical origin of which is situated wholly or in part within the area of another country (a simplified definition as per the Convention on Environmental Impact Assessment in a Transboundary Context, 1991).

²¹ For detailed assessment refer to the Supplementary ESIA for the Interconnector.

- Cumulative impacts on Ovche Pole Important Birds Area and Important Plant Area are predicted from the concurrent Bogoslovec Wind Park operation and gas pipeline construction. The wind farm project underwent a biodiversity impact assessment and has specific biodiversity management plans and conservation strategies developed in line with International Finance Corporation's requirements. Given that both, the gas pipeline project and the wind park project envision biodiversity protection actions that would result in achieving no net loss, negligible to minor cumulative impact on biodiversity would be expected, with no need for additional mitigation. Cumulative air quality impacts might be expected at the pipeline's crossings with existing roads. To reduce this impact, it is required to adjust construction schedules for the horizontal directional drilling at the road crossings to the traffic loads, matching the low traffic intensity as much as possible.
- The minimum distance from the Sveti Nikole-Veles Section route (its beginning) to the national boundary is about 45 km. Due to character of the local terrain and types of potential impacts, no impacts are expected to extend beyond the national boundaries.

Both Project gas pipelines when viewed cumulatively with other planned activities and development projects in their respective areas are expected to contribute to the increased employment, better quality of life of citizens, improved sanitary and epidemiological situation, reduction in air pollutant emissions, and encouraged economic development at the municipal and regional levels.

9 STAKEHOLDER ENGAGEMENT AND GRIEVANCE MECHANISM

Stakeholder engagement and information disclosure was conducted as part of the national Environmental Impact Assessment (EIA) for the proposed pipeline sections, and will also occur during the Lender required ESIA processes.

The Company will implement a dedicated Stakeholder Engagement Plan (SEP) developed for the Project and compliant with Lenders' requirements. The purposes of the SEP are to ensure the most effective interaction with all identified Project's stakeholders, to create and maintain respectful relations between the Company and the stakeholders, and to prevent possible conflict situations.

The Stakeholder Engagement Programme developed as part of the SEP covers the pre-construction and construction stages of the Project facilities and extends into operations. It is subject to regular revisions and updating.

As per the SEP, the Project-related information and documents will be uploaded to the website of NER at <https://mer.com.mk/> (Macedonian), <https://mer.com.mk/en-US> (English), and <https://mer.com.mk/sq-AL> (Albanian - at a later stage for the Gostivar-Kicevo Section disclosure).

NER has set up a Project grievance mechanism for external stakeholders²² that complies with both, national and Lender requirements. Stakeholders can approach NER via contact details provided below (**Table 3**) and available on NER's website (<https://mer.com.mk/mk-MK/Home/Kontakt>). Details will also be posted on notice boards of the affected municipalities, and designated boards at construction sites, together with the contract details of NER's construction contractors. All grievances and enquiries will be registered and reviewed per a procedure stipulated in the SEP.

²² A separate mechanism is developed to address worker grievances.

Table 3. NER Contact Details for Raising Project-related Inquiries or Complaints

NER's contact person for Project-related inquiries and grievances	Mrs Valentina Tasevska Head of the Sector for Legal and General Affairs Address: Blvd. Sv. Kliment Ohridski 58 B, 1000 Skopje, Republic of North Macedonia Mob: + 389 78 231 803 Fax: + 389 26 090 437 E-mail: valentina.tasevska@mer.com.mk
NER's contact person for land acquisition (expropriation) inquiries and grievances	Mr Muharem Emshija Lawyer, Sector for Legal and General Affairs Address: Blvd. Sv. Kliment Ohridski 58 B, 1000 Skopje, Republic of North Macedonia Mob. +389 75 264 288 Tel: + 389 26 090 137 Fax: + 389 26 090 437 E-mail: muharem.emshija@mer.com.mk
JSC National Energy Resources details for general inquiries	Address: Blvd. Sv. Kliment Ohridski 58 B, 1000 Skopje, Republic of North Macedonia Tel: + 389 26 090 137 Web: www.mer.org.mk E-mail: contact@mer.com.mk

The SEP also contains recommendations on the use of alternative methods of engagement with various stakeholders of the Project under unfavourable circumstances (e.g., pandemics).

10 E&S IMPACT AND RISK MANAGEMENT, MONITORING AND REPORTING

In accordance with EBRD requirements, the Project's E&S performance will be continuously monitored during construction and operation of the Project, in compliance with the ESAP requirements, E&S management programmes outlined in the E&S assessment documents of the separate pipeline sections, and other specialist E&S management plans that will still be prepared. A separate E&S Monitoring Programme must be developed for the construction and operation stages and agreed with the EBRD before the start of each stage, including allocating appropriate human and material resources for its implementation.

Responsibility for the development and implementation of the Construction E&S Monitoring Programme will be assigned to the Construction Contractor (through inclusion in their Scope of Work) and the Project Implementation Unit of NER. During operations, the E&S Monitoring Programme will be implemented by NER. The Operations E&S Monitoring Programme must be agreed with the EBRD before the Project facilities are commissioned.

NER will be required to report on the Project's E&S performance indicators, including annual progress reports on the implementation of the ESAP and SEP and other Project management plans, to the EBRD at all stages of Project delivery.

Annex 1. SUMMARY OF FIELD SURVEYS

Primary baseline data collection for the Interconnector and Sveti Nikole-Veles Section was completed by the expert teams of Mott MacDonald - Connecta Consortium (including Tehnolab doo Skopje) and Civil Engineering Institute “Macedonia” JSC Skopje, respectively.

The methodology for environmental, socio-economic and cultural baseline assessment is a combination of the desktop review of archived and open-source data, field observations, surveys and measurements, interviews and discussions with local residents, and consultations with representatives of municipal authorities of the Project-affected municipalities. Both primary and secondary data were used within the impact assessment.

Environmental

Interconnector

In order to obtain the baseline air quality data, measurement of particulate matter in the air with a size of up to 10 micrometres (PM10) was performed in September 2019 - January 2020 at 11 locations along the proposed gas pipeline. Supplementary ambient air quality monitoring was conducted during May 2022 for PM2.5, PM10, SO2, NO2, CH4, CO2 and C6H6 along the proposed pipeline route.

During the period September 2019 - January 2020 water samples were collected at five rivers where they will be crossed by the proposed gas interconnector. The samples were analysed for chemical elements, organoleptic and physic-chemical properties, pH, electrolyte conductivity, turbidity, dissolved oxygen, dry residue and other parameters. Additional water quality measurements were conducted in 2022 with five surface water samples, four groundwater samples and two geothermal groundwater samples.

In September 2019 - January 2020, soil samples were collected at ten locations through which the gas interconnector will pass and analysed for 20 parameters. Supplementary soil surveys were performed at five sampling points along the pipeline route in both natural and agricultural soils in 2022.

The biodiversity baseline data collection was based on extensive desktop research, using the latest surveys and studies, and was complemented by a 4-day field survey during the spring/summer season in 2020. Supplementary field research for plants, birds, mammals, herpetofauna, fungi, fish, insects and so forth and critical habitat assessment, comprising an identification of priority biodiversity features or critical habitats, was conducted during April, May and June 2022. It also covered the identification of invasive species.

Sveti Nikole-Veles Section

The initial field survey was conducted on 9 July 2020 to update the existing habitat maps, maps of roads, water courses and other obstacles, as well as to identify areas of natural and potential critical habitat / priority biodiversity feature and habitats of conservation importance, select locations for noise and air measurement and so forth. The survey also identified key areas of concern where additional surveys were needed, and the latter were conducted as follows:

- 27 July 2020 – a terrestrial ecosystems tour;
- 9 and 10 October 2020 – a tour within the Project area to verify the terrestrial ecosystems, address gaps that have been identified in the existing environmental and social existing information, and hold conversations with the officials;
- 10 February 2021 – an overview of the route and detecting possible critical points, consideration of inter-relations between the environmental condition, cultural heritage and settlements, and performing measurements of noise and air quality (PM10) at specific locations near the settlements;
- 13 May 2021 – a tour along the proposed pipeline route in order to determine the conditions at the river crossing points;
- 21 May 2021 – a tour of all registered archaeological sites and buildings along and near the gas pipeline section, visiting all places along the route, including all crossing points, water bodies, etc., taking photos along the route in order to determine the visual impact that the pipeline section will have.

Air quality monitoring data from the state automatic monitoring station in Veles Town was obtained for the period from January to December 2020 and used in the assessment. In addition, a 24-hour PM₁₀ measurement was made at one location on 10-11 February 2021. At the same time, noise measurements were completed during the day time at two locations.

Socio-economic, including cultural

Interconnector

The socio-economic baseline data for the proposed pipeline were initially collected in August-October 2019 at the level of four Project-affected municipalities (Negotino, Demir Kapija, Gevgelija and Bogdanci), and in January-February 2020 at the level of settlements along the pipeline route. The social experts held: i) field interviews with local residents and ii) meetings and consultations with municipal authorities. The interviewees for the survey were selected so that to obtain a cross section of representative groups from the society. Additional field visits and consultations with authorities and communities were carried out in April-May 2022, as part of the Supplementary ESIA preparation. The field study included: i) meetings and discussions with representatives of municipal authorities, ii) meetings and discussions with leaders of 11 villages crossed by the proposed pipeline route; iii) discussions with representatives of 3-6 households and 1-2 focus groups (women, Roma people and/or land owners and users) per village; iv) four focus group discussions with land owners and users (one per affected municipality).

The assessment of Project-related impacts on cultural heritage was informed by an initial survey aimed to identify registered archaeological and cultural heritage sites along the proposed pipeline; in total nine such sites were identified. At a later stage (in April-May 2022), as part of the Supplementary ESIA preparation, a team of cultural heritage specialists conducted several field surveys along the pipeline route to analyse how the route correlates with the registered as well as the recorded archaeological sites and buildings and cultural heritage. Fieldwork allowed to supplement the baseline data and enhance assessment, as well as mapping and visualization of affected cultural sites and features.

Sveti Nikole-Veles Section

The socio-economic baseline study for the proposed pipeline section was carried out in May-July 2021 and included three field visits to the Project-affected municipalities (Sveti Nikole, Lozovo, and Veles) and settlements along the proposed pipeline route. Social experts applied qualitative methods for primary data collection: i) unstructured and semi-structured interviews with stakeholders and key informants (in total, 27 interviews were conducted), and ii) data collection/verification through numerous consultations and conversations by phone, online and in person. During the field visits, discussions and consultations with the local residents as well as meetings with the officials from the Project-affected municipalities were held.

The cultural heritage impact assessment was informed by five field trips in February-September 2021. In February 2021 a reconnaissance drive along the proposed pipeline route was undertaken to identify cultural heritage hotspots. It was followed by a tour in May 2021 covering all identified cultural heritage sites and buildings and taking photos to inform a visual impact assessment. Further three field trips were held to verify the registered and recorded archaeological sites along the route and included *inter alia* discussions and consultations with the local population about the use of cultural sites locally and other features of intangible cultural heritage.