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NORTH MACEDONIA – REGIONAL GASIFICATION PROJECT

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT: SVETI NIKOLE-VELES GAS PIPELINE

September 2022

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LIST OF ABBREVIATIONS

Aol	Area of Interest
AQMS	Air Quality Monitoring Station
BS	Block Station
CBD	Convention on Biological Diversity
CIA	Cumulative Impact Assessment
CH	critical habitat
CLC	Corine Land Cover
CM	Cadastral Municipality
CP	Cathodic protection
E&S	Environmental and social
EAAA	Ecologically Appropriate Area of Analysis
EBRD	European Bank for Reconstruction and Development
EC	European Commission
EEC	Eurasian Economic Commission
EHS	Environmental, Occupational Health and Safety
EHSS	Environmental, Occupational Health and Safety, and Social
EIA	Environmental Impact Assessment
EIB	European Investment Bank
EN	endangered
ESAP	Environmental and Social Action Plan
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
ESP	Environmental and Social Policy
EU	European Union
EUNIS	European Nature Information System
GDP	Gross Domestic Product
GFCF	Gross Fixed Capital Formation
GIP	Good International Practice
HAZOPS	Hazards and Operability Study
HD	Habitat Directive
HDD	horizontal directional drilling
IBA	Important Bird Area
ICS	Initial Cleaning Station
IFC	International Finance Corporation
ILO	International Labour Organization
IPA	Important Plant Area
IPPC	Integrated pollution prevention and control
IRCS	Initial and Receiving Cleaning Station
IUCN	the International Union for Conservation of Nature
KBAs	Key Biodiversity Areas
LC	Least Concern
LNP	Law on Nature Protection
LRF	Livelihood Restoration Framework
LRP	Livelihood Restoration Plan
MMRS	Main Metering and Regulation Station
MoEPP	Ministry of Environment and Physical Planning
MSDS	Material Safety Data Sheet
MSMEs	micro, small and medium enterprises
NER	National Energy Resources

NGO	Non-governmental organisation
NT	Near Threatened
NTS	Non-Technical Summary
OG RM	Official Gazette of the Republic of Macedonia
OHS	Occupational Health and Safety
OSCE	Organization for Security and Co-operation in Europe
PAP	Project affected person
PBF	Priority Biodiversity Features
PCE	Public Communal Enterprise
PDCA	Plan, Do, Check and Act
PM	particulate matter
PPE	personal protection equipment
PR	Performance Requirement (of EBRD)
QC/QA	Quality Control/Quality Assurance
RCS	Receiving Cleaning Station
RNM	Republic of North Macedonia
RSA	Road Safety Audit
RTA	road traffic accident
SCADA	Supervisory control and data acquisition system
SEA	Strategic Environmental Assessment
SEP	Stakeholder Engagement Plan
TPP	Thermal Power Plant
UN	United Nations
UNECE	United Nations Economic Commission for Europe
VAT	Value added tax
VU	vulnerable
WBG	World Bank Group
WEEE	waste from electrical and electronic equipment
WHO	World Health Organization
ZoI	Zone of Influence

TABLE OF CONTENTS

1	INTRODUCTION	12
1.1	Project Background and Rational	12
1.2	Objective of the Environmental and Social Impact Assessment (ESIA)	13
1.3	ESIA Report Structure	13
2	LEGAL AND REGULATORY FRAMEWORK	15
2.1	Applicable Laws and Regulations of North Macedonia	15
2.2	EBRD Performance Requirements and Guidance	21
2.3	Good International Practice (GIP) Guidelines	22
2.4	Applicable EU Directives	22
3	PROJECT DESCRIPTION	24
3.1	Need and Desirability	24
3.2	Detailed Design	24
3.3	Key Project Facilities	24
3.4	Description of the Pipeline Route	25
3.5	Overview of Project Implementation	26
3.6	Land Acquisition and Land Use Restrictions	37
3.7	Analysis of Alternatives	38
3.8	Associated Facilities/Projects	45
4	ESIA METHODOLOGY	46
4.1	ESIA Approach	46
4.2	Methods for Baseline Analysis and Summary of Surveys	47
4.3	Assessment of Impacts/Risks	48
4.4	Project Areas of Influence	50
4.5	E&S Management and Monitoring	50
4.6	Stakeholder Engagement and Public Consultations	50
4.7	Data Availability, Assumptions and Limitations	51
5	ENVIRONMENTAL AND SOCIO-ECONOMIC BASELINE	51
5.1	Climatic and meteorological characteristics of the area	51
5.2	Relief	52
5.3	Hydrology	55
5.4	Ambient Air Quality	56
5.5	Noise	59
5.6	Soil	59
5.7	Waste Management	61
5.8	Biodiversity	63
5.9	Administrative and Governmental Structure of North Macedonia	73

5.10	National Socio-Economic Baseline	74
5.11	Socio-Economic Baseline of the Affected Municipalities	81
5.12	Socio-Economic Description of Project-affected Settlements	97
5.13	Cultural Heritage	118
5.14	Key Sensitivities within the Project Aols	126
6	ASSESSMENT OF POTENTIAL E&S IMPACTS AND RISKS AND MITIGATION MEASURES ..	129
6.1	Introduction	129
6.2	Impact on Geology and Soil	129
6.3	Impact on Surface and Groundwater	132
6.4	Impact on Air	134
6.5	Climate Change	137
6.6	Impact Caused by Waste Generation	138
6.7	Impact Caused by Noise and Vibration	141
6.8	Biodiversity Impact	144
6.9	Impact on Landscape and Visual Amenity	146
6.10	Impacts on Local and National Economies	147
6.11	Impact on Local Labour Market / Employment	151
6.12	Impacts on Land, Assets and Land-Based Livelihoods	154
6.13	Impact on Livelihoods Related to Natural Resources and Ecosystem Services	163
6.14	Impact on Public Utilities, Services and Infrastructure	163
6.15	Impact on Community Health, Safety and Security	166
6.16	Impact on Health and Safety of Employees	172
6.17	Impact on Tourism, Recreation and Hunting	175
6.18	Impacts on Gender Inequality and Vulnerable Groups	177
6.19	Impact on Cultural Heritage	177
6.20	Risk Analysis and Plan of Measures for Emergency Scenarios and Accidents	180
6.21	Transboundary Impacts	186
7	CUMULATIVE IMPACT ASSESSMENT	187
7.1	Introduction	187
7.2	Step 1 – Determining VESC, and Identifying Spatial and Temporal Boundaries of the Assessment	187
7.3	Step 2 – Identification of Other Activities (Projects) for the Inclusion in the CIA and Environmental Drivers	189
7.4	Steps 4 and 5 – Characterization and Assessment of the Main Cumulative Impacts	189
7.5	Step 6 – Cumulative Impacts Management	190
8	STAKEHOLDER ENGAGEMENT	191
8.1	Summary of Previous Project Stakeholder Engagement Activities	191
8.2	Stakeholder Identification	192
8.3	Further Stakeholder Engagement Steps	193

8.4	Grievance Mechanism	193
9	ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP)	194
9.1	Overview.....	194
9.2	The E&S Management Framework	194
9.3	Checking and Corrective Action	210
9.4	Audits	211
	Annexes.....	213
	Annex 1. Environmental Quality Standards of the RNM	213
	Annex 2. Location of the Pipeline Route Sections	216
	Annex 3. Biodiversity Impact Assessment Report	218
	Annex 4. Cultural Heritage: Data Sources and Fieldwork	219

LIST OF TABLES AND FIGURES

Table 1.	Number and Type of Obstacles	32
Table 2.	Chainage at the Crossing Where Each Obstacle is Located.....	32
Table 3.	Land Requirements for Above-Ground Facilities	37
Table 4.	Summary of Alternatives Assessment	39
Table 5.	Definitions for Sensitivity of Receptors	48
Table 6.	Definitions for Impact Magnitude	48
Table 7.	Definitions for Impact Significance.....	49
Table 8.	Impact Significance Matrix	49
Table 9.	Data on Collected and Generated Municipal Waste in the Period 2017-2019.....	62
Table 10.	Data by Municipalities for Collected Municipal Waste in 2017-2019	62
Table 11.	Summary of Baseline Findings	64
Table 12.	Data Collection Approaches	64
Table 13.	Types of Habitats along the Pipeline Corridor.....	66
Table 14.	Sensitivity of Habitat Types Along The Route.....	67
Table 15.	Priority Biodiversity Features and Critical Habitats	69
Table 16.	Species Identified as PBF / Requiring Specific Mitigation	69
Table 17.	Sites with the Potential to be Impacted by the Project	72
Table 18.	Number of Households and Dwellings, and Average Household Members in the Vardar Statistical Region and Affected Municipalities, 2021	82
Table 19.	Overview of Natural Population Change in the Vardar Statistical Region and Affected Municipalities, 2021	85
Table 20.	Total Resident Population in the Affected Municipalities by Ethnic Affiliation, Religious Affiliation and Mother Tongue, 2021	86
Table 21.	Public Health Systems of the Sveti Nikole and Veles Health Regions (2018)	91
Table 22.	Number of Schools and Students in the Vardar Statistical Region and Affected Municipalities in the Academic Year of 2020/2021.....	92

Table 23. Recipients of Childcare Allowances, 2020	93
Table 24. Recipients of Parental Allowances, 2020.....	93
Table 25. Juvenile Recipients of Social Welfare, 2020	94
Table 26. Adult Recipients of Social Welfare, 2020	94
Table 27. Crop Production in the Vardar Statistical Region, Tonnes, 2021	95
Table 28. Total Number of Livestock, Poultry, and Beehives in the Vardar Statistical Region, 2021	95
Table 29. Agricultural Land by Use Category, ha, 2021	96
Table 30. Forest Land in the Affected Municipalities, ha, 2019.....	97
Table 31. Overview of Settlements along the Proposed Pipeline's Route	97
Table 32. Settlements along the Proposed Pipeline's Route: Sveti Nikole Municipality	99
Table 33. Settlements along the Proposed Pipeline's Route: Lozovo Municipality	107
Table 34. Settlements along the Proposed Pipeline's Route: Veles Municipality	113
Table 35. Registered Archaeological Sites along the Proposed Pipeline Route	119
Table 36. Description of Archaeological Sites along the Proposed Pipeline Route.....	120
Table 37. Limit Values ($\mu\text{g}/\text{m}^3$) for Relevant Air Quality Pollutants as Determined in Directive 2008/50/EC.....	135
Table 38. Waste Classification	139
Table 39. List of Sources of Noise and Vibration.....	142
Table 40. Area Noise Level	142
Table 41. Limit Noise Levels in Areas Outside Urban Locations	143
Table 42. Land to be Acquired: Split by Ownership.....	155
Table 43. Land to be Acquired: Split by Land Use Category	156
Table 44. Privately Owned Land to be Permanently Acquired: Split by Land Use Categories	156
Table 45. Privately Owned Land to be Temporarily Acquired: Split by Land Use Categories	157
Table 46 Impacts/risks to PAPs: Magnitude Grades	158
Table 47. Impacts/risks to Project-affected Land Owners and Formal and Informal Land Users: Significance Grades.....	159
Table 48. Impacts/risks to Project-affected Land Owners and Formal and Informal Land Users: Magnitude Grades	162
Table 49. Impacts/risks to Project-affected Land Owners and Formal and Informal Land Users: Significance Grades.....	162
Table 50 Sensitivity of Public Infrastructure Receptors	164
Table 51 Magnitude of Impacts/risks to Public Infrastructure Receptors	164
Table 52 Significance of impacts/risks to public infrastructure receptors	165
Table 53 Sensitivity of Human Receptors	168
Table 54. Impacts/risks to Community Health, Safety and Security: Magnitude Grades.....	169
Table 55. Impacts/risks to Community Health, Safety, and Security: Significance Grades	170
Table 56. Hazard Characteristics of Natural Gas	182
Table 57. Characteristics of VECs Identified for the Purpose of the CIA	187
Table 58. NER Contact Details for Raising Project-related Inquiries or Complaints.....	193

Table 59. Summary of the Mitigation Defined in this ESIA by Project Phases and The Organization Responsible for Implementation of The Mitigation.....	197
Table 60. Summary Pipeline Project Monitoring Requirements	210
Figure 1. Schematic Location of the North Macedonia Gas Transmission Network.....	12
Figure 2. Route of the Sveti Nikole-Veles Gas Pipeline Section	25
Figure 3. Scheme of the Construction Corridor	26
Figure 4. Gas Pipeline Construction Phases	29
Figure 5. Trench Appearance and Characteristic Transverse Profiles.....	31
Figure 6. Proposed Alternative Routes.....	39
Figure 7. Nezirlik Ardi (Green) and the Alternative Routes which are Passing through It.....	44
Figure 8. Gjuzumliska River	44
Figure 9. KBA's (in Red) and Final Route (in Blue) (as White in the Text)	45
Figure 10. Climatic Area in RNM.....	51
Figure 11. Excerpt from the Basic Geological Map of the RNM (Sheet Veles and Shtip).....	53
Figure 12. Seismic Zoning Map of the RNM (MKS-EN 1998-1:2012 Eurocode 8	55
Figure 13. Svetinikolska River.....	56
Figure 14. Location of the Monitoring Station in Veles	57
Figure 15. Daily Average Concentrations of PM ₁₀ µg/m ³ from the Monitoring Station in Veles, from January to December 2020	58
Figure 16. Location of Noise and Suspended Particle PM ₁₀ µg/m ³ Measurements	58
Figure 17. Types of Soils in Central North Macedonia Highlighting the Area through which the Pipeline Will Pass.....	60
Figure 18. Project's Area of Influence and Zone of Influence on Biodiversity	63
Figure 19. Habitat EAAAs in the Zol (the Most Sensitive Ones)	68
Figure 20. Statistical Regions and Municipalities in the RNM.....	74
Figure 21. Population Distribution by Five-year Age Groups and Sex in the RNM, 2021.....	75
Figure 22. Distribution of Population of the RNM by Sex, 2017–2021.....	75
Figure 23. Dynamics of the Young and Aged Population of the Republic of North Macedonia, 1994–2020.....	76
Figure 24. Overview of International Migration in the RNM, 2017–2020.....	77
Figure 25. Overview of the Natural Population Change in the RNM, 2017–2021	77
Figure 26. GDP at Current Prices (in million Euros) in the RNM, 2017 – 2021	78
Figure 27. Total Enumerated Population in Veles, Sveti Nikole and Lozovo Municipalities, 2017–2021.....	82
Figure 28. Total Resident Population Distribution by Five-year Age Groups and Sex in the Veles Municipality, 2021	83
Figure 29. Total Resident Population Distribution by Five-year Age Groups and Sex in the Sveti-Nikole Municipality, 2021	84
Figure 30. Total Resident Population Distribution by Five-year Age Groups and Sex in the Lozovo Municipality, 2021	84

Figure 31. Net Migration in the Affected Municipalities, 2017–2021	85
Figure 32. Sveti Nikole - Veles Section Route with the Key Social Facilities in the Project-affected Settlements.....	98
Figure 33. Churches in the Project-affected Municipalities	124
Figure 34. Events in the Project region	125
Figure 35. Residential and Non-residential Buildings in the Vicinity of the Proposed Veles BS and Veles MMRS.....	128
Figure 36. Operations and Maintenance Corridor and Restriction Zones 1 and 2 for the Gas Pipeline	161
Figure 37. Causes of Pipeline Failures in the US dollars over a 5-year period from 2017-2022 as Relative Percentages.....	182
Figure 38. Scoping Consultation Meetings at the Affected Municipalities	192
Figure 39. Schematic Presentation of the E&S Management Approach Advocated for the Pipeline Project	196

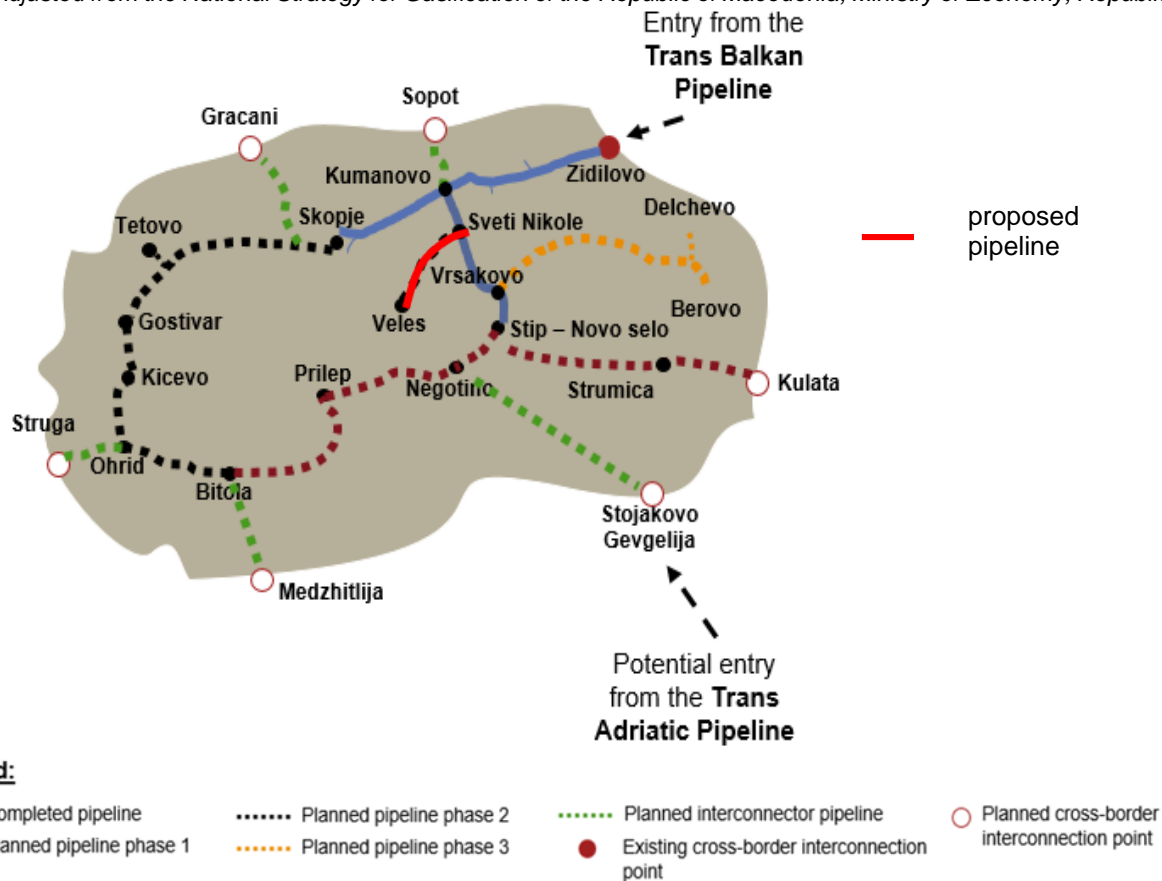
1 INTRODUCTION

1.1 Project Background and Rational

The European Bank for Reconstruction and Development (EBRD) (EBRD or “the Bank”) are considering financing the construction of a 28-km section of a main gas pipeline – Sveti Nikole-Veles – in North Macedonia (“the Project”). The Project beneficiary will be National Energy Resources Skopje JSC¹ (“NER” or “the Company”), a state-owned company responsible for the country’s gas transmission network.

The Sveti Nikole-Veles pipeline is part of the country’s Gasification Plan, whose implementation was structured in three phases. Over the past four years, NER has been progressing the construction of Phase 1 gas transmission lines and has recently embarked on Phase 2 sections. The current Project is part of Phase 2 of the country’s gas network development plans. It is also part of larger project (North Macedonia – Regional Gasification Project) financed by EBRD and European Investment Bank (EIB), which covers, apart from Sveti Nikole-Veles pipeline, Gostivar-Kicevo pipeline and North Macedonian section of the Greece-North Macedonia Interconnector (see **Figure 1**).

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



of Macedonia. 2018².

Figure 1. Schematic Location of the North Macedonia Gas Transmission Network

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

² https://www.energy-community.org/dam/jcr:436db091-3b1c-43c1-8dbb-66fcee79cfc/INFWS052018_FYRM.pdf

The Project is aligned with the North Macedonia's National Strategy for Energy Development (2019)³, which was subject to Strategic Environmental Assessment (SEA). The Strategy's objectives reviewed during the SEA include switching to cleaner energy sources and developing gas transmission networks to improve the integration of the country's energy infrastructure.

The Project will provide natural gas to three municipalities in the centre of North Macedonia (Sveti Nikole, Lozovo and Veles) with a total population of about 70,000 people. The gasification of the area will: i) improve local air quality due to reduced emissions from non-centralised heating and reduce emission-related impact on public health and ii) improve quality of life for local communities by non-stop gas supply used for heating and cooking. The Project will also provide opportunities for further extension of the gas distribution network in the central part of the country. The overall extension of the national gas transmission system contributes to country's energy efficiency through reduced energy loss for heating and to enable more sustainable energy generation with increased share of cleaner energy resources.

1.2 Objective of the Environmental and Social Impact Assessment (ESIA)

The Project involves the funding of a greenfield gas pipeline section and is a part of the larger A-category regional gas project considered by the EBRD for funding. Thus, the Project has been assigned 'Category A' according to the EBRD Environmental and Social Policy (ESP) (2019)⁴. This means that the Project is subject to an Environmental and Social Impact Assessment (ESIA) and participatory disclosure and consultation process including a 120-calendar-day disclosure of the Project's environmental and social (E&S) documents package.

The company (NER) for the preparation of the ESIA for the Project engages the national companies Company for engineering design and planning PROSTOR Ltd. Kumanovo (Kumanovo, North Macedonia) and Civil Engineering Institute MACEDONIA JSC Skopje (Skopje, North Macedonia). They made an initial assessment of the proposed routes for the gas pipeline section, selected the most appropriate alternative from an environmental and social aspect, and prepared a package of draft documents for the ESIA. The EBRD experts guided the team of experts from national companies through the process of preparing the ESIA Study and other accompanying documents, in order to comply with the bank's requirements (PR) in terms of environmental protection and social aspects. The impact assessment and the proposed measures given in the draft documents for ESIA by the national experts were related to the specific locations (site specific). Later EBRD commissioned Ecoline International Ltd. (Bulgaria) and SE Solutions (Pty) Ltd. (South Africa) to revisit the draft ESIA and update it as necessary to ensure compliance of the ESIA with the relevant EBRD's E&S requirements.

The **objective of the present ESIA** is to assess the potential beneficial and adverse environmental and socio-economic impacts that may arise from the Project and its associated facilities at all stages of its lifecycle, to develop mitigation measures, to assess the residual impacts after mitigation measures are applied, and to monitor the impacts. In addition, measures to enhance beneficial impacts have also been included in the ESIA.

1.3 ESIA Report Structure

The remainder of this report is structured as follows:

- **Chapter 2: Legal and Regulatory Framework** – provides a description of the applicable regulatory framework for the proposed project.

³ 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

⁴ <https://www.ebrd.com/news/publications/policies/environmental-and-social-policy-esp.html>.

- **Chapter 3: Project description** – provides a description of the Project, including location, Project components and activities, associated facilities (if any) and details of Project inputs and outputs; the chapter also included analysis of Project alternatives.
- **Chapter 4: ESIA Methodology** – outlines the methodology followed in conducting the present ESIA, in particular the steps and definitions used in the assessment of impact magnitude and significance and Project areas of influence.
- **Chapter 5: Environmental and Socio-economic Baseline** – describes environmental and social baseline conditions of the area potentially affected by the Project.
- **Chapter 6: Assessment of Potential E&S Impacts and Risks and Mitigation Measures** – contains an assessment of potential impacts and defines mitigation and enhancement and monitoring measures related to each of the following environmental indicators, receptors or resources affected by the Project activities;
- **Chapter 7: Cumulative Impact Assessment** – concerns the Project's impacts in combination with other projects.
- **Chapter 8: Stakeholder Engagement** – contains results of the stakeholder engagement activities undertaken so far, outlines key stakeholder groups, future stakeholder engagement activities and grievance mechanism for external stakeholders.
- **Chapter 9: Environmental and Social Management Plan** – contains an Environmental and Social Management framework including the minimum mitigation requirements identified in this ESIA.

2 LEGAL AND REGULATORY FRAMEWORK

2.1 Applicable Laws and Regulations of North Macedonia

2.1.1 National Legislation on Environmental Impact Assessment (EIA)

The Law on the Environment (Official Gazette (OG) of the Republic of Macedonia (RM) No. 53/05, 81/05, 24/07, 159/08, 83/09, 48/10, 124/10, 51/11, 123/12, 93/13, 187/13, 42/14, 44/15, 129/2015, 192/2015, 39/16, 99/18 и 89/22) is a horizontal legal framework and regulates, inter alia: the principles for environment protection and sustainable development, planning aspects and documents for environment protection, subjects and instruments for environment protection, environment monitoring and information system, public involvement in environment matters, environment labelling, financing issues and supervision aspects.

The objectives of this law include conservation, protection, renewal and improvement of the quality of the environment, protection of the life and health of the people; protection of the biological diversity; rational and sustainable use of natural resources and implementation and improvement of the measures aimed at overcoming the regional and global problems of the environment.

The main instruments for environment protection identified in the law include: (i) environmental monitoring and information system and access to environmental data; (ii) strategic environment assessment (SEA); (iii) environment impact assessment (EIA); (iv) integrated pollution prevention and control (IPPC); (v) environmental auditing; (vi) prevention and control of major accidents involving hazardous substances, and (vii) liabilities for environmental damages.

This law regulates the administrative procedure for EIA for projects that will likely result in significant effects on the environment. It sets legal basis for defining the content of the EIA study (EIA Report) and the stakeholder engagement and public involvement process. The general EIA procedure includes three main steps:

1. Screening process – Ministry of Environment and Physical Planning (MoEPP) as a competent authority determines whether an EIA is required for a certain project based on a notification on the project implementation intention.
2. Scoping process – determining the content and extent of the matters, which should be covered by the EIA study.
3. Review process - checking the adequacy of the EIA study as one of the main ‘safeguards’ built into the EIA process.

The administrative competent authority for the EIA process is the Administration for Environment within the MoEPP. The “Decree on determining of projects and criteria upon which the need for an environmental impact assessment is established” (OG of RM No. 74/2005, 109/09 and 164/12) determines the projects that may require EIA. All projects listed in Annex I of this Decree are required to undergo an EIA, whereas Projects listed in Annex II are examined on a case-by-case basis in accordance with the criteria set out in the Decree, to determine whether they are required to undergo an EIA.

In accordance with Article 93 of the Law, if during the review of an EIA Report, it is determined that the proposed project is likely to cause significant transboundary environmental impacts, the Ministry should inform the affected country or countries about the arrangements for public information determined pursuant to paragraph 2 Article 93 of this Law. A country that may be affected may give their opinion and comments on the project and may be represented at any public debate concerning the project and the comments should be taken into account when the decision of Environmental Consent is taken.

Other relevant legal instruments in the area of EIA are as follows:

- Rulebook on the information to be included in the notification on the intention to carry out a project and the procedure determining the requirement for environmental impact assessment of the project (OG of RM No. 33/06);

- Rulebook on the content of the requirements to be fulfilled by the environmental impact assessment study (OG of RM No. 33/06);
- Rulebook on the content of the announcement of the notification on the intention to carry out a project, on the decision for environmental impact assessment, of the environmental impact assessment study on the project, of the report on the adequacy of environmental impact assessment study and the decision by which consent to the project implementation is issued or rejected, as well as the manner of public consultation (OG of RM No. 33/06);
- Rulebook on the form, content, procedure and manner of development of the report on the adequacy of the project environmental impact assessment study, as well as the procedure on the authorization of persons on the List of environmental impact assessment experts to prepare the report (OG of RM No. 33/06).

2.1.2 Relevant Environmental Legislation

The Law on Ambient Air Quality (OG of RM No. 67/04, 92/07, 35/10, 47/11, 163/13 and 10/15) sets the air quality standards and regulates air quality monitoring, air protection measures, air quality assessment, planning documents for air quality management, inspection and supervision, etc.

- Decree on limit values of the levels and types of pollutants in ambient air and alert thresholds, deadlines for achieving the limit values, margins of tolerance for limit values, target values and long-term objectives (OG of RM No. 50/05, 4/13, and 183/17);
- Rulebook on quantities of limit values-maximum values of pollutant emissions in order to determine projections for a particular period of time related to the reduction in the quantities of pollutant emissions at an annual level (OG of RM No. 2/10, 156/11, and 111/14);
- Rulebook on the methodology, manners, procedures, methods and means to measure emissions from stationary sources (OG of RM No. 11/12);
- Rulebook on limit values for permissible emission levels and types of pollutants in waste gases and vapours emitted from stationary sources into the air (OG of RM No. 141/10);
- Rulebook on the methodology of making an inventory and determining the level of emissions of pollutants into the atmosphere in tonnes per year for all types of activities, and other data regarding the submission of the European Monitoring and Evaluation Programme (EMEP) (OG of RM No. 142/07);
- List of zones and agglomerations for ambient air quality (OG of RM No. 23/09);
- Rulebook on the content and method of transmission of data and information on the conditions in the management of ambient air quality (OG of RM No. 138/09);
- Rulebook on methodology for monitoring ambient air quality (OG of RM No. 138/09).

The Law on Nature Protection (LNP) (OG of RM No. 67/04, 14/06, 84/07, 35/10, 47/11, 148/11, 59/12, 13/13, 163/13, 41/14, 146/15, 39/16, 63/16) regulates the nature conservation and promotion via protection of the biological and landscape diversity as well as the natural heritage. It identifies the principles for nature protection, inter alia: principle for sustainability, precautionary principle, prevention principle and user-pays principle and sets the legal bases for protection of habitats, ecosystems and species. In addition, the law regulates the legal bases for establishment of a coherent ecological network, including the European Natura 2000 Network. The LNP also determines the planning documents for nature protection and the legal bases for protected areas (establishment, categorization, management). The Republic of North Macedonia (RNM) has also ratified numerous international agreements that are part of the national legal system for nature protection.

The Law on Waters (OG of RM No. 87/08, 6/09, 161/09, 83/10, 51/11, 44/12, 23/13, 163/13, 42/14, 44/15 and 129/15) introduces watershed management approach and regulates the legal status and

manner for integrated water management, water infrastructure, conditions and manner for water economy, conditions for issuing water use and water discharge permits, etc. The objectives of this law are to ensure availability of a sufficient amount of quality water in accordance with the principles of sustainable management of the water and protection, preservation and continuous improvement of the available water resources.

- Regulation for the classification of surface waters (OG of RM No. 99/16) is used for classification of surface waters (watercourses, lakes and accumulations);
- Regulation for categorization of water courses, lakes, accumulations and ground waters (OG of RM, No. 18/99 and 71/99);
- Natural and artificial watercourses, sections of the watercourses, lakes, accumulations and ground waters, whose waters based on their use and the degree of clarity, are classified into classes following the Regulation on classification of waters, dividing them into 5 categories;
- Rulebook on the criteria for defining the zones sensitive to the issue of release of the urban waste waters (OG of RM, No. 130 dated 29.09.2011);
- The Rulebook of the conditions, method and limit values for the emission of the waste waters release after their treatment/purification, method of calculation/measurement, having into account the separate requirements for the protection of the protected zones (OG of RM, No. 81 dated 15.06.2011).

The Law on Waste Management (OG of RNM No. 216/21) regulates the principles and objectives of waste management, strategies, the plans and programs for waste management, the rights and obligations of the legal and natural persons in relation to waste management, the manner and conditions under which it can to collect, transport, reuse, treat, store, processing and disposal of waste, import, export and transit of waste, establishment of the information system, as well as financing and supervision over waste management. Other waste management laws include:

- Law on Management Electrical and Electronic Equipment and Waste Electrical and Electronic Equipment (OG of RM No. 6/12; 163/13; 146/15; 39/16);
- Law on the Management of Batteries and Accumulators (OG of RM No. 140/10; 47/11; 148/11; 39/12; 163/13; 146/15; 39/16);
- Law on Management of Additional Waste Flows (OG of RNM No. 216/21);
- Law on Extended Liability of the Producer for Management of the Certain Waste Flows (OG of RNM No. 215/21);

The Law on Protection Against Environmental Noise (OG of RM No. 79/07, 124/10, 47/11 and 163/13) regulates protection against noise in the environment and determines measures for mitigation of harmful effects of the noise on human health, including normative, urban planning and technical measures. The law excludes noise in working and living environment.

There is no national legislation on **Climate Change** (it has been drafted, but not yet adopted). The RNM has ratified several Conventions and adopted the National Environment and Climate Change Strategy (2014-2020), and the Third National Plan on Climate Change (2013).

The other relevant legislation includes *inter alia*:

- Law on Spatial and Urban Planning (OG of RM No. 51/05, 60/11, 55/13, 163/13, 42/14, 199/14 and 44/15);
- Law on Forests (OG of RM No. 64/09, 24/11, 53/11, 25/13, 79/13, 147/13, 43/14, 160/14, 33/15, 44/15 and 147/15);
- Law on Construction (OG of RM No. 130/09, 124/10, 18/11, 36/11, 54/11, 13/12; 144/12, 25/13, 79/13, 137/13, 163/13, 27/14, 28/14, 42/14, 115/14, 149/14, 187/14, 44/15, and 129/15);

- Law on Protection of Cultural Heritage (OG of RM No. 20/04, 71/04, 115/07, 18/11, 148/11, 23/13, 137/13, 164/13, 38/14, 44/14, 199/14, 104/15, 154/15, 192/15, 39/16, and 11/18);
- Law on Chemicals (OG of RM No. 145/10, 53/11, 164/13, 116/15, 149/15 and 37/16).

The national environmental quality standards are presented in **Annex 1**.

2.1.3 Relevant Social Legislation

Labour and Workforce

- Labour Law of RNM (OG of RM No. 62/05; 106/08; 161/08; 114/09; 130/09; 149/09; 50/10; 52/10; 124/10; 47/2011; 11/12; 39/12; 13/13; 25/2013; 170/2013; 187/13; 113/14; 20/15; 33/15; 72/15; 129/15, 27/16, 120/18, OG of RNM No. 14/20);
- Law on Pensions and Disability Insurance (OG of RM No. 53/13, 170/13, 43/14, 44/14, 97/14, 113/14, 160/14, 188/14, 20/15, 61/15, 97/15, 129/15, 147/15, 154/15, 173/15, 217/15, 27/16, 120/16, 132/16, 35/18, 220/18, 245/18, OG of RNM No. 180/19, 275/19, 31/20, 267/20);
- Law on Employment of Disabled Persons (OG of RM No. 44/00, 16/04, 62/05, 113/05, 29/07, 88/08, 16/08, 99/09, 136/11, 129/15, 147/15, 27/16, 99/18);
- Law on Volunteering (OG of RM No. 85/07, 161/08, 147/15, OG of RNM No. 124/19, 103/21);
- Law on Peaceful Settlement of Labour Disputes (OG of RM No. 85/07, 27/14, 102/14, 30/16);
- Law on Employment and Work of Foreigners (OG of RM No. 217/15, OG of RNM No. 163/21);
- Law on Minimum Wage (OG of RM No. 11/12, 30/14, 180/14, 81/15, 129/15, 132/17, 140/18, OG of RNM No. 239/19);
- Law on Prevention and Protection of Discrimination (OG of RNM No. 258/20);
- Law on Protection from Harassment in the Workplace (OG of RM No. 79/13, 147/15, OG of RNM No. 103/21).

Land Acquisition

- Law on Expropriation (OG of RM No. 95/12, 131/12, 24/13, 27/14, 104/15, 192/15, 23/16, 178/16);
- Law on Property and Other Real Property Rights (OG of RM No. 18/01, 92/08, 139/09, 35/10);
- Law on Land for Construction (OG of RM No. 15/15, 98/15, 193/15, 226/15, 31/16, 142/16, 190/16, OG of RNM No. 275/19);
- Law on Construction (OG of RM No. 130/09, 124/10, 18/11, 36/11, 54/11, 13/12, 144/12, 25/13, 79/13, 137/13, 163/13, 27/14, 28/14, 42/14, 115/14, 149/14, 187/14, 44/15, 129/15, 217/15, 226/15, 30/16, 31/16, 39/16, 71/16, 132/16, 35/18, 64/18, 168/18, OG of RNM No. 244/19, 18/20);
- Law on Real Estate Cadastre (OG of RM No. 55/13, 41/14, 115/14, 116/15, 153/15, 192/15, 61/16, 172/16, 64/18);
- Rulebook of the Method of Cadastral Classification and Determination and Registration of the Change of Cadastral Culture and Land Class (OG of RM No. 144/13, 95/15);
- Law on Appraisal (OG of RM No. 115/10, 158/11, 185/11, 64/12, 188/14, 104/15, 153/15, 192/15, 30/16);
- Methodology for Assessment of the Market Value of the Real Estate (OG of RM No. 54/12, 17/13, 21/13, 142/14);

- Law on Expert Review (OG of RM No. 115/10, 12/14, 43/14, 104/15, 148/15, 192/15, 64/18);
- Law on General Administrative Procedures (OG of RM No. 124/15);
- Law on Administrative Disputes (OG of RM No. 62/06, 150/10, OG of RNM No. 96/19);
- Law on Extra-Judicial Proceedings (OG of RM No. 9/08);
- Law on Acting Upon Illegally Constructed Buildings (OG of RM No. 23/11, 54/11, 155/12, 53/13, 72/13, 44/14, 115/14, 199/14, 124/15, 129/15, 217/15, 31/16);
- Law on National Spatial Data Infrastructure of RNM (OG of RM No. 38/14);
- Law on Obligations (OG of RM No. 18/01, 78/01, 04/02, 59/02, 05/03, 84/08, 81/09, 161/09).

Health and Safety

- Law on Health and Safety at Work (OG of RM No. 92/07, 136/11, 23/13, 25/13, 137/13, 164/13, 158/14, 15/15, 129/15, 192/15, 30/16, 150/15, 173/15, 192/18, 30/16, 163/17, 51/18, OG of RNM No. 18/20);
- Rulebook on personal protective equipment used by employees at work (OG of RM No. 116/07);
- Rulebook on safety and health at work when using work equipment (OG of RM No. 116/07);
- Rulebook on signs for safety and health at work (OG of RNM No. 127/08, 107/19, 238/19);
- Rulebook on the manner of keeping records in the field of safety and health at work (OG of RM No. 136/07);
- Rulebook on safety and health at work of employees at risk of noise (OG of RM No. 21/08);
- Rulebook on the minimum requirements for safety and health at work for temporary mobile construction sites (OG of RM No. 105/08);
- Rulebook on the conditions for the employees, the organization, the technical and other conditions that should be fulfilled by the legal or natural person for performing professional activities (OG of RM No. 37/08);
- Rulebook on the manner of preparing a safety statement, its content, as well as the data on which the risk assessment should be based (OG of RM No. 02/09);
- Rulebook on the minimum requirements for safety and health of employees at the workplace (OG of RM No. 154/08);
- Rulebook on safety and health at work when manually transporting cargo (OG of RM No. 135/07);
- Rulebook on safety and health at work of employees exposed to the risk of mechanical vibration (OG of RM No. 26/08);
- Rulebook on the minimum requirements for safety and health of employees who are potentially exposed to the risk of explosive atmospheres (OG of RM No. 74/09);
- Rulebook on the minimum requirements for safety and health of employees from the risks related to exposure to asbestos at work (OG of RM No. 50/09);
- Rulebook on minimum occupational safety and health requirements for employees at risk of exposure to carcinogens, mutagens or substances toxic to the reproductive system (OG of RM No. 110/10);
- Rulebook on the minimum requirements for safety and health at work of employees from risks related to exposure to chemical substances (OG of RM No. 46/10).

2.1.4 National Technical Regulations on the Construction of Gas Pipelines

- Network Rules for Natural Gas Transmission (OG of RM No. 45/09);
- Rulebook on the 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 the Soviet Federal Republic of Yugoslavia (SFRY) No. 26/85, and OG of RM No. No. 18/97);
- Decision on the technical conditions and norms for the construction of distribution gas pipeline systems in SR Macedonia (OG of the Socialistic Republic of Macedonia No. 45/90);
- Rulebook on the manner and the conditions for regulating the prices for natural gas transmission, distribution and supply (OG of RM No. No. 94/05);
- Natural Gas Transmission Tariff System (OG of RM No. 94/05);
- Decision on defining the general conditions for natural gas delivery (OG of RM No. 36/99).

2.1.5 International Treaties and Conventions

Besides the national legislation, the RNM has ratified a number of international treaties and conventions along with the ongoing process of transposing European Union (EU) laws into the national legal and policy framework.

The following international environmental and social treaties and conventions ratified by the RNM were taken into account during the ESIA:

- Aarhus Convention: Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters, UNECE, Aarhus, Denmark 1998 (OG of RM⁵ No. 40/99);
- Espoo Convention: Convention on Environmental Impact Assessment in a Transboundary Context, UNECE, Espoo, Finland 1991 (OG of RM No. 44/99);
- Convention on Biological Diversity (CBD), UN, 1992 (OG of RM No. 54/97);
- Convention on the Conservation of Migratory Species of Wild Animals, Bonn, 1979 (OG of RM No. 38/99);
- Convention on the Conservation of European Wildlife and Natural Habitats, Bern, 1972 (OG of RM No. 49/97);
- UNESCO World Heritage Convention, 1972. Notification of succession by the Macedonian Government on 30th April 1997;
- UNFCCC Convention on Climate Change, New York, 1992 (OG of RM No. 61/97, entrance into force on 28th April 1998);
- Kyoto Protocol on Climate Change, Kyoto, 1997 (OG of RM No. 49/04, entrance into force on 16th February 2005);
- Convention on Long-Range Transboundary Air Pollution, Geneva, 1979 (OG of SFRY No. 11/86);
- Conventions of the International Labour Organization (ILO): North Macedonia has ratified 79 ILO conventions⁶ including:

⁵ Note: Official name of the Republic of North Macedonia before February 2019.

⁶ ILO. 2022. Ratifications for North Macedonia, https://www.ilo.org/dyn/normlex/en/f?p=1000:11200:0::NO:11200:P11200_COUNTRY_ID:103555

- C029 - Forced Labour Convention (1930) (No. 29);
- C087 - Freedom of Association and Protection of the Right to Organise Convention (1948) (No. 87);
- C098 - Right to Organise and Collective Bargaining Convention (1949) (No. 98);
- C100 - Equal Remuneration Convention (1951) (No. 100);
- C105 - Abolition of Forced Labour Convention (1957) (No. 105);
- C111 - Discrimination (Employment and Occupation) Convention (1958) (No. 111);
- C138 - Minimum Age Convention (1973) (No. 138);
- C155 - Occupational Safety and Health Convention (1981) (No. 155) (1991);
- C187 - Promotional Framework for Occupational Safety and Health Convention (2006) (No. 187);
- C122 - Employment Policy Convention (1964) (No. 122);
- C154 - Collective Bargaining Convention (1981) (No. 154);
- C183 - Maternity Protection Convention (2000) (No. 183),
- C135 - Workers' Representatives Convention (1971) (No. 135);
- C182 - Worst Forms of Child Labour Convention (1999) (No. 182);
- C132 - Holidays with Pay Convention (Revised) (1970) (No. 132);
- UN Convention for the Safeguarding of the Intangible Cultural Heritage adopted on 17th October 2003.

2.2 EBRD Performance Requirements and Guidance

The ESIA was prepared to meet the obtaining the relevant Decision by the competent authorities and the approval from EBRD. This means that the ESIA content and process should meet not only national standards mentioned in the above section but also the standards and guidelines of EBRD.

The EBRD Environmental and Social Policy (ESP)⁷ (2019) sets minimum requirements for managing environmental and social impacts and risks caused by EBRD financed projects throughout the lifetime of the projects. The EBRD Performance Requirements (PRs) which are relevant to this Project include:

- PR 1 - Assessment and Management of Environmental and Social Risks and Impacts;
- PR 2 - Labour and Working Conditions;
- PR 3 - Resource Efficiency and Pollution Prevention and Control;
- PR 4 – Health, Safety and Security;
- PR 5 - Land Acquisition, Restrictions on Land Use and Involuntary Resettlement;
- PR 6 - Biodiversity Conservation and Sustainable Management of Living Natural Resources;
- PR 8 - Cultural Heritage; and
- PR 10 - Information Disclosure and Stakeholder Engagement.

Each PR defines, in its objectives, the desired outcomes, followed by specific requirements for projects to help clients achieve these outcomes. Compliance with relevant national law is an integral part of all PRs.

⁷ <https://www.ebrd.com/news/publications/policies/environmental-and-social-policy-esp.html>

The applicable EBRD's guidance on implementing the PRs taken into consideration include:

- EBRD's Sub-sectoral Environmental and Social Guidelines for Building and Construction Activities (2010)⁸;
- EBRD's Sub-sectoral Environmental and Social Guidelines for Pipelines (2010)⁹;
- Briefing notes on occupational health and safety¹⁰;
- EBRD's additional requirements in the context of the COVID-19 pandemics, namely 2020 briefing notes¹¹.

2.3 Good International Practice (GIP) Guidelines

The World Bank Group (WBG)/International Finance Corporation (IFC) established a range of general and sector specific EHS guidelines. The EHS guidelines are technical reference documents with general and industry-specific examples. They contain performance levels and measures that are normally acceptable to IFC and that considered to be achievable in new facilities at reasonable costs by existing technology. The following EHS guidelines are considered relevant for the Project and have been used to inform the ESIA process:

- IFC EHS General Guidelines (2012)¹²;
- IFC EHS Guidelines for Gas Distribution Systems (2007)¹³; and
- IFC EHS Guidelines for Onshore Oil and Gas Development (2007)¹⁴.

2.4 Applicable EU Directives

- Directive 2014/52/EU of the European Parliament and of the Council of 16th April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment (EIA Directive)¹⁵;
- Directive 2008/50/EC of the European Parliament and of the Council of 21st May 2008 on ambient air quality and cleaner air for Europe¹⁶;
- Directive 2006/118/EC of the European Parliament and of the Council of 12th December 2006 on the protection of groundwater against pollution and deterioration¹⁷;
- Directive 2008/98/EC of the European Parliament and of the Council of 19th November 2008 on waste¹⁸;

⁸ <https://www.ebrd.com/downloads/policies/environmental/construction/buidling.pdf>

⁹ <https://www.ebrd.com/downloads/policies/environmental/construction/pipelines.pdf>

¹⁰ Briefing note BN01: Underground and overhead services. <https://www.ebrd.com/underground-overhead-services.pdf>

Briefing note BN02: Safe excavations. <https://www.ebrd.com/safe-excavations.pdf>

Briefing note BN04: Safe working with mobile plant. <https://www.ebrd.com/mobile-plant.pdf>

Briefing note BN05: Setting up a safe site. <https://www.ebrd.com/safe-site.pdf>

¹¹ EBRD Covid-19 briefing note: Workplace risk assessment checklist. <https://www.ebrd.com/covid19-workplace.pdf>

EBRD Covid-19 briefing note: Labour requirements. <https://www.ebrd.com/covid19-labour-requirements.pdf>

EBRD Covid-19 briefing note: Stakeholder engagement <https://www.ebrd.com/covid19-consultation.pdf>

¹² <https://www.ifc.org/wps/wcm/connect/29f5137d-6e17-4660-b1f9-02bf561935e5/Final%2B-%2BGeneral%2BEHS%2BGuidelines.pdf?MOD=AJPERES&CVID=nPtguVM>

¹³ <https://www.ifc.org/wps/wcm/connect/88f41d8f-bd85-4535-a689-066d41b7ee29/Final%2B-%2BGas%2BDistribution%2BSystems.pdf?MOD=AJPERES&CVID=nPtqtS&id=1323162128496>

¹⁴ <https://www.ifc.org/wps/wcm/connect/f0167aa2-edd2-4b46-aeb6-b2935a9e6c95/Final%2B-%2BOnshore%2BOil%2BAnd%2BGas%2BDevelopment.pdf?MOD=AJPERES&CVID=nPtiaCr&id=1323153172270>

¹⁵ <http://data.europa.eu/eli/dir/2014/52/oj>

¹⁶ <http://data.europa.eu/eli/dir/2008/50/oj>

¹⁷ <http://data.europa.eu/eli/dir/2006/118/oj>

¹⁸ <http://data.europa.eu/eli/dir/2008/98/oj>

- Directive 2012/18/EU of the European Parliament and of the Council of 4th July 2012 on the control of major-accident hazards involving dangerous substances¹⁹;
- Directive 2009/147/EC of 30th November 2009 on the conservation of wild birds²⁰ and Council Directive 92/43/EEC of 21st May 1992 on the conservation of natural habitats and of wild fauna and flora²¹ (EEC Birds and Habitats Directives);
- Commission Recommendation 75/65/EEC of the Commission to the Member States of 20th December 1974 on the protection of the architectural and natural heritage;
- Council Directive 89/391/EEC of 12th June 1989 on the introduction of measures to encourage improvements in the safety and health of workers at work (OHS Framework Directive)²².

¹⁹ <http://data.europa.eu/eli/dir/2012/18/oj>

²⁰ <http://data.europa.eu/eli/dir/2009/147/oj>

²¹ <http://data.europa.eu/eli/dir/1992/43/oj>

²² <http://data.europa.eu/eli/dir/1989/391/2008-12-11>

3 PROJECT DESCRIPTION

3.1 Need and Desirability

The RNM urgently needs to replace fossil fuels with renewable energy sources and natural gas. The country is heavily dependent on fossil fuels for energy generation making it a significant per capita emitter of greenhouse gases. The RNM intends to use natural gas for primary energy production and is therefore developing gas infrastructure throughout the country. This Project –construction of the Sveti Nikole - Veles section (km 0+000.00 - km 27+674.23) – envisions the construction of an underground gas pipeline consisting of high-pressure steel pipes through which natural gas will be transported from metering and regulation stations to gas distribution networks in towns and / or industrial and other large users of gas in the areas through which it passes.

A Detailed Design Report for this pipeline section has been prepared as part of investment project documentation for the main gas pipelines in the RNM. The individual pipeline components have been based on an existing “Feasibility study for the gas system of the Republic of Macedonia with Preliminary Design” which was funded by the Ministry of Transport and Communications. The ESIA that is presented in this report is based on the Detailed Design for the Sveti Nikole-Veles main gas pipeline.

3.2 Detailed Design

The Detailed Design of the proposed pipeline was based on the previously prepared Preliminary Design which included several alternatives. The Preliminary Design, with the corridor of the main gas pipeline, had already been presented for public review and the required opinions and consents of all competent institutions were received. This main gas pipeline corridor was adopted by the RNM's Ministry of Transport and Communications and accordingly an Inter-Ministerial Committee was established, after material and a presentation by the design consortium for the Preliminary Design was officially submitted.

Because some 11 years elapsed since the preparation of the Preliminary Design several sub-alternatives were added to the Preliminary Design. The key factors for the choice of the pipeline axis included the length of the route as well as the natural and artificial obstacles, such as rivers, roads, canals, railways, infrastructure, and so forth. The certain urban plans that were adopted or being adopted were considered. The preferred alternative was subject to analysis and evaluation of biodiversity protection, social aspects and cultural heritage. As such the preferred alternative is actually the most favourable in terms of the above-mentioned criteria.

3.3 Key Project Facilities

The key Project facilities to be constructed include:

- An underground main gas pipeline DN 200, Ø 8” with a length of 27.67 km;
- An initial cleaning station (ICS) in Sveti Nikole (Sveti Nikole ICS) at the beginning of the gas pipeline (km 0);
- A receiving cleaning station (RCS) in Veles (Veles RCS) at the end of the gas pipeline (km 0+27.5);
- One connection to Sveti Nikole - DN 80 with a length of 387 m (km 6.39);
- A linear block station (BS) DN200 at km 27.5 (Veles BS);
- A block station DN80 at the end of the connection pipeline to Sveti Nikole (Sveti Nikole BS) (km 6+385);
- Sveti Nikole BS 2 (km 12+325.00);
- Optical communication network;
- Cathodic protection system; and
- Main metering and regulation stations (MMRSs):
 - Veles MMRS (25.000 – m³/h) at the end of the proposed pipeline, and

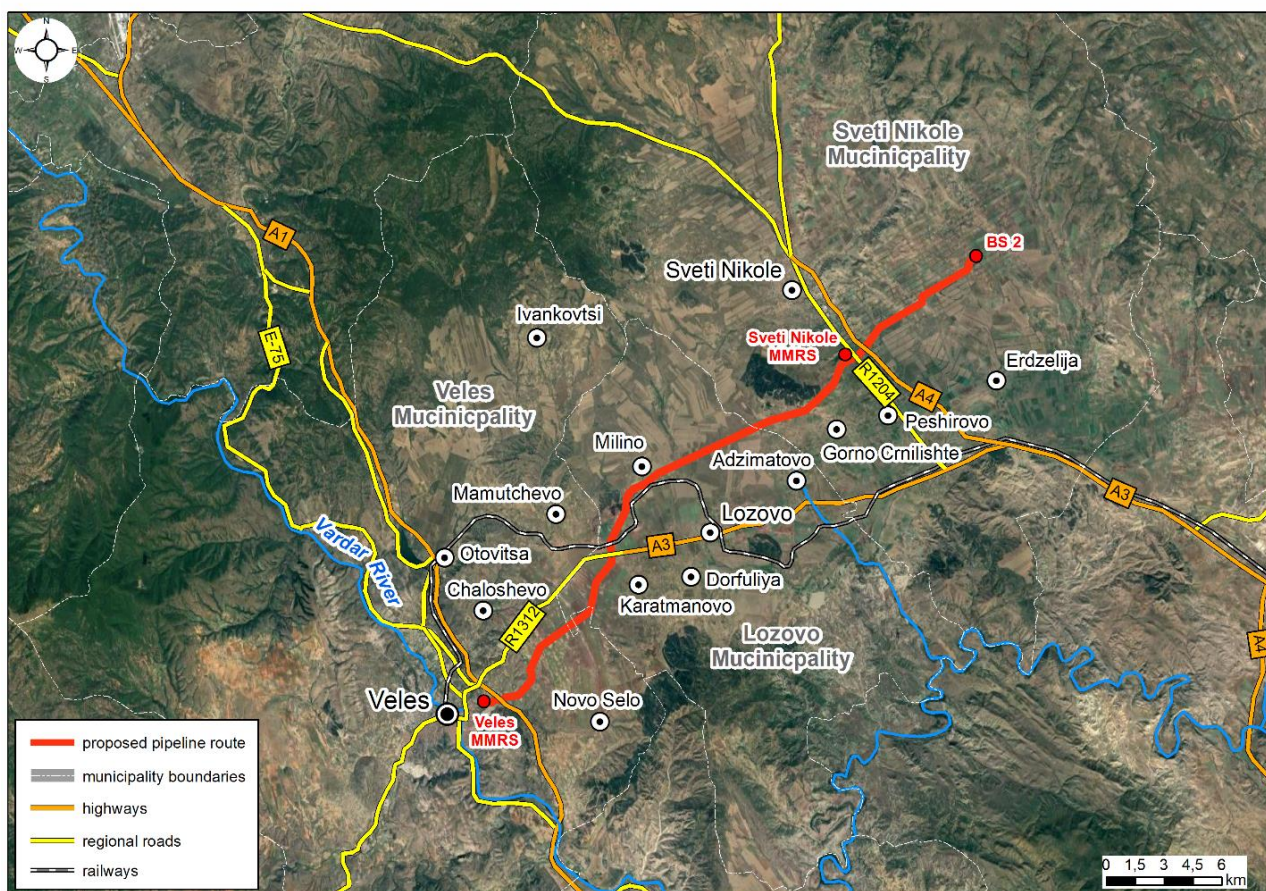
- Sveti Nikole MMRS (8.000 – m³/h) at the end of connection to Sveti Nikole.

BSs, MMRSs, and cleaning stations are fully or partially above-ground facilities. The Project will also include small-scale road construction, i.e., construction of short road sections connecting the construction corridor with the nearby public roads. Basic block stations provide automatic closing via pneumo-hydraulic control. Metering and regulation stations are to protect against the computational throughput of the pipeline and to ensure the possibility of launching the instruments for cleaning and inspection.

The proposed pipeline section will be connected to the existing main pipeline (LOT1 Klechovce-Negotino) using its block station in the vicinity of Sveti Nikole town; this block station was built to ensure connection the new pipeline section to existing network. The basic block stations provide automatic closing via pneumo-hydraulic control. Sveti Nikole ICS will be established at the beginning of the proposed pipeline, with the Veles BS, Veles RCS, and Veles MMRS at the end of the pipeline.

3.4 Description of the Pipeline Route

The pipeline begins east of Sveti Nikole town and north of Erdzelija village connecting to the existing pipeline (LOT1 Klechovce-Kavadarci) just after its Block Station (BS) 2. The Sveti Nikole – Veles Section runs southwest and ends east of the town of Veles. The proposed Sveti Nikole – Veles Section is shown in **Figure 2**.



Source: Ecoline International Ltd. based on NER's information

Figure 2. Route of the Sveti Nikole-Veles Gas Pipeline Section

The pipeline crosses the roads: Highway A4 "Miladinovci-Shtip", Regional Road R1204 "Sveti Nikole-Kadrifakovo", Local asphalt road "Milino-Lozovo", Regional Road R1312 "Milino-Karatmanovo", Regional Road R1312 "Veles-Kadrifakovo", Planned Highway "Veles-Bulgaria", Highway A1 "Skopje-Gevgelija", "Veles-Kochani" Railway and the Svetinikolska and Sariderska Rivers.

3.5 Overview of Project Implementation

3.5.1 Construction Phase

All construction activities, and vehicle movement would be undertaken within a 22m wide *construction corridor* (**Figure 3**) allocated for the Project before the start of the construction works. Within this corridor, soil will be stripped of vegetation, and topsoil and subsoil removed and stored separately, and then used again in the backfilling of the trench and rehabilitation of the surface. Heavy transport motor vehicles for transport and placement of steel pipes must also operate in the corridor.

The construction corridor must also accommodate the trench for laying the pipes, as well as storage of the excavated earth or other material, or supplied material for backfilling the trench. The construction activities for the pipeline are sequentially: pre-construction surveys, clearing of trees and bushes, stripping of all vegetation and grading the surface, pipe stringing (essentially the delivery of the pipes), pipe bending to follow the alignment, welding the pipe sections together and inspecting the welded joints, field coating of the pipeline and corrosion protection, trenching (excavating the trench), lifting and lowering the pipeline into the trench, valve installation, backfilling of the trench, pressure testing of the pipe and then clean up and rehabilitation (reestablishment of vegetation). Various parts of the pipeline will also be installed without open trenches using horizontal directional drilling (HDD) for river crossings and other obstacles that preclude trenching (**Figure 4**).

Generally, the bedding material (backfill) should be the same material from the excavation but additional material may need to be imported in certain areas depending on the quality of the excavated material. Topsoil (humus) of around 20-30 cm will be stripped and stockpiled separately, not mixed with other soil and reinstated following the closing of the trench to provide a growing layer for the reestablishment of vegetation cover. Arable land will be affected during construction, and some trees, orchards and vineyards will be affected longer term as they cannot be re-planted directly on top of the pipeline for safety reasons. The diameter of the main gas pipeline is 200 mm.

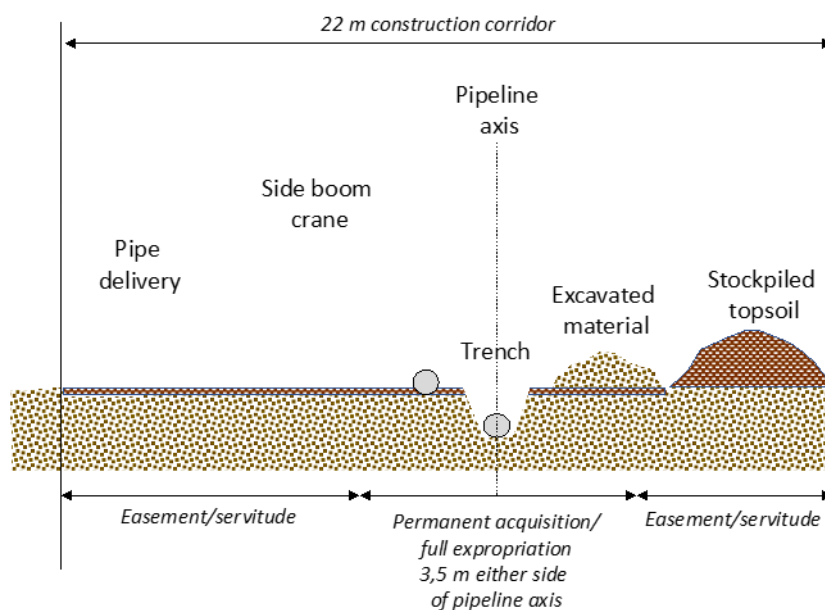


Figure 3. Scheme of the Construction Corridor²³

²³ The Construction Contractor can change the scope of works and reduce the dimensions of the construction corridor according to the conditions.

Access to reach the construction area will be via existing (dirt, compacted or asphalted) roads, whereafter the construction corridor itself can be used as for the movement of vehicles and machinery.

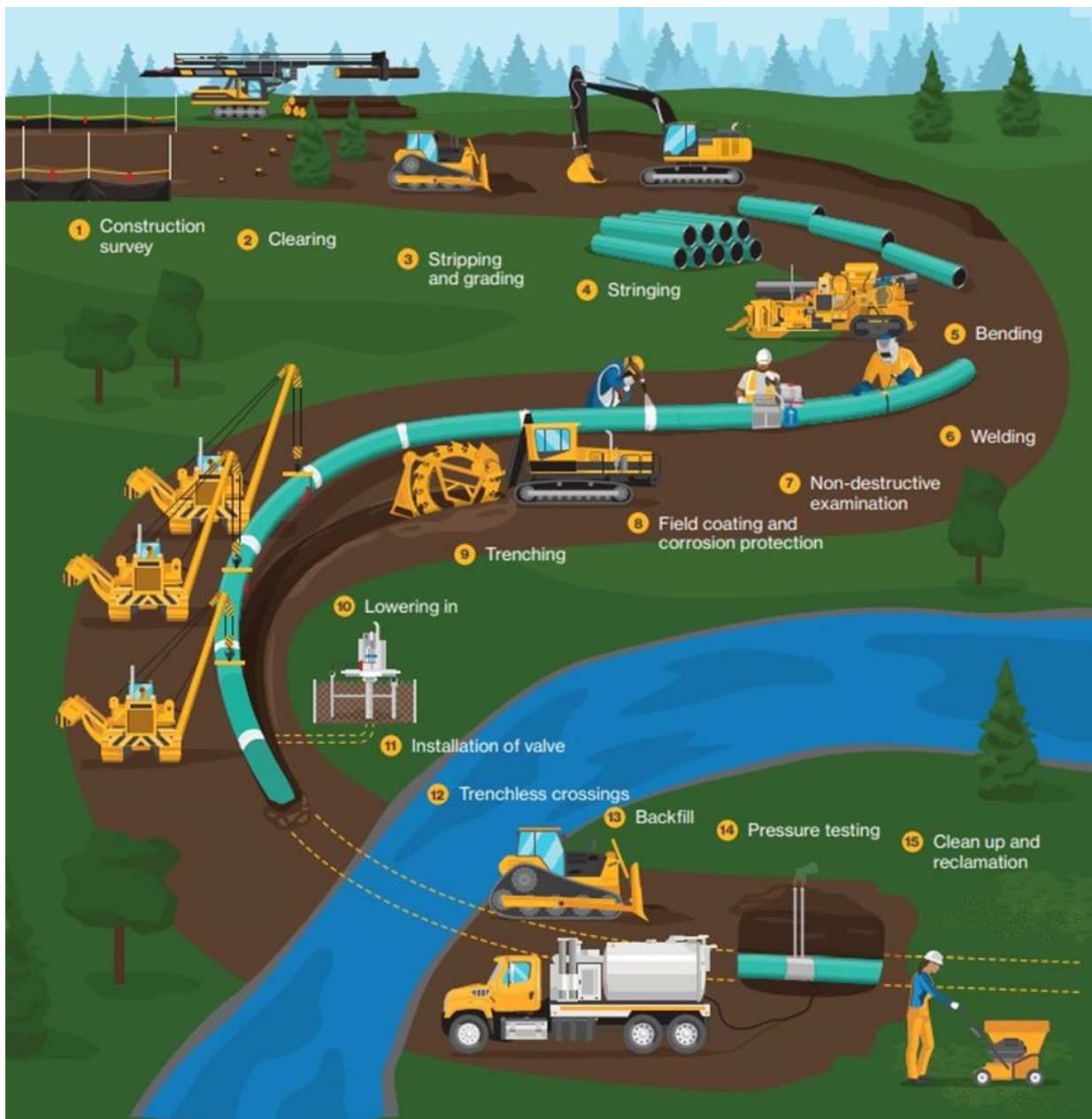
3.5.1.1 The construction Sequence

The construction sequence is detailed below and illustrated schematically in **Figure 4**:

1. Pre-construction surveys allow the identification of specific engineering challenges that need to be addressed in the implementation of the pipeline. They may also be used to identify specific environmental or social issues that need to be managed during pipeline construction.
2. Clearing of trees and bushes is required because the pipeline servitude may not have any roots that could interfere with either the construction or the operation of the pipeline. Plants that have complex root structures can simply not be allowed near the pipeline.
3. Stripping of all vegetation and grading the surface, all vegetation within the construction servitude is then stripped and the surface graded in order to provide access for the vehicles and operational machinery needed for construction
4. Pipe stringing refers to the delivery of the sections of pipe that are needed for the pipeline and laying them out informally in the pattern in which they will ultimately be placed in the trench),
5. A pipe bending machine is then used to bend the pipe to directly 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 is extremely important for the pipeline. Obviously if the pipeline corrodes over time that would be highly problematic in terms of pipeline safety and various techniques are used to minimize the risk of corrosion. The first is coating the pipeline with material that would prevent water accessing the steel and rusting. At the same time the welded joints are wrapped with an insulation binding to protect the pipe from changes in external temperature.
9. Trenching is the excavation of the trench in which the pipeline will be placed. The width of the trench is obviously a function of the pipeline diameter with some additional space to allow the pipeline to be lifted and placed in the trench. Depending on the diameter of the pipeline the pipeline can be welded together out of the trench or with larger diameter pipelines must be welded in the trench. Obviously where the pipeline is welded in the trench the trench must be significantly larger than the pipeline diameter to provide the necessary space for the welding. From an environmental point of view the smaller the trench the better, and so welding the pipeline outside of the trench is environmentally a better option.
10. Once the entire section of pipeline has been welded together and coated with corrosion protection, it is then lifted using side-lifting cranes which simultaneously lift the pipeline section and place it into the construction trench.
11. Valve installation refers to the mechanical requirements for controlling the flow of the gas and again these obviously need to be installed before the pipeline is buried.
12. Once the pipeline has been placed in the trench, excavated material is placed back in the trench and this serves to bed the pipeline down and ensure that it does not move in a manner that might damage the integrity of the pipeline. It may sometimes happen that additional backfill material is required which needs to be brought in from areas external to the pipeline construction area. Before the pipeline is buried the coordinates of every welded joint is determined so that in the event of a pipeline failure it is known where the excavation should target.

13. The pipeline is then pressure tested, normally using water. The water is pumped into the pipeline section firstly to clean the inside of the pipeline and then placed under pressure and the pressure across the pipeline section monitored to ensure that there are no leaks. The pressure testing also serves to identify weak or poor welding connections which would then fail under the pressure of the water. Once the pressure testing has been done the water needs to be safely disposed of to ensure that it does not create any environmental risks.
14. The final phase of the construction is to remove all construction material and machinery from the alignment and to reinstate the topsoil layer above both the trench and the entire construction footprint.
15. Finally, a vegetation layer is established, typically a fast-growing endemic grass so as to stabilise the reinstated topsoil and prevent erosion. From an environmental point of view the rehabilitation of the construction area is of critical importance because it not only serves to ensure that the land is returned as well as it can be to the original character but also serves to protect the backfill from being eroded and opening up the pipeline.

Various parts of the pipeline will also be installed without open trenches using HDD for river crossings and other obstacles that preclude trenching (**Figure 4**). As the pipeline is implemented there will be a number of obstacles that would preclude the use of a trench. HDD is done by excavating an access area on the one side of the obstacle to a sufficient depth to allow the pipeline to pass below the obstacle and then drilling horizontally from that excavation to allow the pipeline to be passed underneath the obstacle with excavating a trench.



Source: Civil Engineering Institute "Macedonia" J.S.C Skopje

Figure 4. Gas Pipeline Construction Phases

The route of the gas pipeline must be visibly marked. These markings are at surface at 1,000 m intervals on the flat part of the route, at each pipe fracture and before and after each passage under water flow, canal, traffic artery, railway. The markings for staking out the route of the gas pipeline are placed at 0.8 m right of the gas pipeline, axis. The markings and distances for staking out the route of the gas pipeline are in accordance with the norms prescribed in the relevant Macedonian standards.

3.5.1.2 The Construction Footprint

The layout of the construction footprint is as follows (not all areas are defined in terms of the width of the area along the entire pipeline alignment):

- area for welding pipes 6.00 m width
- space for excavating construction trench 4.00 m width
- space for placing the excavated material 4.00 m width

- space for pipe layers and longitudinal transport 5.00 m width
- temporary stockpiling of topsoil 3.00 m width
- total width of footprint 22.00 m
- minimum transversal gradient 2%
- minimum longitudinal gradient 0.0%
- maximum transversal gradient 6% (8%)
- maximum longitudinal gradient 100%

The gradients of the slopes at the cuttings and embankments which are mainly with small heights are structurally adopted and are:

- cuttings 1:1
- embankments 1:1

3.5.1.3 Manpower Requirements

It is estimated that as minimum 70-80 people will be engaged in the construction of the pipeline per the following tentative split:

- 10 management and engineering staff (geodetic, geotechnical, civil, mechanical, electrical, environmental, OHS, QC/QA staff);
- 30-40 skilled workers (welders, surveyors, machinists, crane operators, etc); and
- 10-20 semi-skilled and non-skilled workers.

Construction camps are not foreseen for the Project. It is assumed that construction workers will be based in one of the nearby towns and commute to construction sites on daily basis, which is in line with the GIP practice for construction works.

Due to the procurement requirements, a Europe-wide tender will be undertaken. Therefore, it is uncertain whether a North Macedonian company will be commissioned as the Construction Contractor. At the same time, it is assumed that (considerable) part of the manpower needs would be covered by citizens of the country.

3.5.1.4 Transverse Profiles

Different transverse profiles are required as a function of the topography of the land being traversed by the pipeline viz. flat, sloping or ridge compared to the axis of the pipeline (**Figure 5**). The complexity and scope of the required earthworks depends on the size of the transversal gradient of the terrain.

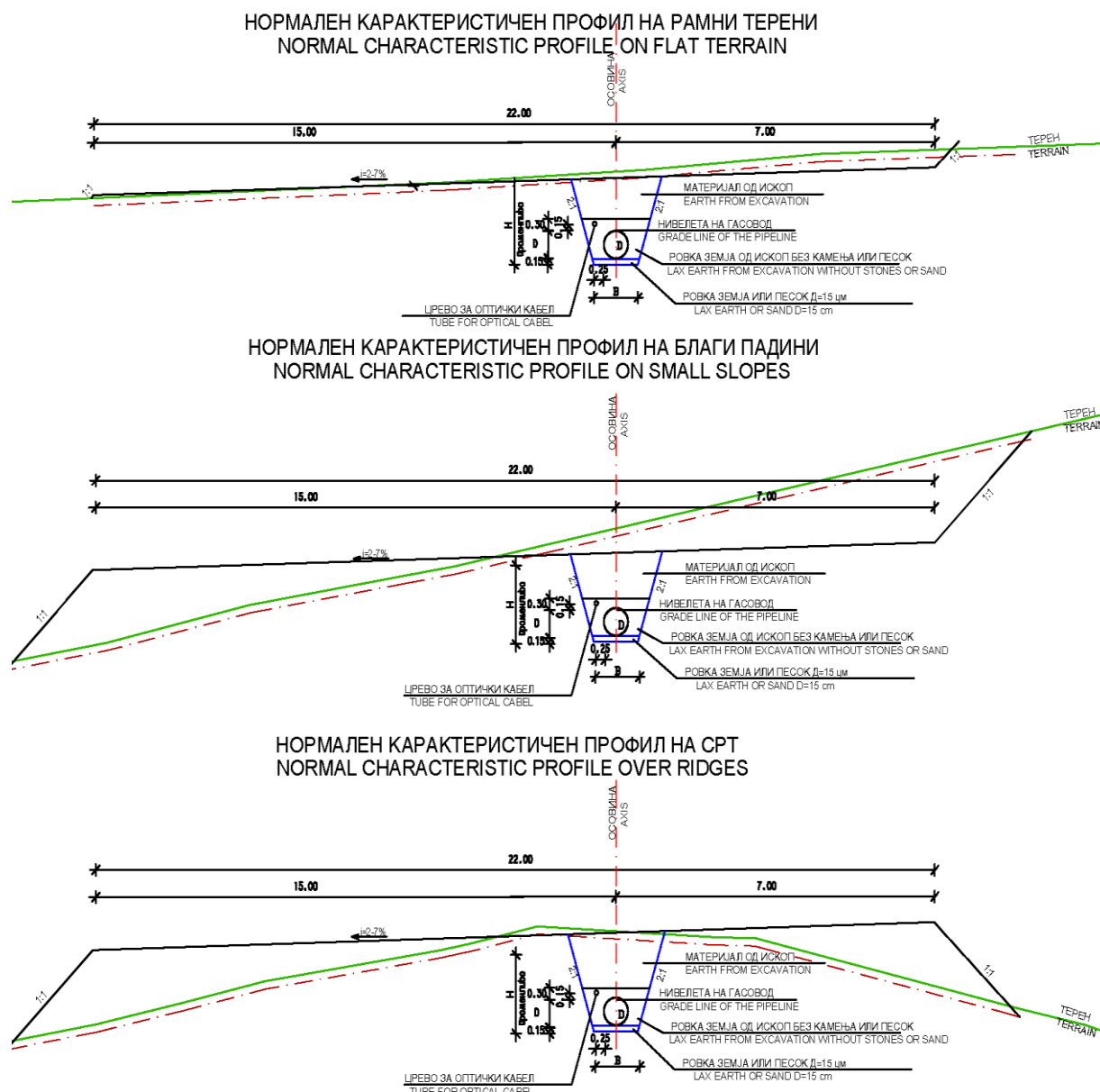


Figure 5. Trench Appearance and Characteristic Transverse Profiles

3.5.1.5 Erosion protection

To ensure safe operating conditions during construction of the gas pipeline and additional works, protection against erosion, landslides, protection must be provided against erosion.

Measures to prevent erosion and landslides

Consolidation of soils disturbed during the construction of the gas pipeline and reduction of erosive processes occurred during them are the main task to ensure safe operating conditions.

Drainage canals intersected by the gas pipeline must be reinforced with crushed stone, as well as stone-filled drainage sites.

Where the gas pipeline passes through ravines and ditches these should be filled with mineral soil and compacted.

3.5.1.6 Intersection with Natural Obstacles or Other Existing Infrastructure

Multiple natural and anthropogenic obstacles will be crossed by the pipeline as shown in **Table 1**.

Table 1. Number and Type of Obstacles

No.	Obstacle type	Quantity
1	Railway	1
2	Roads	
2.1	Local roads	1
2.2	Regional Roads	3
2.3	Highway	2
2.4	Dirt roads	43
3	Underground infrastructure	
3.1	Telecommunication cables	6
3.2	Preliminary pipeline	1
3.3	Pipelines	12
4	Transmission lines	
4.1	400 kV	1
4.2	110 kV	2
4.3	35 kV	3
4.4	10 kV	4
5	Ravine	10
6	Canals	5
7	Rivers	2

Table 2. Chainage at the Crossing Where Each Obstacle is Located

No.	Chainage at the crossing	Obstacle type
1	0+008.84	Dirt road
2	0+807.12	Dirt road
3	0+951.33	Dirt road
4	1+887.38	Dirt road
5	2+702.98	Dirt road
6	2+717.04	Concrete covered channel
7	2+745.50	Dirt road
8	3+263.32	Irrigation pipeline
9	3+300.52	Pipeline "9" Ø 250 mm for irrigation
10	3+563.05	Ravine
11	3+952.97	Dirt road
12	3+997.36	Irrigation pipeline
13	4+110.77	Pipeline "10" Ø 250 mm for irrigation
14	4+696.96	Pipeline "11" Ø 250 mm for irrigation
15	4+885.94	Ravine

No.	Chainage at the crossing	Obstacle type
16	5+126.36	Irrigation pipeline
17	5+340.62	Dirt road
18	5+509.61	Underground optical cable
19	5+708.23	Transmission line 35 kV
20	5+717.77	Pipeline "12" Ø 250 mm for irrigation
21	5+765.39	Highway A4 "Miladinovci-Shtip"
22	5+788.14	Underground transmission line 35 kV - EVN
23	6+083.46	Dirt road
24	6+162.04	Svetinikolska River
25	6+262.08	Regional Road R1204 "Sveti Nikole-Kadrifakovo"
26	6+298.54	Underground copper cable for telecommunications
27	6+306.28	Underground optical cable
28	6+311.87	Water supply pipeline "Probishtip-Kratovo"
29	6+354.63	Transmission line 10 kV
30	6+535.22	Dirt road
31	6+771.49	Dirt road
32	7+081.83	Irrigation pipeline
33	7+095.63	Dirt road
34	7+140.39	Dirt road
35	7+895.13	Dirt road
36	7+903.92	Concrete channel
37	7+961.54	Dirt road
38	8+502.54	Dirt road
39	8+521.23	Dirt road
40	9+180.66	Dirt road
41	9+188.82	Ravine
42	9+435.25	Planned Oil Pipeline "AMBO"
43	10+155.31	Dirt road
44	10+703.24	Dirt road
45	10+869.10	Dirt road
46	10+932.03	Ravine "Dlabok Dol"
47	10+948.00	Dirt road
48	11+227.65	Ravine
49	11+904.42	Dirt road
50	12+297.84	Dirt road
51	13+247.30	Dirt road

No.	Chainage at the crossing	Obstacle type
52	14+063.73	Dirt road
53	14+125.46	Dirt road
54	14+453.00	Dirt road
55	14+692.28	Ravine "Livadski potok"
56	14+735.63	Dirt road
57	14+740.41	Underground copper cable for telecommunications
58	15+022.96	Ravine "Gjuzumilska River"
59	15+461.85	Transmission line 10 kV EVN
60	15+521.75	Underground copper cable for telecommunications
61	15+527.35	Local asphalt road "Milino-Lozovo"
62	15+530.31	Water supply pipeline "Milino-Lozovo-Karatmanovo"
63	15+713.72	Water supply pipeline for the village of Milino
64	15+715.39	Dirt road
65	15+950.58	Dirt road
66	16+224.73	Regional Road R1312 "Milino-Karatmanovo"
67	16+229.77	Water channel
68	16+399.07	Dirt road
69	16+958.40	Sariderska River
70	17+556.09	Ravine
71	18+966.27	Dirt road
72	18+983.12	Railway "Veles-Kochani"
73	19+219.44	Transmission line 110/400 kV MEPSO - TS Veles - TS Ovche Pole
74	19+381.16	Soil canal
75	19+389.79	Regional (express) road R1312 "Veles-Kadrifakovo"
76	19+399.15	Water channel
77	19+404.65	Dirt road
78	19+446.56	Underground optical cable
79	19+452.11	Planned highway "Veles-Bulgaria"
80	19+724.25	Gullies "Jaruga"
81	20+420.83	Dirt road
82	21+401.68	Dirt road
83	21+539.58	Dirt road
84	21+855.09	Oil pipeline "Skopje-Thessaloniki" Ø 406 mm
85	22+475.13	Dirt road
86	23+567.56	Transmission line 35 (110) kV EVN
87	24+346.40	Transmission line 400 kV MEPSO

No.	Chainage at the crossing	Obstacle type
88	24+383.64	Dirt road
89	24+812.67	Dirt road
90	25+108.29	Dirt road
91	26+528.58	Dirt road
92	26+874.97	Dirt road
93	26+876.39	Underground transmission line 10 kV - EVN
94	26+983.99	Highway A1 "Skopje-Gevgelija"
95	27+062.38	Transmission line 10 kV EVN
96	27+175.06	Ravine
97	27+388.84	Transmission line 110 kV MEPSO

3.5.1.7 Crossing Roads and Railways Lines

When intersecting roads and railway lines, regulations require that the angle of intersection is between 60° to 90°. The laying depth is respectively 1.35 m from the upper edge of the road pipe and 1.50 m for railway. All road and railway crossings require additional protection, with a diameter of 200 mm larger than the main pipe. To prevent interference with road and railway traffic all crossings will be HDD.

3.5.1.8 River Crossings

Rivers will also be crossed using HDD at least 1.5 m below the bottom of the water flow.

A water management agreement (permit) must be obtained for all river crossings.

3.5.1.9 Construction of Above-ground Structures

Structure description:

- A MMRS is a ground floor concrete structure with a steel roof, with dimension 10x18x4 m (the fence is about 25x40 m); the MMRS is for regulating and metering the gas.
- BSs are partially above-ground structures, i.e., above the terrain, where the actuators used for regulation of the valves installed underground, as well as the manometers and valves for taking gas samples are housed. A BS is used for regulating the valves, or for turning on, or shutting off the gas in the section.
- Initial and receiving cleaning stations are partially above-ground structures, i.e., above the terrain, for the manometer, thermometers and ramp for receiving and launching the cleaning pig.

Pipeline pigging is a concept in pipeline maintenance using devices known as pigs, which clean pipelines and while checking pipeline conditions. This cleaning and inspection are done without materially changing the flow of product in the pipe. The initial cleaning station (Sveti Nikole ICS) will be at the start of the pipeline with the receiving cleaning station at the end. The pigs move inside the pipeline.

There are also two block stations, Sveti Nikole BS 2 at km 12+325.00 and Veles BS at km 27+500.00 which allow the flow to be stopped for a certain section of the line when maintenance is required, without interfering with supply to other consumers.

To provide gas to Sveti Nikole and Veles, as well as for the local industry, Sveti Nikole MMRS (with maximum consumption of 8,000 m³/h) and Veles MMRS (with maximum consumption of 25,000 m³/h) will be built. Within the MMRS, the gas pressure is reduced from inlet 54 bar to the outlet 13-10 bar and the gas flow velocity is measured to provide gas to the local distribution network. A boiler

house will preheat the gas before the pressure reduction, in order to avoid the impact of Joule-Thomson effect (gases cool when pressure is reduced). Inlet and outlet fire cranes are installed on the MMRS inlet pipeline and the MMRS outlet pipeline.

3.5.1.10 Gas Pipeline Testing

After the finalization of the construction and installation activities, before the examination of the strength and permeability of the steel pipeline (hydro test), it is necessary to clean it from the inside, in order to remove all dirt, sand, dust, construction waste, corrosion, factory cinder and trapped water.

3.5.2 Operational Phase

3.5.2.1 Regular Operation

Regular operation means the transfer of natural gas through the pipeline with a prescribed minimum pressure of 20 bar and a maximum pressure of 54 bar. Pressures and conditions along the gas pipeline will be routinely monitored and regular maintenance and monitoring of the gas pipeline will consist of:

- Monitoring the valves and control points of the gas pipeline with gas leaks monitored through gas detection sensors;
- Valve boxes are maintained;
- The cathodic protection is checked through voltage monitoring and anodes replaced whenever necessary.

According to GIP, pipeline operation is usually monitored and controlled from a central location through a supervisory control and data acquisition system (SCADA) which allows field operating variables to be monitored such as flow rate, pressure, and temperature and to open and close valves. The SCADA system is envisioned to be installed for the Project.

3.5.2.2 Repair Works

The main pipelines belong to a regulated area. EU norms and national regulations apply to them. The Rulebook on the use of pressure equipment is valid in the RNM (OG of RM No. 32/09). It stipulates that the main gas pipelines should be periodically inspected every five years, as follows:

- technical inspection of the exterior;
- technical inspection of the interior;
- integrity check.

These works will require excavation of the pipeline.

3.5.2.3 Manpower Requirements

During the operational phase it is planned to

The Company will merge with GAMA Joint Stock Company (GAMA), which is an operator of the existing gas transmission system. GAMA's existing maintenance and monitoring staff will become part of the NER staff and be engaged in maintenance and monitoring works during the operational phase.

Managers, engineers and skilled workers will be assumingly organised into maintenance crews based at the Company's headquarters and visiting the Project facilities as needs be.

3.5.3 Decommissioning the Pipeline

If the pipeline operation is permanently stopped, the system should be preserved to prevent damage to the pipeline. The design lifetime of the pipeline could be extended provided there is a detailed technical assessment of the condition of the line prior to deciding on extending the lifetime. If the decision is made to decommission the pipeline, then a detailed decommissioning plan will need to

be developed and submitted to the authorities for approval. Within that decommissioning plan the infrastructure that is to be left in situ versus that that would be demolished and removed is to be defined. It seems highly unlikely that the pipeline itself would be ever excavated as this would simply require the re-disturbance of the already rehabilitated construction works.

3.6 Land Acquisition and Land Use Restrictions

3.6.1 Project Land Requirements

The Project land requirements includes land for construction of the pipeline, supporting above-ground facilities (i.e., cleaning stations, BSs and MMRSs) and short sections of roads connecting the construction corridor with the existing road network.

The land allocated for a proposed pipeline is a 22m strip along the proposed pipeline axis (the construction corridor) (**Figure 3**). The construction corridor will include a proposed *operations and maintenance corridor*, which is 3.5 m to both side of the pipeline axis. Land within this 7 m corridor is subject to permanent land acquisition (full expropriation); land ownership rights on this area will be obtained by the RNM and then transferred to NER. As stated by NER, for the remaining part of the construction corridor the right of easement will be established temporarily, i.e., this is an area of temporary land acquisition. After the completion of construction works, the ownership and other property rights of the landowners/right-holders over the temporarily taken land plots will be restored.

Geodetic Report for the Project (2021)²⁴ presents permanent and temporary land take estimates covering only the pipeline and supporting above-ground facilities; land requirements for the short connection roads will have not determined yet. The Project requires acquiring 381 land plots (208,850 m²) permanently and 451 plots (413,670 m²) temporarily.

The total area required for the above-ground constructions is 5,459 m² (**Table 3**), which are subject to permanent land acquisition.

Table 3. Land Requirements for Above-Ground Facilities

	Above-ground Facility	Area, m ²
1.	Construction of Sveti Nikole ICS	375
2.	Construction of Sveti Nikole BS	196
3.	Construction of Sveti Nikole MMRS	1,200
4.	Construction of Sveti Nikole 2 BS	179
5.	Construction of Veles BS and Veles RCS	1,009
6.	Construction of Veles MMRS	2,500
	TOTAL	5,459

3.6.2 Land Use Restrictions During Operational Phase

The 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) imposes the following restriction (buffer) zones along the operational pipelines where various land use restrictions are applied.

- 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 (Article 8);

²⁴ Geo-Kat Engineering Company for Geodetic Work, Design and Consulting. 2021. Geodetic Report for Geodetic Work for Special Purposes Elaborate for Permanent and Temporary Expropriation. Business Number: 0801-197/21.

- Restriction Zone 2 – a land corridor of 30m on both sides of the pipeline axis where it is forbidden to construct residential buildings (Article 9)²⁵;
- Restriction Zone 3 – a land corridor of 200m on both sides of the pipeline axis where population density limits should be adhered to (Article 10).

According to current design solutions, the pipeline's operations and maintenance corridor is a land corridor of 3.5 m on both sides of the pipeline axis. Therefore, Restriction Zone 1 will comprise: i) the 7m operations and maintenance corridor permanently acquired by the Company and ii) 1.5 m strips on both sides of the corridor not owned by the Company during the operations but subject to agricultural land use restrictions; this area totals 84,000 m².

3.7 Analysis of Alternatives

3.7.1 Best Practicable Environmental and Social Option

Optimizing the alignment of the pipeline to avoid sensitive environmental and social elements is the key to reducing the potential impacts of the pipeline. The following criteria has been used to optimize the routing:

1. Restrictions from the national and local authorities;
2. The shortest overall distance;
3. Maintaining safety distances from other infrastructure
4. Avoiding protected areas, such as national parks and minimizing land acquisition
5. Targeting areas with low land price;
6. Access to the route during the construction;
7. Avoiding steep slopes especially those exceeding 45 degrees;
8. Large side slopes should be avoided (side or cross slopes), as much as possible;
9. Avoiding watercourses, regional roads, motor ways, railroads, seismically risky areas, other large pipelines and overhead transmission lines;
10. The pipeline alignment to intersect other infrastructure at angles of greater than 70°
11. The minimum distance from the gas pipeline route to the existing facilities should be at least 20 m;
12. The following areas should be avoided wherever possible or minimized:
 - Areas with geological/geotechnical implications, such as: unstable slopes, erosive soils, rocky terrains, potential landslides, etc.;
 - Areas prone to flooding and areas with high levels of groundwater;
 - Existing or planned construction areas;
 - Areas which are of historical and archaeological interest;
 - Legally protected areas;
 - Recreational areas, airports, etc.;
 - Military restricted areas;
 - Areas zoned for future development purposes;

²⁵ As an exception to this provision, residential buildings may be built in a zone narrower than 30 m if their construction was already envisioned by the urban plan before the design of the pipeline and if special protection measures are applied. Thereby the smallest distance between the residential building and the pipeline can be a) 10 m for a 125 mm diameter pipeline; b) 15 m for a 125 mm to 300 mm diameter pipeline; c) 20 m for a 300 mm to 500 mm diameter pipeline, and d) 30 m for pipelines with diameter larger than 500mm (Art. 9 of the Rulebook).

- Areas comprising planned future projects;
- Dangerous areas that could have an impact of the integrity of the gas pipeline, such as areas with reservoirs, factories for storing explosives, mines and other dangerous installations;
- Areas with underground man-made obstacles.

13. Other requirements:

- Cathodic protection systems for other facilities;
- Low and high voltage earthing cables;
- Earthing systems;
- Power transformer stations;
- Solar cell stations;
- Wind turbine stations;
- Aggressive (corrosive) areas.

3.7.2 Determination of the Route

Four potential routes for the pipeline were initially proposed with each assessed according to criteria described above. The corridor is mainly agriculture, mostly ephemeral crops (like vegetables and cereals), perennial plants (such as orchards and vineyards) and pastures, while forest areas (mostly remnants of thermophilus oak forests) are negligible. Dry pastures are secondary habitats primarily due to permanent degradation of forest phytocenoses (mainly oak), but also due to re-colonization of abandoned agricultural areas by pasture species. All potential routes pass through agricultural areas, mostly fields with already high anthropogenic impact. The preferred alignment mostly follows the white alternative, with small adjustments (**Figure 6**).

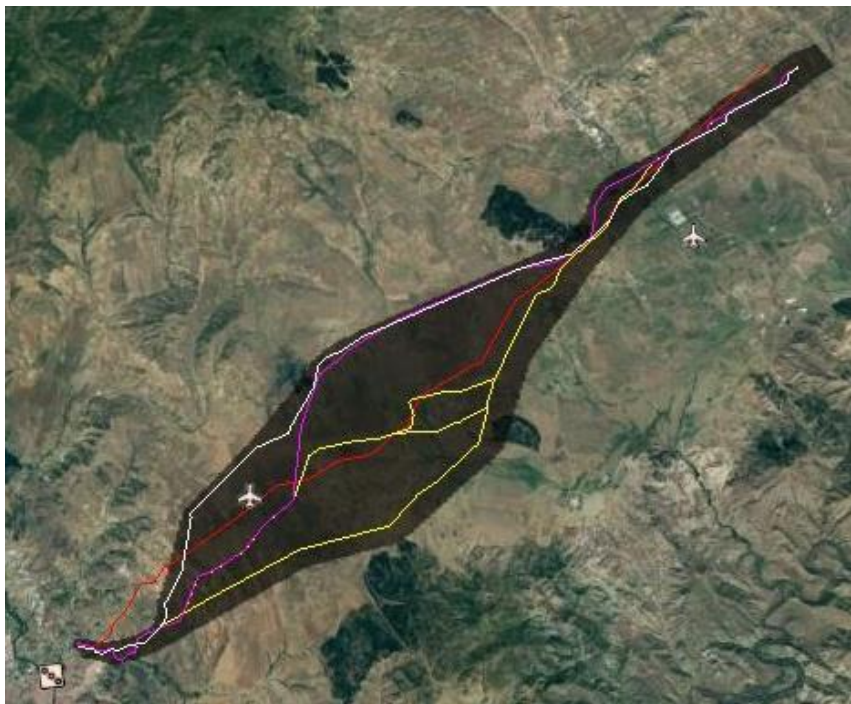


Figure 6. Proposed Alternative Routes

Table 4. Summary of Alternatives Assessment

Criteria	RED	PINK	YELLOW	WHITE	Comments
	Rate	Rate	Rate	Rate	

Criteria	RED	PINK	YELLOW	WHITE	Comments
Well-developed Forest	0	0	0	0	All alternatives pass through agricultural areas where the main land use is arable land and livestock breeding (grasslands), while forest areas (mostly remains of thermophilus oak forests) are negligible. Dry grasslands are secondary habitats primarily because of permanent degradation of forest phytocenoses (mainly Oak), but also due to recolonization of abandoned farmland by grassland species
Environmental impacts	-1	-1	-1	-1	All alternatives pass through agricultural areas, mostly fields and acres with high anthropogenic influence. Even without the project, there is environmental impact: noise, air, soil and water pollution) by agricultural machinery and traffic on the regional and access roads to agriculture fields. Anthropogenic influence is significant owing primarily to habitat alteration and intensification of agriculture, but also increasing use of pesticides. According to Integrated Biodiversity Assessment Tool, agriculture is the most significant threat to species that occur in the country
Crossing through bio-corridor	-1	-1	-1	-1	All alternatives pass through the Steppe Bio Corridor Karatmanovo-Ivankovci, which connects the steppe core areas of Dolna Bregalnica and Gradishtanska Planina
Mammals distribution	-2	0	-2	0	The area of the Gjuzumliska River is important area for mammals and yellow and red alignment alternatives pass through this area
Protected Areas under National legislation	0	0	0	0	No alternatives pass through protected areas according to the National legislation
Areas proposed for protection according to the Spatial Plan of the RM	0	0	0	0	No alternatives pass through Areas proposed for protection according to the Spatial Plan of the RM
Areas proposed for protection in Spatial Plan of East planning region	-2	0	-2	0	Red and yellow alternative pass through the proposed Nature Park "Gjuzumliska River". The area spreads over an area starting near and east of the village Dorfulija, along the Gjuzumliska River and surroundings of the village of Kjoseleri. The basic value of the area proposed for protection – Nature Park "Gjuzumliska River" is the presence of plane grasslands (humid and mesophilic) that are still used for livestock feed. Apart from grasslands, the area also encompasses Gjuzumliska River with riparian vegetation of willows and canes
Emerald sites	-1	-1	-1	-1	All alternatives are passing through Emerald sites. Emerald site "Ovche Pole" has been identified for conservation of bird species included in Resolution 6 (type "A") and its ornithological values are described in the section on Important Bird Area "Ovche Pole"
Important Plant Areas	-1	-1	-1	-1	All alternatives are passing through IPA Ovche Pole Bogoslovec. It covers areas under grasslands on Paleogene sediments – steppe-like vegetation, as well as habitats with halophytic vegetation (Continental inland habitats with halophytic (salt) herbs and herbaceous plants - E6.2) and Pannonic salt steppes and saltmarshes - E6.21 and Helleno-Balkan savory steppes [<i>Satureja montana</i>] – E1.21). Saline soils in the RNM are well represented in this area. Therefore, vegetation in this IPA has great national importance. IPA „Ovche Pole-Bogoslovec" includes four species of criterion A, namely <i>Galium rhodopeum</i> , <i>Hedysarum macedonicum</i> , <i>Salvia jurisicii</i> and <i>Anchusa macedonica</i>

Criteria	RED	PINK	YELLOW	WHITE	Comments
Important Bird Areas	-1	-1	-1	-1	All alternatives pass through IBA Ovche-Pole, mostly Western slopes which support important population of Lesser Kestrel, where significant reductions in numbers of breeding couples have been observed. The area also supports large populations of several steppe species (Short-toed Lark, Calandra Lark, Steppe Pipit, Stone Curlew), other important and/or rare bird species (Roller, Rock Partridge, Lesser Grey Shrike, Masked Shrike), and Griffon and Egyptian Vultures and numerous individuals of different prey birds species can be seen
Prime Butterfly Areas	0	0	0	0	No alternatives pass through PBA sites
KBA	-2	-1	-2	-1	All alternatives pass through KBA Ovche Pole, and yellow and red are passing through KBA Babuna-Topolka-lower Bregalnica too
Ecosystem Services	-1	-1	-1	-1	All alternatives are passing through agricultural areas, mostly wheat fields that are very important for existence of the local stakeholders. Hedges have ecosystem services too
Critical Habitats	-1	-1	-1	-1	<p>According to PR6, Steppe-like Grasslands and Riparian Willow-Poplar Woodlands & Belts that could be seen here are categorized as critical habitats. Yellow and pink are passing near/through small areas with riverside forest near Veles (Drenov Potok) and yellow and red near Gjuzumlska River. Parts of riverine forest of Svetinikolska River will be impacted by all alternatives.</p> <p>The area of dry grassland is represented on some place, only in the vicinity of v. Chaloshevo, v. Karatmanovo, v. Hadzimatovo, Dolno Crnilishte, Dorfulija, Azambegovo mostly presented by alliance Saturejo-Thymion etc. Nevertheless, this is not a real steppe. As a result of anthropogenic influences these grasslands are degraded and isolated, and preliminary results showed that they have no characteristic halophytic vegetation and are so confined by agricultural lands that they only exist in a strip. This area of habitat is significantly modified, confined and isolated from the main body of the grasslands. Further field work will give more data.</p> <p>At 41° 45' 14,90" N; 21° 50'53,98"E (≈ 21+700.00 km) locality Nezirlik Ardi yellow and pink alternative are passing through Typha reedbed developed along the slow waters of the water canals. This is very important place for wildlife – reproductive centre for amphibians, but also for aquatic insects and birds</p>
Flood risk and climate change	0	-2	-2	-1	Sedges can help deliver scheme objectives, through purifying water, reducing flood risk, preventing soil loss from fields, supporting pollinators and assisting with carbon storage and reduction in greenhouse gas emissions. Only the red alternative and part of white are not crossing through sedges (near Sveti Nikole)
Settlements	0	0	0	0	All alternatives have an impact on settlements, however there is some distance between the alignment and the houses or structures . There are no informal settlers within the planned corridor of all alternatives and some of the settlements have been depopulated or have small number of inhabitants
Land acquisition	0	-3	-2	-1	<p>All alternatives pass through agricultural areas. With a total length of 28.784 km, the pink alternative is the longest.</p> <p>Where possible boundaries of land plots should be followed (if possible) to avoid orphaning land.</p> <p>In addition, it is useful to consult the legal experts on the possibility of applying the Law on Ownership and Other Real Rights (Article 25)</p>

Criteria	RED	PINK	YELLOW	WHITE	Comments
Community concerns and stakeholder feedback ²⁶	1	1	1	1	Affected municipalities provided inputs for the planned project which has been considered in the planning.
Integrity of the cultural values in the region	0	0	0	0	All alternatives pass through regions with cultural heritage value, but impacts are limited by the distance between the sites and monuments and planned routes of the pipeline
Authenticity of the cultural values in the region	0	0	0	0	All alternatives pass through the authenticity region. Examined from the aspect of conservation there will not be any direct impacts because of the distance of sites and monuments from the route.
Distribution of archaeological sites	-2	-1	-2	-1	The red alternative passes close to 12 of 16 analysed archaeological sites, yellow alternative near 10, pink near 9, while white is near 8.
Distribution of buildings and complexes	0	0	0	0	No alternatives pass through cultural buildings and complexes in this area
Cultural landscapes	-1	-1	-1	-1	All alternatives are passing through cultural landscapes in the region
Distribution of intangible heritage and associations	0	0	0	0	No alternatives pass through areas with intangible heritage and associations
Protected Cultural Areas under National legislation	0	0	0	0	All alternatives aren't passing through areas proposed for protection according to the National legislation
Development of Rural tourism	1	1	1	1	All alternative routes are passing near the villages in the region and will have a slightly positive impact on the development of rural tourism in the region
Total	-14	-13	-18	-10	According to the preliminary rating, WHITE ALTERNATIVE has smaller impact followed by pink

0 no consequences

(-) 1 slightly negative impact

(-) 2 moderate negative impact

(-) 3 highly negative impact

(+) 1 slightly positive impact

(+) 2 moderate positive impact

(+) 3 highly positive impact

The Red and Yellow Alternatives were immediately discarded due to:

- Traversing the proposed Nature Park "Gjuzumliska River";

²⁶ Community concerns are open trenches, animal crossings, appropriate signage to avoid injuries of people and animals, non-local people, and so forth. Continued stakeholder engagement is fundamental for successful implementation of the project in speedy resolution of problems.

- The area is spread over an area that starts near and east of the village Dorfulija besides the Gjuzumliska River and the outskirts of the village Kjoseleri. The basic value of the area proposed for protection - Nature Park "Gjuzumliska River" is the presence of flat pastures (wet and mesophilic) that are still used for the production of animal feed;
- Besides grasslands, the area includes the Gjuzumliska River with riparian vegetation of willows and reeds;
- The two alignments are near the Kanda Geoglyph north of the village Dolno Crnilishte.

Minimisation of Land Acquisition

To minimize land acquisition, NER strove to avoid residential areas and privately owned land. Where agricultural land was seen to be affected the pipeline was aligned with the borders of the properties as far as possible. No residential houses are located within the 30 m safety zone. In both Veles and Sveti Nikole, the route is several hundred metres away from the urban area. Land with perennial trees was also avoided.

Significant biodiversity features

To avoid significant biodiversity features the Pink and White Alternatives were combined to create Alternative 1. This alternative passes through 3 municipalities (Sveti Nikole, Lozovo and Veles) with 2 settlements in the corridor of 2 km (Milino - km 15+750.00 and Karatmanovo - km 20+000.00). The alternative crosses 2 Highways (A4 and A1) and one Regional Road (R1204) and population density in the corridor is moderate (Milino has 334 inhabitants, and Karatmanovo 520). The alternative passes through agricultural land, however, which is cultivated by residents from neighboring settlements (villages and cities). What had to be avoided though, was a Typha reedbed which provides important wildlife habitat. Additional changes include:

1. Locality of Nezirlik Ardi (Figure 7)

- Significant biodiversity features (final route is at ≈ 220 m distance).
- Reed belt (EUNIS habitat D5.1).
- At ($\approx 21+700,00$ km) yellow and pink alternative were aligned through Typha reed belt which creates reproductive habitat for amphibians, but also for aquatic insects and birds.

Ovche Pole is an arid area and the reedbed provides specific conditions for amphibians, whose life cycle depends on water bodies (ponds, swamps and wet meadows). Such an example was observed at the locality of Nezirlik Ardi.

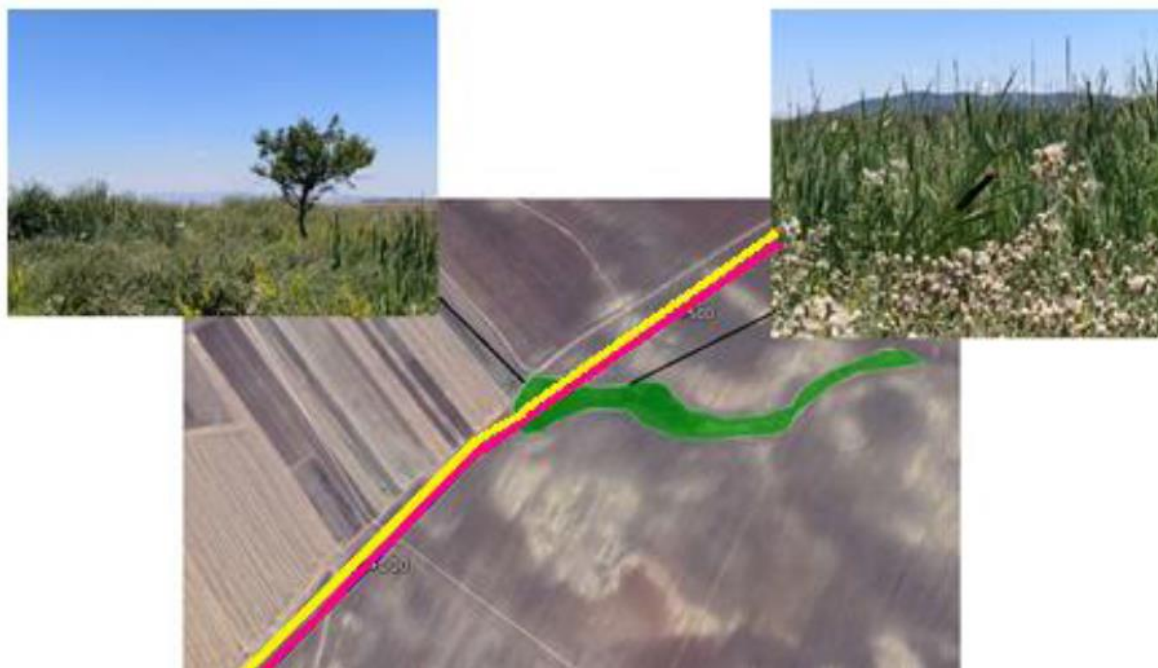


Figure 7. Nezirlik Ardi (Green) and the Alternative Routes which are Passing through It

2. Gjuzumliska River

The Gjuzumliska River has been proposed for protection as a nature park - IUCN category IV; The area proposed for protection pastures and meadows (wet and mesophilic) and good willow and polar woodland ([Appendix 3](#)).

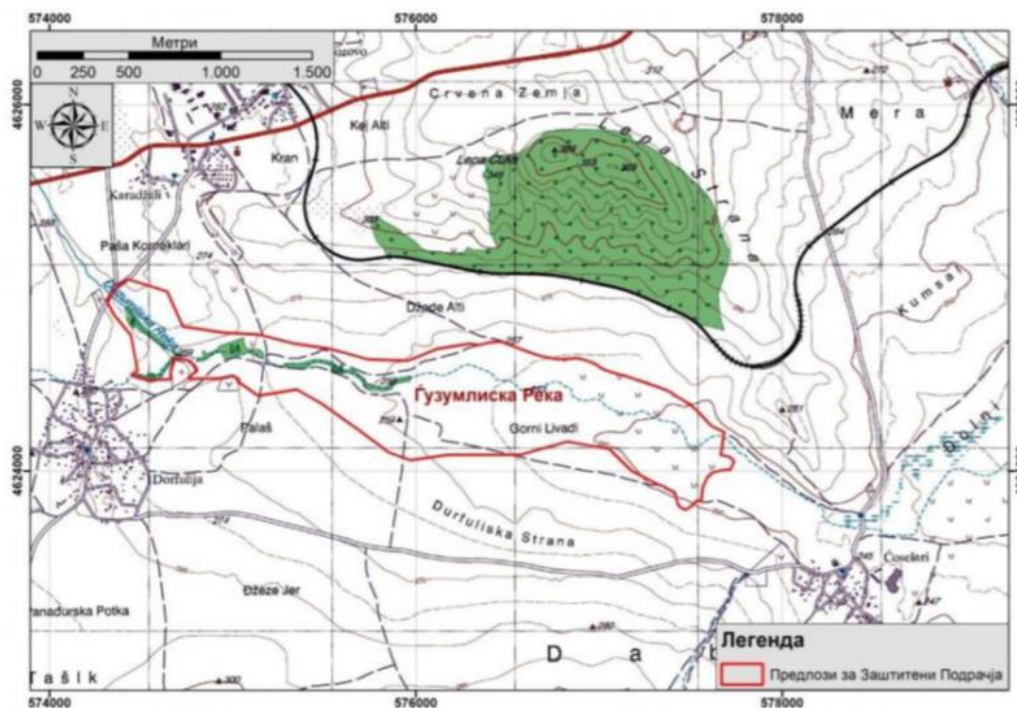


Figure 8. Gjuzumliska River²⁷

²⁷ <http://www.bregalnica-ncp.mk/>

3. Key Biodiversity Areas

- The region also has a number of key biodiversity areas (KBAs) namely Taorska Klisura and Babuna-Topolka-lower Bregalnica which also need to be avoided as far as possible (**Figure 9**).

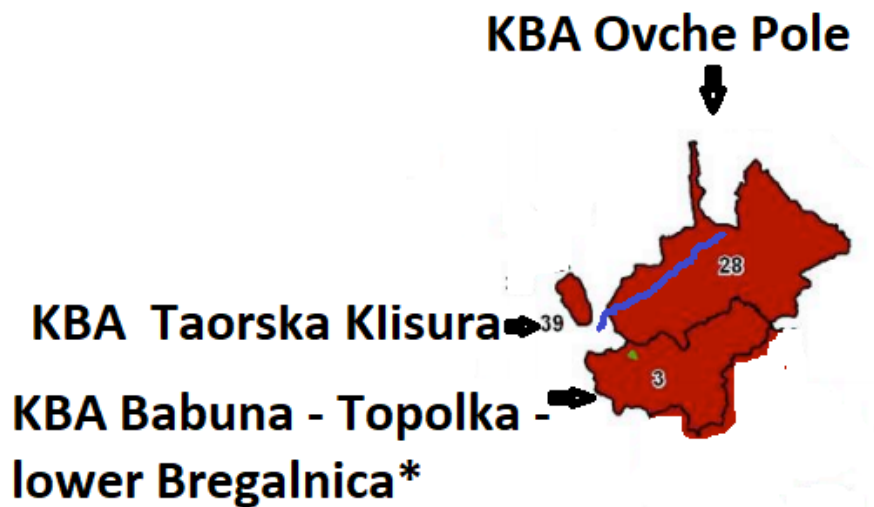


Figure 9. KBA's (in Red) and Final Route (in Blue) (as White in the Text)

Alternative 1 was then modified to minimize the impact on the KBAs which was named alternative 2, and which is deemed to be the preferred route.

3.7.3 The Zero Alternative

The Zero alternative (Do-Nothing alternative) denotes a circumstance where the project is not implemented. If the project is not implemented, then:

- Lost opportunity for diversification of energy sources and related improvements in air quality and greenhouse gas emissions.
- No additional employment opportunities and associated economic and financial benefits.
- None of the negative environmental and social impacts that would be generated by the project
- Loss of benefits from future potential investment directly or indirectly related to the planned activity.

3.8 Associated Facilities/Projects

Given that the Sveti Nikole-Veles pipeline section forms part of a much wider programme of gasification in North Macedonia, all other natural gas transmission infrastructure is technically associated facilities. At the same time, it must be recognised that once the main transmission infrastructure has been established it will then be necessary to establish distribution networks to pipe the gas to users. For the purposes of this assessment, it is assumed that all existing gas transmission infrastructure has been subjected to E&S impact assessments and that all gas distribution infrastructure will be subject to E&S assessments, prior to construction.

4 ESIA METHODOLOGY

4.1 ESIA Approach

4.1.1 ESIA Process

The key stages of the ESIA process are screening, scoping, baseline characterisation, analysis of alternatives, impact assessment, mitigation and enhancement planning, management and monitoring, and stakeholder consultations. The ESIA process is undertaken in accordance with the EBRD ESP (2019) and national legislation.

4.1.2 Screening

Screening serves to establish the likely degree of difficulty and/or risks, based on which the need for an ESIA is determined. EBRD has assigned Category A to the Project as per its ESP (2019). This means that a comprehensive ESIA be prepared, alongside the associated E&S documents and management plans, followed by their public disclosure for 120 days.

4.1.3 Scoping

Scoping (as detailed in this document) is one of the major parts of the ESIA process. Scoping involves the preliminary identification of **aspects** of the Project and related **E&S impacts/risks**²⁸. Specific components of the natural or social environment that might be affected by the Project are referred to as **environmental or social receptors**²⁹. The principle is one of determining the environmental and social aspects of the project in question. Aspects are defined as elements of an activity, good or service that interact with the receiving environment. Examples of environmental aspects include atmospheric emissions, waste and pollution, resource use including energy, water and land resources and finally social aspects which include job creation, skills development and transfer and spending.

Scoping refers to a process of determining which elements of the receiving environment will be changed as a result of the environmental and social aspects and the significance of that change. as defined above changes in the receiving environment defined as impacts but the requirements of an ESIA is not only to identify those impacts but to determine the consequence of those impacts as well. This is only done at a preliminary level within the scoping process but used to determine the scope of work for specialist investigations that make up the body of the ESIA.

During impact identification, the following types of potential impacts / risks are considered:

- **Direct impacts:** impacts of the Project that occur in the same space and time. Also known as primary impacts, they are the direct consequences on the natural or social environment;
- **Indirect impacts:** impacts of a chain of activities associated or induced by the Project that often occur later in time, affecting a broader area, but that are nevertheless reasonably foreseeable.
- **Cumulative impacts:** these impacts can result from the interaction amongst impacts of the Project, or from the interactions amongst impacts of several projects within a same area. They may also result from the incremental effects of an action when added to other past, present and reasonably foreseeable future actions.

²⁸ The term 'impact' refers to any change in the state of natural or social environment attributed to the Project.

²⁹ Example environmental receptors are habitats disturbed as a result of earthworks / construction activities; example social receptors are residents of houses located next to the Project pipeline.

- **Residual impacts:** the impacts that remain after implementation of the Project-associated mitigation / enhancement and other E&S management measures.

4.2 Methods for Baseline Analysis and Summary of Surveys

Primary baseline data collection for the Sveti Nikole-Veles Section was completed by the expert teams of Civil Engineering Institute “Macedonia” JSC Skopje. 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. A summary of the field surveys undertaken to gather E&S baseline information required to inform the ESIA is provided below.

Environmental surveys

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 of influence to verify the terrestrial ecosystems, address gaps that have been identified in the existing environmental and social 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 daytime at two locations.

Socio-economic, including cultural field studies

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 (for additional information refer to **Annex 2**).

4.3 Assessment of Impacts/Risks

For the impact assessment phase, it is not adequate to simply determine the impacts; the assessment would rather be able to define the consequence of those impacts. Consequence is meant the consequence for decision making. For example, if a project brings about changes in air quality it is necessary to determine what the consequence will be of those changes in air quality in terms of nuisance or human health. Such consequences articulated in the impact assessment in terms of significance.

Impact significance is determined as a function of a receptor's sensitivity (environmental or social value) and the magnitude (extent of change to the natural or social environment) of the impact. This section sets out the approach to determining impact significance through:

- Assigning receptor sensitivity (environmental or social value);
- Assigning impact magnitude;
- Assigning significance;
- Assessing residual impacts; and,
- Assessing cumulative impacts.

4.3.1 Assigning Receptor Sensitivity

The proposed descriptors and criteria for the sensitivity of a receptor are given below.

Table 5. Definitions for Sensitivity of Receptors

Sensitivity	Typical Criteria Descriptors
High	High or very high importance and rarity, international or national scale and very limited to no potential for substitution; for social also – a highly vulnerable receptor with very little capacity and means to absorb socio-economic shocks and take advantage of opportunities
Medium	Medium importance and rarity, regional scale, limited potential for substitution; for social also- a vulnerable receptor with some capacity and means to absorb socio-economic shocks and take advantage of opportunities
Low	Low importance and rarity, local scale; for social also - a non-vulnerable receptor with limited capacity and means to absorb socio-economic shocks and take advantage of opportunities
Very low	Very low importance and rarity, local scale; for social also - a non-vulnerable receptor with plentiful capacity and means to absorb socio-economic shocks and take advantage of opportunities

4.3.2 Assigning Impact Magnitude

Magnitude refers to the 'size' or 'amount' of an impact. It is a function of various magnitude criteria including the impact's extent (i.e., the spatial dimension of the impact), duration (i.e., the temporal dimension of the impact), and reversibility (i.e., whether the impact is temporary (within a reasonable timescale) or permanent). In order to help define the range of impact magnitudes, the definition given in the table below will be used.

Table 6. Definitions for Impact Magnitude

Magnitude Category	Typical Criteria Descriptors
High	Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, permanent / irreversible change, features or elements (Adverse)
	Large scale or major improvement of resource; extensive restoration or enhancement, permanent change major improvement of attribute quality (Beneficial)
Medium	Loss of resource, but not affecting integrity, partial loss of/damage to key characteristics, features or elements (Adverse)

	Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality (Beneficial)
Low	Some measurable change in attributes, quality or vulnerability, minor loss of or alteration to one (possibly more) key characteristics, features or elements (Adverse)
	Minor benefit to, or addition of, one (possibly more) key characteristics, features or elements, some beneficial impact on attribute or a reduced risk of a negative impact occurring (Beneficial)
Negligible	Very minor loss or detrimental alteration to one or more characteristics, features or elements (Adverse)
	Very minor benefit to or positive addition of one or more characteristics, features or elements (Beneficial)
No change	No loss or alteration of characteristics, features or elements, no observable impact in either direction.

4.3.3 Assigning Impact Significance

Assigning impact significance relies on reasoned argument, professional judgement and consideration of views and advice of stakeholders. Some topics may have their predicted impacts assessed using quantitative thresholds and scales in the determination of significance. Assigning each impact to one of five significance categories enables different topic issues to be placed within the same scale to allow a direct comparison. The five significance categories are given in **Table 7**.

Table 7. Definitions for Impact Significance

Significance Category	Typical Criteria Descriptors
Major	Very large or large magnitude of change in environmental or socio-economic conditions. Impacts, both adverse and beneficial, which are likely to be important considerations at a national and regional level or could result in breaches of legally enforceable environmental protection mechanisms.
Moderate	Intermediate magnitude of change in environmental or socio-economic conditions. Impacts that are likely to be important considerations at a regional and local level.
Minor	Small magnitude of change in environmental or socio-economic conditions. Impacts may be raised as local issues but are unlikely to be of importance in the project's permitting process.
Negligible	No discernible change in environmental or socio-economic conditions. Impacts that are likely to have a negligible or neutral influence, irrespective of other impacts.

It is important to note that significance categories are required to be determined for both positive (beneficial) and negative (adverse) impacts / risks.

The greater the receptor sensitivity and the greater the impact magnitude, the more significant the impact. The consequence of a highly sensitive receptor suffering a high magnitude impact would be a major adverse impact. The determination of impact significance is shown below in the impact significance matrix (**Table 8**).

Table 8. Impact Significance Matrix

Impact Magnitude	Receptor Sensitivity / Value			
	High	Medium	Low	Very Low
High	Major	Major	Moderate	Minor
Medium	Major	Moderate	Minor	Minor
Low	Moderate	Moderate	Minor	Negligible
Negligible	Moderate	Minor	Negligible	Negligible

4.3.4 Assessment of Residual Impacts

Significance of residual impacts will be assessed using the same approach as described above. Residual impacts should be environmentally and socially acceptable. Typically, negative residual impacts assessed as being either of minor (or negligible) significance are considered to be environmentally and/or socially acceptable. Negative residual impacts assessed as major or

moderate are environmentally and/or socially unacceptable unless they can be offset by other positive impacts of the project or controlled through the imposition of permitting conditions and/or specific actions implemented through the project's E&S management and monitoring plan.

4.3.5 Assessment of Cumulative Impacts

Cumulative effects will be assessed where they are predictable both within the project and in combination with existing and reasonably foreseeable future projects. Cumulative effects will be considered as either additive or interactive effects. Additive effects will be those effects for which a change in a receptor may be added to (or subtracted from) a similar change to the same receptor (e.g., the combination of several similar impacts on one receptor). Interactive effects will be those effects for which a change in a receptor may be added to (or subtracted from) a different change to the same receptor (e.g., the combination of different impacts on one receptor).

Cumulative impact assessment will be based on the process described in the IFC's Good Practice Handbook³⁰. Any additional mitigation and/or management measures required for cumulative impacts will be included in the ESMP for the Project.

4.4 Project Areas of Influence

A key element of any ESIA is to define the proposed project Area of Influence (Aoi). The Aoi is the spatial area that could be affected by, in this case, the proposed gas pipeline. It stands to reason the Aoi as a function of the E&S aspects of the proposed Project and the Aoi will vary from aspect to aspect. For example, dust emissions from the Project will likely affect an area of several hundred meters on either side of the pipeline, whereas the economic and social benefits of the project would be experienced region- or country-wide. The Aoi's for this Project are defined separately per aspect in the baseline section but it should be recognized that an immediate distinction is drawn between the project footprint (the area that will be physically transformed for the purposes of constructing the pipeline, it is also called a 'construction corridor' or – in the biodiversity section – a 'Zone of Influence') and the areas that would be less directly affected by, for example, dust emissions beyond the direct project footprint.

4.5 E&S Management and Monitoring

Based on the assessment, mitigation will be developed to avoid, reduce or manage the potential negative impacts and enhance positive impacts. Mitigation measures will be translated into clear, practical measures applicable to the local conditions and will be based on GIP.

The various mitigation requirements that emerge from the impact assessment must ultimately be incorporated in an Environmental and Social Management Programme (ESMP) that would be implemented together with the project. The ESIA is concluded with an environmental and social management framework to be used in developing the ESMP, together with the mitigation that is prescribed in the ESIA.

4.6 Stakeholder Engagement and Public Consultations

Stakeholder engagement completed for the Project is provided in **Chapter 8**. In addition, a Stakeholder Engagement Plan (SEP) has been developed for the Project, including a grievance mechanism. The SEP details a structured and systematic approach for stakeholder engagement during the Project planning and implementation stages.

³⁰ IFC. Good Practice Handbook - Cumulative Impact Assessment and Management: Guidance for the Private Sector in Emerging Markets" (2013). https://www.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/sustainability-at-ifc/publications/publications_handbook_cumulativeimpactassessment.

4.7 Data Availability, Assumptions and Limitations

Because ESIA's are predictive processes undertaken before project detailed design, there is always data uncertainty. Furthermore, a fully comprehensive suite of E&S information is seldom available. Where data do exist, they are sometimes outdated. Where information is not available or too outdated to be used with confidence, assumptions and estimates need to be made and this will be clearly indicated in the ESIA.

5 ENVIRONMENTAL AND SOCIO-ECONOMIC BASELINE

5.1 Climatic and meteorological characteristics of the area

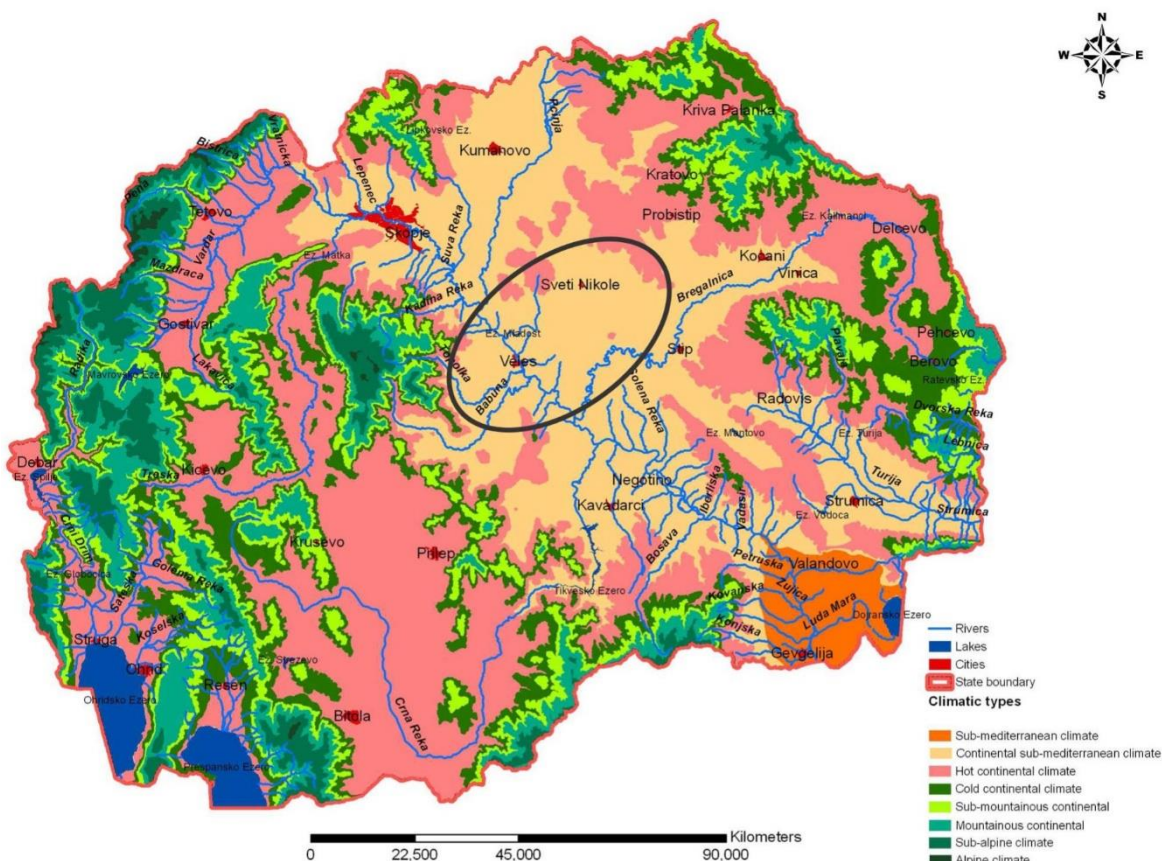


Figure 10. Climatic Area in RNM

The study area for climatic and meteorological characteristics is continental, national and then specific to central North Macedonia. Climate and relief dictate a moderate - continental - sub-Mediterranean climate that is up to 600 m above sea level. The Vardar Valley (Figure 10) sees continental air masses from the European mainland move through the Kacanica and Kumanovo-Presevo valleys where they encounter higher ground near Demir Kapija where thermo-topographic flow occurs.

The climate is strongly influenced by the terrain, manifesting as temperature inversions and pools of cold air that occur (especially in Winter) from the Skopje Valley (in the north) to Demir Kapija (in the south). During anticyclonic weather, radiation fogs that intensify during the night and weaken during the day, occur.

The climatic influences of the Mediterranean are significantly weakened in this central area of RNM. During summer, when anticyclonic conditions occur, there are long periods without precipitation, with high temperatures and dry winds. In this, compared to other areas, the influence is strongly continental. Mean annual air temperature ranges from 12.8°C to 13.6°C. The warmest month is July with an average monthly air temperature of 23.0°C to 24.5°C. The highest maximum air temperature

is between 39.5°C to 43.6°C (July and August). The lowest air temperatures range between -17.5°C and -20.0°C (in Sveti Nikole). The annual number of tropical days is up to 64 days as much as the number of days with ice. Precipitation is generally light between 428.1 mm to 561.3 mm per year, with most occurring in the winter. year. November and May typically experience most precipitation and the driest month is August.

There are typically 2,178 sunny hours in a year, with the sunniest months being July and August. The wind velocity is strongly influence by orography. Along the Vardar River valley wind blows from the north with a frequency of 15,9% and a maximum speed of 15.5 m/s, and from the south with a frequency of 15,1% and an average speed of 5.7 m/s. These winds blow throughout the year, while the winds from other directions are insignificant. In the eastern part of Ovche Pole winds are quite pronounced. Fog is not so common, and occurs from 5 to 25 days a year, most often in the autumn months³¹.

5.2 Relief

5.2.1 Sveti Nikole and Lozovo Municipalities

The Ovche Pole Valley has a specific morphological structure limited on all sides by ridges and sloping hills, which form a pronounced natural border. The Ovche Pole Valley is closely linked to the nearby surroundings of Shtip, where altitude ranges from 200 to 400 m. The local peak is not more than 900 m. To the northwest Ovche Pole is surrounded by the low Gradishtanska Mountain (861 m), and to the northeast by Mangovica (741 m). Between these two low mountains is the pass Karaula through which the Regional Road Sveti Nikole-Kumanovo (40 km) passes. To the south, Ovche Pole is surrounded by low hills Bogoslovec (755 m) and Ilandza (664 m) which separate Ovche Pole from the valley and the lower course of the river Bregalnica called Slandol. To the east and west, Ovche Pole is open to the Veles and Shtip valleys. Within these borders, the Ovche Pole Valley covers an area of 670 km².

The largest length is 32 km, while the largest width per line drawn between the villages of Vrsakovo in the east and Milino in the west is 26 km. The lowest point is in the plane of the valley bottom near the village Delisinci and is 231 m. Overall, in Ovche Pole there are three separate geographical areas, alluvial plains with an average height of about 260 m. The hilly areas are called "bairi" and the edges along the borders of the valley or "mountains".

Most of the municipal areas of Sveti Nikole and Lozovo are between 250 to 320 m above sea level. Most villages are established on flat ground with a few in the hills but no mountain settlement. "Devil's Wall" is a natural geomorphological phenomenon of rocky outcrops clearly visible in the relief, and extend eastwest-northwest, for several hundred meters. The wall starts from the southwestern foot of Tiski Vrv (747 m), at Grilishte, then continues about 260 m to the west to Plavishte before turning northwest to follow the western foothills of Bogoslovec (2 km southeast of the top of Bogoslovec).

5.2.2 Veles Municipality

The city is in a large, beautiful valley in the middle of the Vardar river, and surrounded by mountains and hills. The Veles Valley itself stretches between the Taor Canyon to the north and the canyon of Mount Klepa to the south. The urban area is at 160-200 m. The city is surrounded on both sides of the valley by hills of different altitudes (from about 300 m to 675 m). On the left side of the valley are the hills Vrshnik, Kameno Brdo and Groot and the villages Prevalec and Gorno Orizari, and on the right side of the valley are the hills Prcorek and St. Ilija and the villages of Otovica and Bashino Selo.

³¹ Study for identification of strategic locations for organization of informative points along Corridor 10 and highway road M-5 in Vardar Statistical Region, September 2011

The Vardar river valley, south of the Skopje Valley, enters the Taorska Canyon, which extends to Bashino Selo (north of Veles). The valley has a gorge shape with steep slopes of over 200 m.

5.2.3 Geological and Seismic Characteristics

5.2.3.1 Geological Characteristics

The study area is the specific footprint of the proposed pipeline but derived from broader scale geological characterisations. The gas pipeline will occur in terrain almost entirely sedimentary rock of Quaternary, Pliocene and Eocene ages, and to a lesser extent firmly bound rocks (marbles) which are closer to Veles. Quaternary sediments are eluvial and proluvial with the latter significantly more common (**Figure 20**). Eluvial sediments occur between the villages Burilovci and Peshirovo where poorly resistant soil has clayey-sandy composition. This to a depth of 1-5 m and providing a soft and crumbly soil suitable for agricultural.

Proluvial sediments occur between Milino and Karatmanovo. The sediments are made of semi-processed pieces of surrounding mother rocks, mixed with sand and a large percentage of clay. Their thickness is quite variable, reaches up to 30 m.

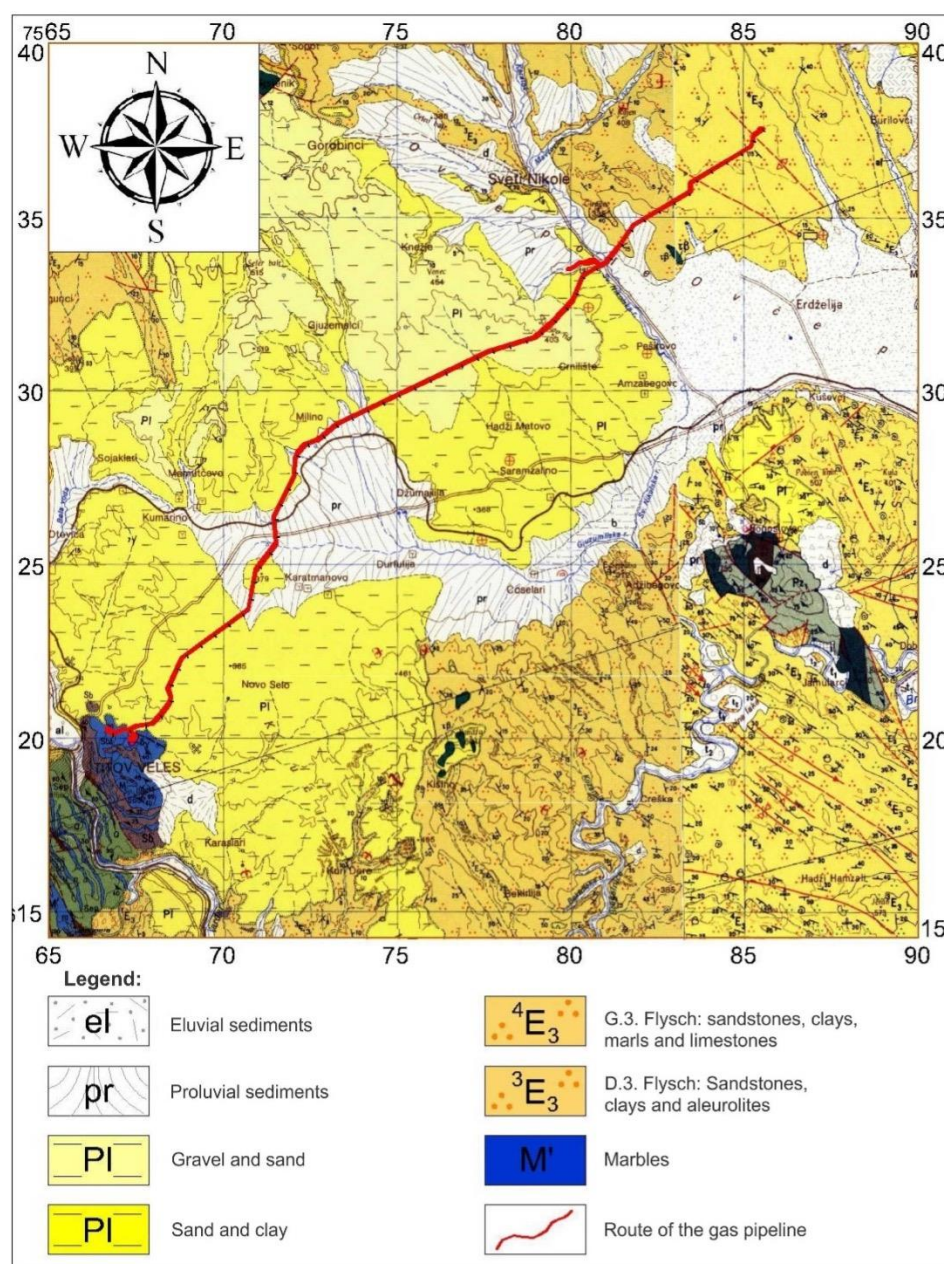


Figure 11. Excerpt from the Basic Geological Map of the RNM (Sheet Veles and Shtip)

Pliocene sediments are the most common and occur as two series. The younger series is composed of gravel and sand north of the villages Dolno Crnilishte and Hadzi Matovo, and the second (older) system is generally composed of sand and clay. These sediments are made up of well-rounded quartz, quartzite, amphibolite, and other schists, gabbro, diabase, sandstone, and clays. They are poorly sorted and solid rock ranges from 2 to 20 cm, with the spaces filled with sandy clay. Where there are higher carbonate matter semi-bound conglomerates occur in blocks. The sands appear within the gravels in the form of irregular lenses and change vertically rapidly.

The sands and clays within the Pliocene form the basal series. In this horizon, in the part of the terrain between Sveti Nikole and the village of Peshirovo, coal and coal clay interbeds are also found. The sands are mainly fine-grained and contain quartz. Alluvial sands with clay interbeds predominate, but there is also pure quartz-mica that could be used as a mineral raw material. They are greenish – gray to yellowish in color depending on the iron content. Alleurolites are limy and similar to the sands and differ in grain size. In the base the clays are hydromicas, and in the upper parts montmorillonite. Hydrolytic clays also appear in the final part of the profile. The pH values are around 8.3 and color varies from light yellow to dark red.

Eocene sediments occur in the north-eastern parts in the first four kilometres of the gas pipeline. The upper zone of flysch is predominant, in sandstones, clays, marls and limestones. The marls are gray in color, contain about 35% CaCO₃ and have a crypto-crystalline structure. Of the other minerals, irregularly angled quartz grains, muscovite and sericite flakes are present and oriented in parallel. The clays are sandy and occur in the form of banoci occur in layers between the sandstones. They are gray to gray green in color and made of clay material of illite type and quartz detritus, feldspar, muscovite and heavy minerals: garnet, rutile, metallic minerals, sphene and others. Conglomerates occur in the form of banoci or larger layers inserted interspersed into the remaining flysch sediments.

The lower zone of the flysch is where the upper Eocene sediments are present. They are represented by sandstones, clays and aleurolites which are quite similar in petrographic composition to those of the upper series with more pronounced physical properties. The marbles occur in the part of the section of the gas pipeline, i.e., in the last 500 to 1,000 m. These rocks occur in larger masses in the upper part of the Palaeozoic profile, are gray, white, in places with the appearance of stripes. They are mostly fine-grained and are also known as large calcite crystals with impurities of limonite. In places within the marbles, a clearly expressed schistose texture appears with an increased percentage of mica, which indicates a gradual transition to the surrounding mica schists. Layers of quartzites up to 10 m thick also appear.

In terms of hydrogeology, the area has impermeable to poorly permeable sedimentary rocks with aquifers at depths greater than 60 m. The water is mostly unsuitable as drinking water, primarily due to elevated salinity. Such terrain is generally suitable for the construction pipelines, provided water-saturated clayey-sandy are identified. There are no significant engineering geological phenomena that could negatively affect the pipeline structure, but the groundwater and soil promote rather than inhibit corrosion. The pipeline will be built in areas of incoherent rocks with low water permeability (diluvial, proluvial-sand silt, silty sand and gravel etc.) and material soil pollution is not considered likely.

5.2.3.2 Seismic Characteristics

Geotectonically the terrain is in the Vardar Zone which is distinguished as a separate geotectonic unit. The seismic zoning map of the RNM (MKS-EN 1998-1:2012 Eurocode 8) has relatively low seismicity (Z-2), i.e., $a_g = 0.15 g$ (**Figure 12**).

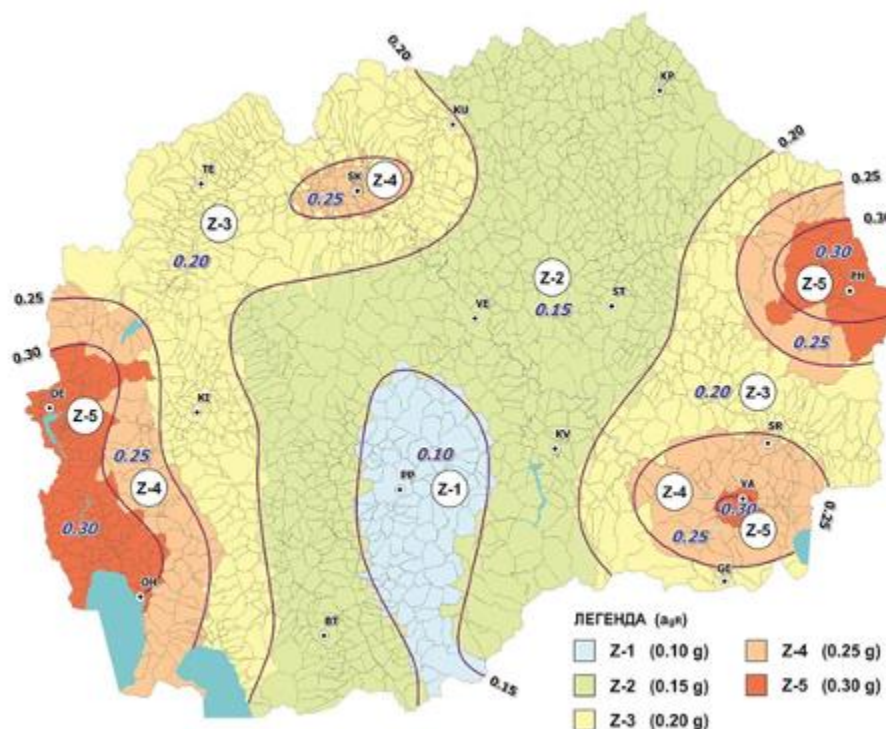


Figure 12. Seismic Zoning Map of the RNM (MKS-EN 1998-1:2012 Eurocode 8)

5.3 Hydrology

5.3.1 Sveti Nikole and Lozovo Municipalities(Ovche Pole)

The region is sub-arid region with weakly expressed hydrology. The main permanent watercourses are the Svetinikolska and Gjuzumliiska Rivers, which have a very limited water flow, with the Gjuzumliiska River often drying up in summer. In terms of hydrology, the Ovche Pole waters belong to the Bregalnica River Basin. The largest water flow is the Svetinikolska River consisting of three smaller watercourses - Parish, Karatash and Mavrovica. They join at Sveti Nikole and from there to the village of Amzabegovo the water flow is known as the Svetinikolska River, from this village to the confluence with Bregalnica it is named the Azmak River. The Svetinikolska River is 35 km long, covers a catchment area of 665 km², which is the largest catchment area among all tributaries of Bregalnica, but a very small gradient of only 1.16%. The Azmak flows into the Bregalnica south-east of Adzibegovo at 203 m above sea level. The following springs occur:

- The spring of Karatash is at Gradishte on the Gradishtanska Mountain at an altitude of 610 m.
- The spring of Mavrovica is located near Makresh at an altitude of 727 m.
- The spring of Parish is in the area of the village Malino and village Alakinci at an altitude of 380 m.

These three rivers join in the central part of the valley near the Sveti Nikole city and from there flow in a meridian direction as Svetinikolska River (Figure 13).

The Svetinikolska River in the Ovche Pole Valley has several tributaries: on the left bank - the Burilovska River with Nemashnica, on the right bank - the Gorobinska, Knezevska and Ljuzumelska Rivers. There is no natural lake in the valley. There is a dam with an area of 7 km² and a volume of 2,700,000 m³ on the Mavrovica River at Alin Dol, 10 km north of Sveti Nikole. The dam is an earthen embankment with a height of 25 m, a crown length of 360 m and a width of 6 m and supplies water to Sveti Nikole. The dam is 5 km from the planned pipeline alignment. In the Ovche Pole Valley, weak springs are common and found in many villages and surroundings. The springs are fed by small surface water aquifers.



Figure 13. Svetinikolska River

5.3.2 Veles Municipality

The Veles Municipality occurs in the larger watercourses of Babuna, Topolka and Otavica, oart of the Vardar River watershed. The annual average flow is:

- Babuna 4.65 m³/s,
- Topolka 2.41 m³/s, and,
- Otovica 1.31 m³/s.

The average annual flow of the Vardar river at the water meter station near the city of Veles is 83.1 m³/s. Lake “Mladost” is a dam located north of the city of Veles, on the Otovica river on which a concrete-arch dam was built, near the village Otovica and the road Veles-Skopje. The dam is located at 41°46’ N and 21°45’ E, 2.5 km upstream of the inflow of the river Otovica into the river Vardar, where the Mladost Dam occurs. This dam is some 6 km from the proposed project alignment. The height of the dam is 27 m, and the length of the crown is 73 m. The Otovica and its tributaries descends from under the slopes of Gradishtanska Mountain. The dam has a useful volume of 3.8 x 106 m³, which supplies irrigation water areas around Veles and the village Otovica. About 1,350 ha of arable land is irrigated, mostly vineyards.

5.4 Ambient Air Quality

The study area is the entire country but with a specific focus on the central part of the RNM and specifically, the three municipal areas. Air pollution in the RNM is a concern because the limit concentrations set to protect human health, especially those for particulate matter, are greatly exceeded. According to the legislation, measures to improve air quality must be implemented under such circumstances.

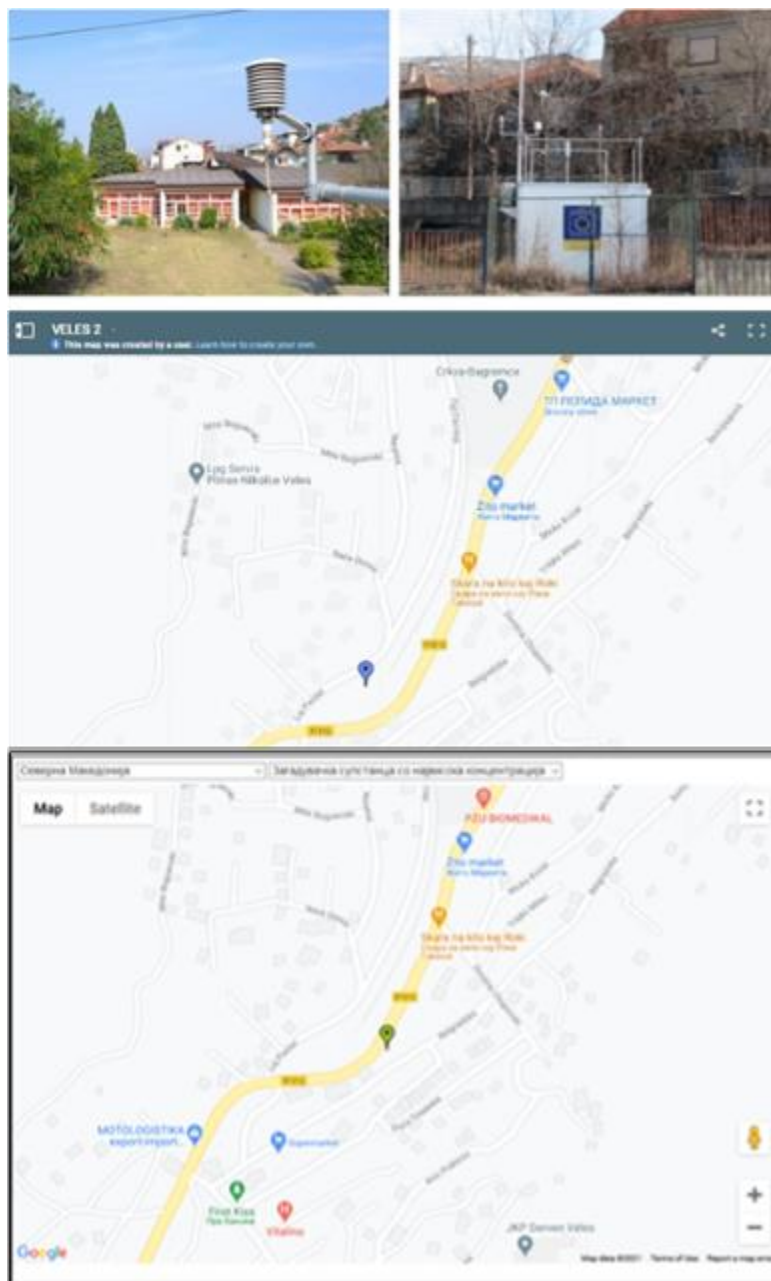


Figure 14. Location of the Monitoring Station in Veles

The MoEPP is responsible for monitoring ambient air quality. The state air quality monitoring network consists of 17 stations in different parts of the country. The monitoring stations monitor concentrations of SO₂, CO, NO₂, PM₁₀, PM_{2.5} and O₃, and the monitoring information is publicly available in real time through the internet portal: <https://air.moepp.gov.mk>.

Veles, as an industrialized city, is considered one of the most polluted cities in the country and has an AQMS monitoring SO₂, CO, NO₂, PM₁₀ and O₃. This monitoring station is located approximately 4 km away from the end point of the proposed pipeline alignment. Supplementary measurements were also conducted along the proposed pipeline route as a baseline. Daily concentrations of suspended particles PM₁₀ µg/m³ from Veles are shown in **Figure 15**. The most frequent exceedances occur in the winter months.

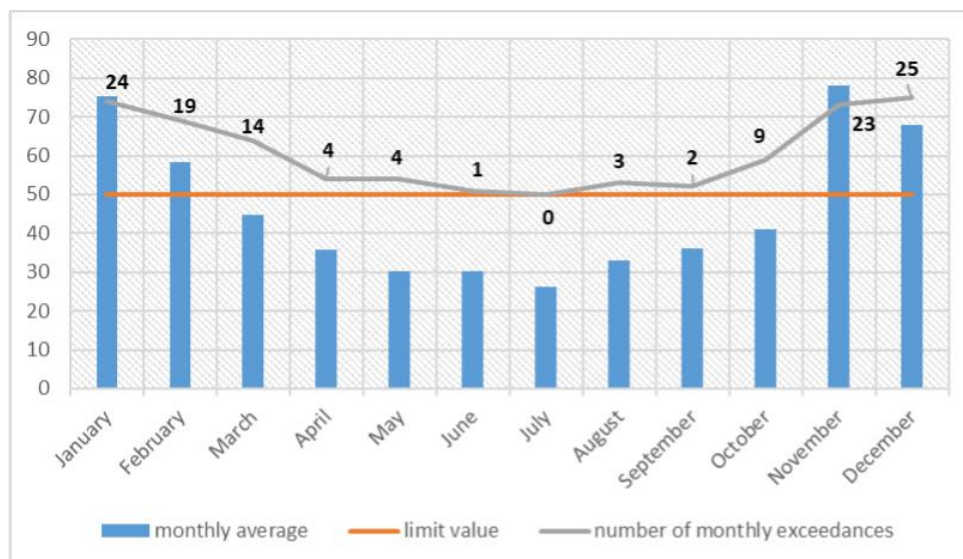


Figure 15. Daily Average Concentrations of PM_{10} $\mu g/m^3$ from the Monitoring Station in Veles, from January to December 2020

The most significant sources of PM are heating of homes and offices, using biomass (mostly wood) as fuel. Although PM_{10} was measured along the route over a single 24-hour exposure the measurement is not representative of the differing climatic conditions that would prevail through the course of a year and as such has not been used further here.



Figure 16. Location of Noise and Suspended Particle PM_{10} $\mu g/m^3$ Measurements

5.5 Noise

Environmental noise is primarily from industry and transport. The intensity of the noise and workplace exposure, together with limit values for ambient noise for different types of urban and rural areas are regulated by the Law on Noise and relevant bylaws. The limit values for environmental noise are defined in the Rulebook on limit values of the noise level in the environment (OG of RM No. 147/08). There is no routine noise monitoring and so baseline noise measurements were conducted along the proposed pipeline route.

5.5.1 Ambient Noise Monitoring on the Pipeline Route

Noise measurements were conducted at two points along the proposed pipeline alignment and compared to limit values in the Rulebook on limit values of the level of environmental noise (OG of RM No. 147/08). One of the measured values at exceeded the limit value.

5.6 Soil

In the RNM there are just over 30 soil types and even more subtypes, varieties and forms. The soil types that occur in the area where the pipeline will be built are shown in **Figure 17**. The roadbed starts with the presence of resin, rendsina and regosol soils. After several kilometres the soils become colluvial with fluvial soil around the Svetinikolska River. After the fluvial soil, the route enters in an area with regosol and leptosol between the villages Knezje and Dolno Crnilishte, and after that it passes again through colluvial soil and resins. As the altitude rises, the route passes through an area with resin, cement forest soil and regosol. Close to the end of the route, rendzina and regosol soils are encountered. There are 11,000 hectares of naturally saline soils located in the driest region of Ovche Pole. It is also known that irrigation, especially in arid regions, leads to increased salinization, but due to the lack of monitoring or research, the intensity, size and condition of salinization cannot be precisely defined in this circumstance.

5.6.1 Soil Quality in the Project Aol

Soil contamination is likely due to the use of fertilizers, pesticides, organic pollutants, heavy metals and oil, but there is no established permanent and long-term soil monitoring system. Soil protection is regulated by several laws, including laws relating to the environment, nature, forests, water and waste management but soil monitoring systems have not yet been established.

Soil quality research is presented in the Geochemical Atlas of Veles and its surroundings, prepared by the Faculty of Natural Sciences and Mathematics - Skopje, 2008. The soil data were prepared as the first systematic examination of the spatial distribution of various elements in the surface layer of soils in Veles and its surroundings. In what follows, the presence of elements such as As, Cd, Cu, Hg, In, Pb, Sb, and Zn (as representing contaminated soils) are described.

Arsenic (As)

The average content of **As** in the surface soils in the area is 9.3 mg/kg in the range from 1.3 to 110 mg/kg. The highest concentrations are found in the samples taken in the industrial part, especially in the western part of the smelter (from 33 to 110 mg/kg) and in the southern part of the city of Veles and in the surrounding hills (34 to 92 mg/kg).

Cadmium (Cd)

The average **Cd** content in the surface soil is 7.7 mg/kg and ranges from 0.30 to 600 mg/kg. The highest values for cadmium are in the industrial part, where the maximum values range from 76 to 600 mg/kg and in the part of the city near the smelter, where the maximum values are 110 mg/kg.

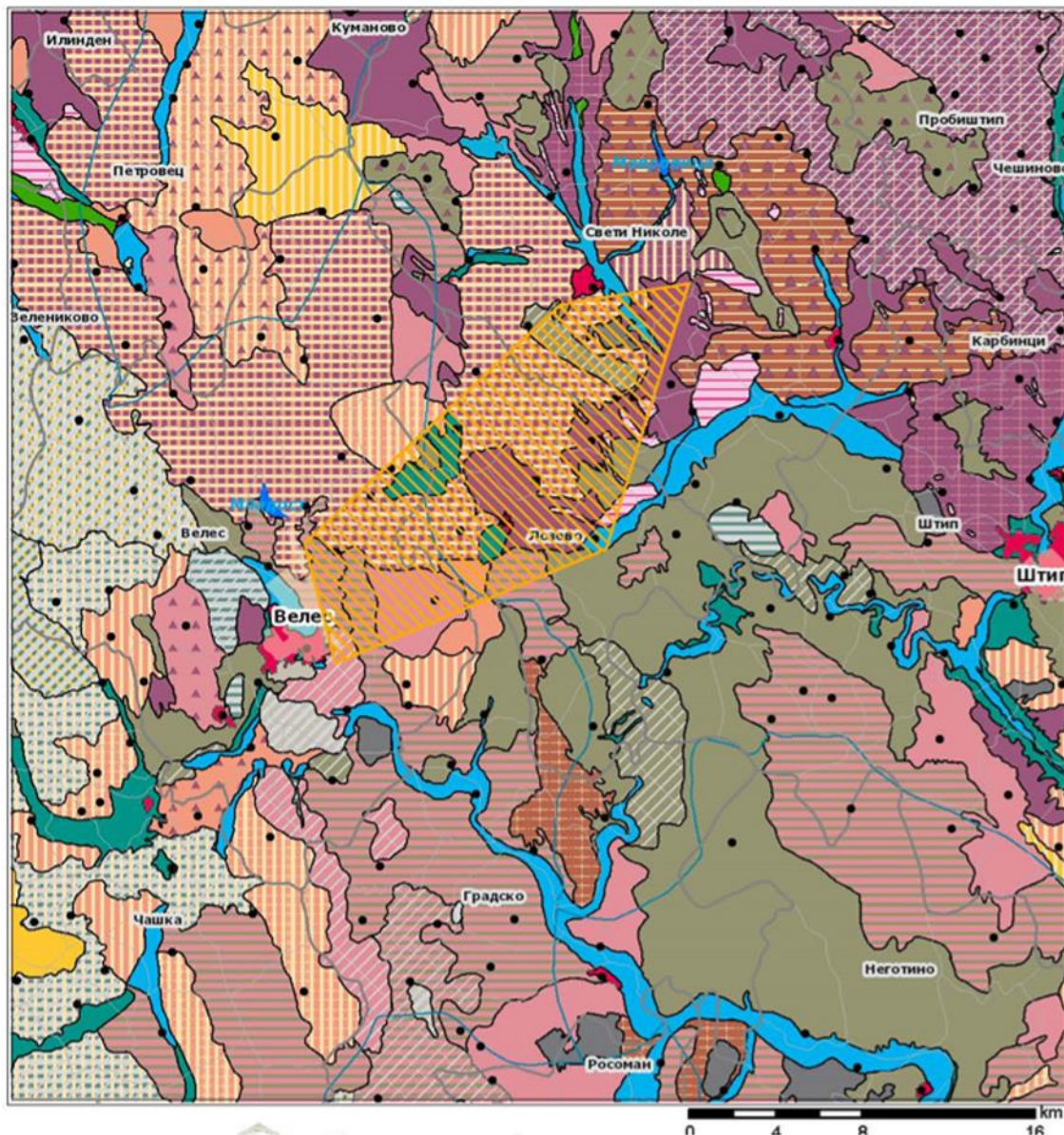


Figure 17. Types of Soils in Central North Macedonia Highlighting the Area through which the Pipeline Will Pass³²

Copper (Cu)

The average value of **Cu** in surface soil layers is 44 mg/kg, and ranges from 11 to 1,700 mg/kg. The highest copper content in soil is in the vicinity of the Lead/Zinc Smelter, where the maximum values range from 140 mg/kg to 620 mg/kg. The highest value is found in the topsoil taken from the top of Umka Rid, west of the smelter (1,700 mg/kg).

Mercury (Hg)

The average value of Hg in the surface layers of the soils is 0.25 mg/kg, with a range from 0.01 to 12 mg/kg. Maximum mercury content in the surface layers of the soils around the smelter (from 6.9 to 12 mg/kg), then in the surface soils from the agricultural areas in the locality Rechani (from 1.9 to

³² Source: <http://www.maksoil.ukim.mk/masis/>

6.0 mg/kg) and in two soil samples from the southern part of the city of Veles (2.1 mg/kg and 3.6 mg/kg).

Indium (In)

The average In concentrations in soils in the area is 0.25 mg/kg and ranges from 0.012 to 9.2 mg/kg. Maximum concentrations of indium occur in soils around the smelter (from 2.4 to 9.2 mg/kg). Other very high values were found in soils taken north of the smelter (two samples containing 1.8 mg/kg and 2.3 mg/kg), in one soil sample from Rechani (2.0 mg/kg) and in one sample soil from the hill St. Ilija, south from the city (3.5 mg/kg).

Lead (Pb)

The average lead content in the area is 220 mg/kg and ranging from 13 to 15,000 mg/kg.

Antimony (Sb)

The average antimony content in the surface soils in the area is 1.6 mg/kg, and ranges from 0.016 to 105 mg/kg. The highest values of antimony are found in the soils of the industrial zone, especially around the smelter, where the maximum values range from 13 to 110 mg/kg. Three of the ten highest values of antimony content from the whole examined area were found in the soils of the northern part of the city - with values of 13 mg/kg, 15 mg/kg and 17 mg/kg. One soil sample that belongs to the group of 10 samples with the highest antimony content was taken north of the smelter (13 mg/kg), and one was taken near the top of the hills Vrshnik (14 mg/kg).

Zinc (Zn)

The average zinc content in the surface soils in the area is 280 mg/kg and ranging from 22 to 27,000 mg/kg. Again, the highest concentrations are in the vicinity of the smelter (8 samples with the highest content ranging from 2,600 mg/kg to 27,000 mg/kg). Two samples taken from the northern part of the city also had high zinc values (2,600 mg/kg).

Ovche Pole is a famous agricultural and livestock region because the region is rich in soil of several classes, many sunny days and an irrigation system that covers 8,000 ha of arable land. This fulfils the conditions for growing cereals, industrial and horticultural crops.

5.7 Waste Management

The collection, transport and disposal of waste is provided by the Public Communal Enterprises (PCEs). Waste disposal is provided by PCEs at illegal regional landfills because there is no legal landfill under EU legislation. Landfills are constantly monitored by PCEs, but do not comply with EU requirements or even requirements of national legislation. In landfills, most often the waste is just left and buried, without taking protective measures. At the same time, spontaneous ignition of waste is common, resulting in air pollution. In addition to irregular landfills, there are non-compliant landfills, especially in rural areas that are not covered by the waste collection system. The National Waste Management Plan envisages the closure of all existing local landfills and the establishment of regional landfills or so-called regional waste management. For that purpose, the RNM is divided into eight planning regions, with one regional landfill in each planning region.

The Vardar Statistical Region consists of Veles, Kavadarci, Negotino, Sveti Nikole, Demir Kapija Rosoman, Gradsko, Lozovo and Cashka municipalities, all of which use their own local landfill. Veles, the most populated municipality generated about 38% of waste in the Vardar Statistical Region. Average daily waste per capita for the Vardar Statistical Region is 280 kg/ca/yr.

Table 9. Data on Collected and Generated Municipal Waste in the Period 2017-2019³³

	2017		2018		2019	
	Collected municipal waste (m ³)	Generated municipal waste (m ³)	Collected municipal waste (m ³)	Generated municipal waste (m ³)	Collected municipal waste (m ³)	Generated municipal waste (m ³)
Vardar Statistical Region	63,584	84,051	61,064	111,893	59,301	90,393

Sveti Nikole Municipality

Waste management in the municipality of Sveti Nikole is performed by PCE Komunalec - Sveti Nikole, a local public enterprise established to perform communal activities for the municipality. The municipality uses its own local landfill for municipal waste "Ljubin Dol" which is managed by a local utility company. Paper and plastic waste recovered for recycling, and there is a location for collecting electrical and electronic waste, as well as battery containers.

Lozovo Municipality

PCE Lozovo is responsible for waste management in the municipality, which has no local landfill and does not use a regional landfill. The waste is disposed in the Veles local landfill.

Veles Municipality

Waste is managed in Veles by the PCE "Derven" – Veles. The services provided by PCE "Derven" include Veles with 48,000 inhabitants, the suburban settlement Prevalec and the villages of Gorno Orizari and Bashino Selo which have a total of 3,000 inhabitants. The total population covered by the services provided by PCE "Derven" is 51,000 inhabitants. The municipality of Veles uses a local landfill for which there is no integrated environmental permit and it is managed by a local utility company. All waste is deposited at the non-standard municipal landfill "Bunar Dere", but there is also another landfill for waste from construction and demolition, and approximately 14 other informal "landfills".

Different types of non-hazardous industrial waste are disposed in special places marked for that purpose and are not mixed. The process of waste segregation is in the initial phase, households have been assigned waste sorting bins, and the construction of centre for sorting and storage of collected waste is underway. Veles Municipality has signed an agreement for business and technical cooperation for the establishment of services for separate collection and transportation of waste from electrical and electronic equipment. The municipality develops and adopts an annual Waste Management Plan.

Table 10. Data by Municipalities for Collected Municipal Waste in 2017-2019³⁴

	Collected Municipal Waste (m ³)		
	2017	2018	2019
Municipalities of Veles and Lozovo	96,511	87,687	78,275
Municipality of Sveti Nikole	19,880	20,739	24,110

³³ Source: <http://makstat.stat.gov.mk>

³⁴ Source: Official information provided from the affected municipalities.

5.8 Biodiversity

The construction of the gas pipeline will result in a range of impacts on biodiversity associated with the clearance (and later restoration) of the construction corridor (Project footprint), excavating (and later filling) of the trench and laying of the pipe. Even though the activities are only temporary, the impacts on biodiversity may last a lot longer. Impacts associated with operation of the pipeline will generally be limited to noise and air emissions from the above ground installations and temporary maintenance works. There is a stand-alone Biodiversity Impact Assessment Study (prepared according to EBRD PR6) developed as part of this assessment (see [Annex 3](#)). In this section only key findings from that report are presented.

For this assessment, two zones are distinguished as illustrated in [Figure 18](#), namely a broader Aol between Veles and Sveti Nikole and the specific construction footprint (Zone of Influence (Zol))³⁵. The Aol is a nominal 500 m wide corridor along the gas pipeline route (250 m either side), whereas the construction footprint is the 22m the construction corridor.

The Ovche Pole area that is crossed by the proposed gas pipeline is open and moderately hilly with the elevation ranging between 150 and 400 m. Agricultural landscapes dominate the Aol, mainly the broad plains and floodplains along the valley of the Svetinikolska River. At the start of the route the landscape is dominated by lowland rolling agricultural landscape with wind hedges. Visually the area is one of a mosaic of fields. In the middle of the route the landscape is dominated by rolling agricultural area with very gentle slopes and the end of the corridor is hilly with patches of highly degraded oak hornbeam forest.

Habitats within the pipeline Aol are mostly anthropogenic (agriculture) although some areas of fragmented natural habitats are present including degraded oak forests, grasslands, riparian areas and water course. For much of the route, and almost all the lowland areas, the 500 m wide corridor (Aol) runs primarily through agricultural lands, with almost 90% of the land within the corridor arable. This habitat type represents most of the land that will be impacted during construction and operation.



Figure 18. Project's Area of Influence and Zone of Influence on Biodiversity³⁶

The proposed pipeline alignment crosses one natural water course (Svetinikolska River), one intermittent stream (Sariderska River), and four constructed irrigation channels. Agricultural intensification is one of the main causes of biodiversity loss and ecosystem degradation in Europe.

³⁵ The boundaries of all locations where construction activities will take place. Temporary construction zone surrounds the pipeline, as well as the staging and storage areas. The width of the construction corridor is determined based on the diameter of the pipe, in this case it is 22 m.

³⁶ Source: Zol photo from another project (as an example).

Intensification in Ovche Pole has transformed formerly diverse landscapes, consisting of many small fields and habitats, into uniform unbroken terrain managed with large machines and a small work force. This has led to a decline in the abundance and diversity of natural habitat.

A small fragment of reed belt (locality of Nezirlik Ardi) is found around 220 m away from the planned alignment. This is not a typical biotope, but important for especially amphibians. This type of reed belts usually represents fragments of the swampy plant community Scirpo-Phragmitetum.

The first part of the pipeline Aol is part of Important Plant Area (IPA) Ovche Pole - Bogoslovec, designated due to the presence of steppe-like vegetation. Viable examples of vegetation (and habitat) can only be found south of the alignment at 8+000.00 km at the archaeological monument-Kanda Geoglyph, and also surrounded by arable land. This habitat which is highly significant is about 130 m away from the Zol, and at a higher altitude so no direct impacts during construction or operational phase are expected. Fragments of natural forest, remnants of well-developed oak-hornbeam forests, occur at the end of the corridor near Veles (in a very degraded form). This habitat is mixed with hill pastures Festuco Brometalia and Satureja montana.

The habitat 6210: semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco Brometalia) (*important orchid sites) is listed in Annex I. Although without priority status, the habitat still has high significance as a myriad of orchid species occur there. Small stands of this habitat were mainly observed in the vicinity of Veles but they do not have substantial coverage and are largely overgrown. Riparian habitats are found along the watercourses (92A0), with willow poplar trees occurring in small belts along the Svetinikolska River. These types of the natural habitats (grasslands with steppe-like vegetation and riparian belts) are the equivalent of EU Annex I Habitats. All these habitat types have been under intense anthropogenic pressure for centuries, due to the need for arable farmland and so are in different stages of degradation. Key sensitive receptors identified within the Project Aol or the Zol are summarized in **Table 11**.

Table 11. Summary of Baseline Findings

Receptor	Presence within the Area of Influence
Designated sites	One IPA, one IBA, one EMERALD site and one identified KBA will be crossed by the gas pipeline. There are no national protected areas, or areas proposed for protection in the Aol.
Habitats	A total of 13 habitats were identified within the Sveti Nikole - Veles pipeline alignment corridor. Of these, specific mitigation was deemed necessary for some habitats, with impacts to all other habitats considered fully mitigated through standard Good International Practice mitigation.
Species	Approximately 140 species (mostly bird species) are notable potential receptors which could be impacted by the proposed pipeline. Of these, 8 species are listed in II or IV Annex of Habitat Directive. Specific mitigation was deemed necessary for those species or species groups - impacts to others can be successfully mitigated through Good International Practice mitigation.

5.8.1 Methodology & Approach for data collection

The baseline conditions described here were defined iteratively through a combination of desk studies and rapid biodiversity survey. A summary of the key approaches used is provided in the **Table 12** below.

Table 12. Data Collection Approaches

Data	Collection Approach
Designated sites	Designated Site information and maps relating to Protected areas according to National Law, proposed Emerald site and Natura 2000 boundaries (European Designated Sites) were obtained from the national Ministry of Environment and Physical Planning (MoEPP) and plotted on GIS. Maps, photos were also obtained from a combination of publicly available sources and photographs by field surveyors.

Data	Collection Approach
Field Surveys – habitats and species	<p>The area was surveyed by ecologists to update habitat maps; identify areas of natural and potential CH or PBF as required for PR6; and identify habitats of conservation importance. The survey also identified key areas of concern where additional surveys were needed, specifically identified as either:</p> <ul style="list-style-type: none"> Containing CH/PBF; or Exposed to particular risks or impacts from the Project. <p>Field surveys included:</p> <ul style="list-style-type: none"> Hill pastures with sparse shrubs in the area near the city of Veles) - habitat 6210: (*important orchid sites) listed in Annex I; Pseudo-steppe with grasses and annuals of the <i>Thero-Brachypodietea</i> (EU HD (Annex I): 6220*) at the archaeological monument Kanda Geoglyph. This habitat has a high priority for protection and its status as a 'Priority' habitat under this classification qualifies it as Critical Habitat (CH) - as per GN6; The area surrounding the location Nezirlik Ardi, a small fragment of reed belt; Svetinikolska River crossing section. <p>A rapid assessment of species of particular conservation concern, included those listed in Annexes I, II, and IV of the Habitats Directive, the IUCN Red List, and N. Macedonia's new National Red Lists (plants, amphibians, reptiles, mammals) was conducted.</p>
Desk studies – habitats	<p>The field-based assessment was followed by desk assessment. The significance of individual habitats was evaluated using:</p> <ul style="list-style-type: none"> Annex I of Council Directive 92/43/EEC of 21st May 1992, on the conservation of natural habitats and wild fauna and flora; Convention on the Conservation of European Wildlife and Natural Habitats. Resolution No. 4 listing endangered natural habitats requiring specific conservation measures, revised Annex 1 (2010). <p>The goal was to evaluate biodiversity along the pipeline alignment to identify sites of special importance in respect of biodiversity and natural heritage, including natural and potential critical habitat as per PR6.</p>

5.8.2 Description of Habitats and Species

5.8.2.1 Overview of the Findings

The following is a description of the habitats, flora and fauna and their sensitivity. According to their origin, the habitats in the AoI can be divided into two main categories, natural and anthropogenic habitats.

Natural habitats include:

- Forests and areas with shrubs;
- Grass areas;
- Aquatic habitats.

Anthropogenic habitats include:

- Grass and forest areas of anthropogenic origin;
- Agricultural land.

The division was made according to the [EUNIS](#) classification of habitats. In reality, the boundaries between the habitats and regions are diffuse and often intersect. Defining a clear boundary between habitat types is extremely difficult, but necessary for further analysis of their characteristics. In this case, the boundaries were determined in part by manual digitization (subjectively, usually by tracking Google Earth images) and in part by overlapping the boundaries of some CLC classes (Corine Land Cover).

Description of habitats

The investigations revealed 13 habitat types (**Table 13**) that are mosaically distributed in the area of interest. The coverage area refers to a corridor with a width of 2 x 250 m. Approximately 90% of the area within the Aol is arable land (fields and acres, vineyards, orchards) while $\approx 10\%$ are natural habitats. The whole area is $\approx 1,323$ ha.

Table 13. Types of Habitats along the Pipeline Corridor

Habitat type		EUNIS code	Natura 2000 code	Area (ha) within Aol (250 m either side of pipeline)	Area (%) within Aol (250 m either side of pipeline)
1	Degraded thermophilic oak-hornbeam forests	G1.7	/	5.37	0.4
2	Riparian belts with willows and poplars	G1.1	92AO	1.24	0.09
3	Reed belt	G5.1	/	/	
4	Pseudo-steppe grassland	E1.3	6220*	1.63	0.1
5	Semi-natural dry grasslands and scrubland facies on calcareous substrates (<i>Festuco-Brometalia</i>)	E1.21	6210	18.5	1.4
6	Rivers narrower than 5 m	C2.2	3260	/	
7	Temporal watercourses	C2.5	3290	/	
8	Fields and acres	I1.3	/	1,200	90.7
9	Orchards	G1. D.	/		
10	Vineyards	F13 4.1	/		
11	Coniferous plantations	G3. F	/	35	2.6
12	Abandoned fields with ruderal vegetation	I1.53	/	61.4	4.6
13	Agricultural constructions	J2.4	/	0.67	0.04

The whole description of the habitats including list of species (flora, mammals, birds, amphibians, reptiles and insects), habitat maps as well are part of the BIA which should be read together with this ESIA.

5.8.3 Habitat Sensitivity Assessment

The sensitivity was assessed using purpose matrices (**Table 14**) for assessing the sensitivity of the natural ecosystems and habitats, and anthropogenic habitats.

Description of the criteria

Twelve different criteria were applied for assessing the sensitivity of the aforementioned ecosystems/habitats:

1. The Habitats Directive;
2. Rare communities RNM;
3. Well preserved natural communities;
4. Function of bio-corridors;
5. Area (landscape) value;
6. Economic value;
7. Prevention from erosion;
8. Prevention from pollution;
9. Associated fauna/flora of interest.

The criteria were selected to highlight the national and international (in Europe and World) importance of the ecosystems/habitats and species composition. The higher value of the habitat (applying of larger number of criteria) corresponds with higher sensitivity of habitat.

Low sensitivity - No significant obstacles for construction, however the aesthetic value of the area must be respected and unnecessary disturbance avoided.

Medium sensitivity - Construction work can be conducted as is allowed, but require appropriate precaution measures, partial or complete disruption of this type of habitat should be avoided, and if the disruption is inevitable, appropriate mitigatory measures must be undertaken.

High sensitivity - Construction should be avoided but if there is no other option, the strictest measures should be taken for reducing, preserving and protecting natural habitats, (for example seasonal restrictions, strict no-go areas and so forth). Disturbance to this type of ecosystem must be compensated.

Very high sensitivity – including critical habitat. Every effort must be made to avoid impacts on this habitat but if the project results in changes to the habitat, the project must ensure not just no net loss of habitat but in fact net gain. Although the water habitats are part of Annex 1 from the Habitats Directive, these habitats in the Svetinkolska River experience strong anthropogenic impact from the discharge of wastewater.

One of the habitats was assessed as 'vhs' (pseudo-steppe with grass and annual of *Thero-Brachypoditea*). Two habitats (riparian willow - poplar belts, Semi-Natural Dry Grasslands and Scrubland Facies on Calcareous Subs) were assessed as being of high sensitivity. One habitat was assessed as being of 'ms' (Intermittent streams) while the rest of the habitats were assessed as being of ls.

Table 14. Sensitivity of Habitat Types Along The Route

Habitats	Habitat Directive	Rare communities in North Macedonia	Well preserved natural communities	Function of biocorridors	Area value	Economic value	Prevention from erosion	CH/PBF	Associated fauna/flora of interest	Total	Sensitivity Ranking
<i>Degraded thermophilus oak hornbeam forest</i>	0	0	0	3	0	0	1	-	N	4	ls
<i>Pseudo-steppe grass and areal of Thero Brachypoditea</i>	3*	3	2	2	2	1	1	CH	Y	14	vhs
<i>Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco Brometalia) (* important orchid sites)</i>	3	0	1	2	2	1	1	PBF	Y	10	hs
<i>Riparian Willow- Poplar belt</i>	3	0	1	3	2	1	3	PBF	Y	13	hs
<i>Intermittent streams</i>	0	1	1	3	3	0	1	-	N	8	ms
<i>Reed belts</i>	0	1	2	1	1	0	1	-	N	5	ls
Rivers narrower than 5 m	0	0	1	1	1	1	1	-	N	6	ls
Abandoned fields with ruderal vegetation	0	0	0	1	1	1	1	-	N	4	ls
<i>Fields and acres</i>	0	0	0	0	3	3	0	-	N	6	ls
<i>Orchards and vineyards</i>	0	0	0	0	1	3	0	-	N	4	ls
<i>Coniferous plantations</i>	0	0	0	1	0	2	3	-	N	6	ls
<i>Agricultural structures</i>	0	0	0	0	0	3	0	-	N	3	ls

Ranking:

0- No significance

- 1- Low significance
- 2- Average significance
- 3- High significance

The sum of scores for a habitat determined its sensitivity. The highest possible score is 24. The rating of sensitivity was performed on the basis of the following criteria:

- 0-7 - low sensitivity (ls)
- 8-14 - medium sensitivity (ms)
- 14-19 - high sensitivity (hs)
- 20-24 - very high sensitivity (vhs)
- Y* signifies Priority Annex I habitat

Sensitive habitats (and their associated Ecologically Appropriate Areas of Analysis (EAAAs)) according to their sensitivity which are present along the Project alignment. Only those habitats considered to be of medium sensitivity and above are included here (habitat polygons with more than one sensitivity category have the higher category illustrated).

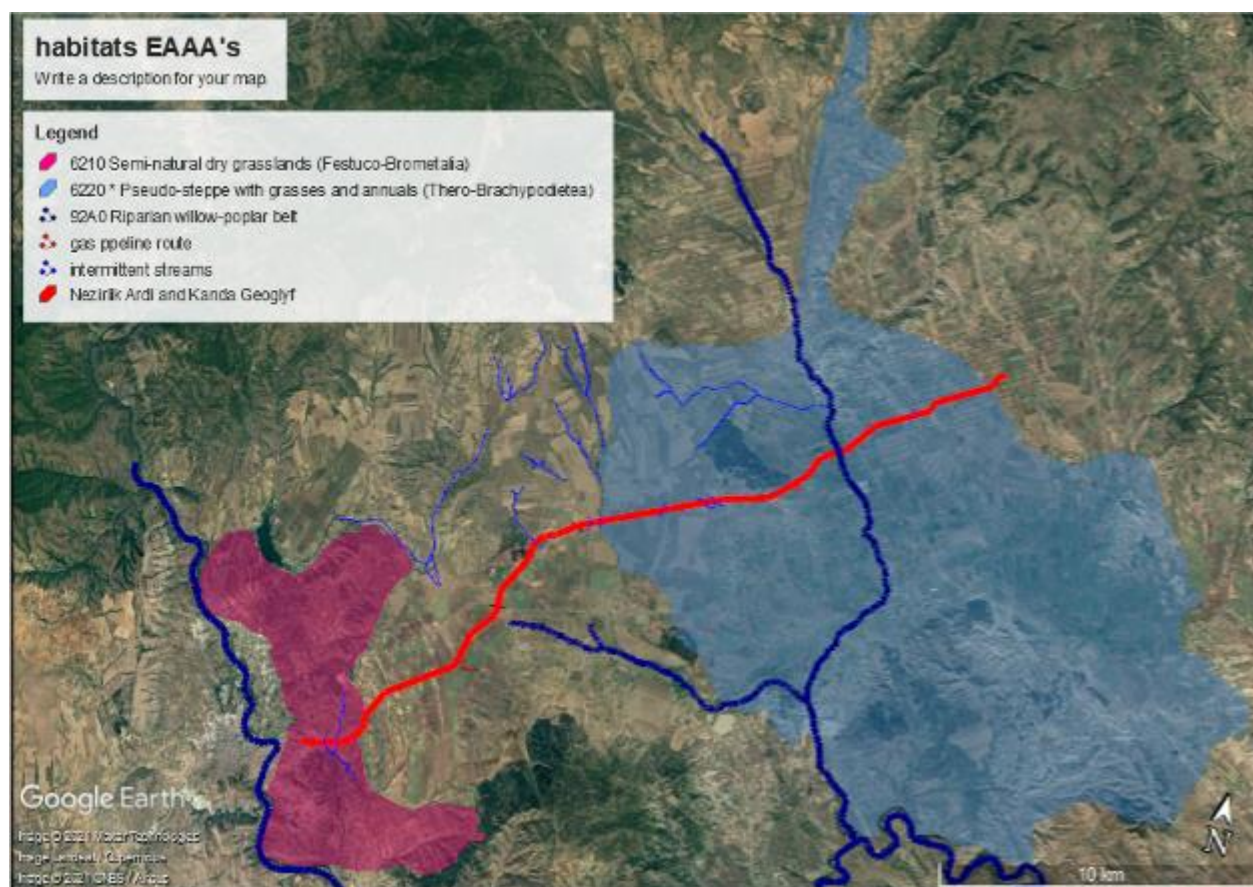


Figure 19. Habitat EAAAs in the Zol (the Most Sensitive Ones)

5.8.3.1 Summary of PBF and Critical Habitat

This section summarizes Priority Biodiversity Features or Critical Habitats.

Table 15. Priority Biodiversity Features and Critical Habitats

Priority Biodiversity Features as per EBRD PR6	
Threatened habitats	Three EU HD Annex I habitats are present and considered to be PBF: - 92A0 Riparian willow-poplar belt (<i>Salix alba</i> and <i>Populus alba</i> galleries); - 6220*: Pseudo-steppe with grasses and annuals of the <i>Thero Brachypodieta</i> ; and - 6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (<i>Festuco Brometalia</i>) (* important orchid sites)
Vulnerable species	
Plants	None identified
Fungi	None identified
Amphibians	<i>Hyla arborea</i> , <i>Bombina variegata</i> and <i>Bufo viridis</i> are listed in Annex II of HD. The EAAA for this species therefore qualifies as PBF Species connected to riparian habitats
Reptiles	<i>Testudo graeca</i> , <i>Testudo hermanni</i> and <i>Emys orbicularis</i> are species with priority biodiversity features since in the National Red List of Threatened Reptiles they are assessed as vulnerable (VU). <i>Testudo graeca</i> and <i>Emys orbicularis</i> are listed in Annex II of HD. <i>Platycephalus najadum</i> and <i>Elaphe quatuorlineata</i> are NT and listed in Ann.IV
Birds	Eastern Imperial Eagle (<i>Aquila heliaca</i>) is VU and Egyptian Vulture (<i>Neophron percipiter</i>) is EN
Mammals	Grey wolf (<i>Canis lupus</i>)
Significant biodiversity features	The locality of Nezirlik Ardi, a small fragment of reed belt (EUNIS D5.1), is ≈ 220 m away from the planned pipeline alignment. This is an important reproductive centre for survival of amphibians and it is the only aquatic habitat in the area of 2 km radius, surrounded by agricultural land
Ecological structures and functions required to maintain PBFs	PBFs occur within riparian zones of rivers within the wider area and are dependent upon the presence and continued flow of these rivers
Critical Habitat as per EBRD PR6	
(i) Highly threatened or unique Ecosystems	priority habitat 6220 *Pseudo-steppe with grasses and annuals of the <i>Thero Brachypodieta</i>
(ii) Habitats for significant importance to endangered Species	None present
(iii) Habitats of significant importance to endemic or geographically restricted Species	None present
(iv) Habitats supporting globally significant migratory species	None present
(v) Areas associated with key evolutionary processes	None present
(vi) Ecological functions necessary for maintenance of CH	None

Table 16. Species Identified as PBF / Requiring Specific Mitigation

Latin Name	IUCN Conservation Status Global / National (if have)	Habitat Directive	Value	Comment on selection
<i>Bombina variegata</i>	LC	Annex II / IV	5	Biodiversity Specialist actions required and PBF mitigation around riparian habitats, water courses and
<i>Rana dalmatina</i>	LC / NT	Annex IV	4	
<i>Rana graeca</i>	LC / NT	Annex IV	4	

Latin Name	IUCN Conservation Status Global / National (if have)	Habitat Directive	Value	Comment on selection
<i>Bufotes viridis</i>	LC	Annex IV	3	intermittent streams
<i>Hyla arborea</i>	LC / NT	Annex IV	4	
<i>Emys orbicularis</i>	NT / VU	Annex II	4	Require interventions from Biodiversity Specialists to prevent death or injury (moving individuals away from harm etc.).
<i>Testudo graeca</i>	VU / VU	Annex IV	5	
<i>Testudo hermanni</i>	NT / VU	Annex IV	5	
<i>Elaphe quatuorlineata</i>	NT	Annex IV	4	
<i>Lacerta viridis</i>	LC	Annex IV	3	
<i>Lacerta trilineata</i>	LC	Annex IV	3	
<i>Vipera ammodytes</i>	LC	Annex IV	3	
<i>Dolichophis caspius</i>	LC	Annex IV	3	
<i>Podaricus erhardi</i>	LC	Annex IV	3	
<i>Platycephalus najadum</i>	NT	Annex IV	4	
<i>Falco neumannii</i>	LC	Annex II	3	Care to be taken in respect of nesting birds.
<i>Aquila helica</i>	VU	Annex I / II	5	Care to be taken in respect of nesting birds.
<i>Neophron perconopterus (only for foraging)</i>	EN	Annex I / II	5	Requires good site practice, mitigation and restoration.
<i>Coracias garrulus</i>	LC/NT	Annex II	4	
<i>Accipiter gentilis</i>	LC	Annex II	3	
<i>Accipiter nisus</i>	LC	Annex II	3	
<i>Apus apus</i>	LC	Annex II	3	
<i>Athene noctua</i>	LC	Annex II	3	
<i>Aquila chrysaetos</i>	LC	Annex II	3	
<i>Burhinus oedicnemus</i>	LC	Annex II	3	
<i>Buteo buteo</i>	LC	Annex II	3	
<i>Buteo rufinus</i>	LC	Annex II	3	
<i>Carduelis carduelis</i>	LC	Annex II	3	
<i>Cecropis daurica</i>	LC	Annex II	3	
<i>Cettia cetti</i>	LC	Annex II	3	
<i>Chloris chloris</i>	LC	Annex II	3	
<i>Ciconia Ciconia</i>	LC	Annex II	3	
<i>Circaetus gallicus</i>	LC	Annex II	3	
<i>Columba livia</i>	LC	Annex II	3	
<i>Delichon urbicum</i>	LC	Annex II	3	
<i>Dendrocopos minor</i>	LC	Annex II	3	
<i>Dendrocopos syriacus</i>	LC	Annex II	3	
<i>Emberiza citronella</i>	LC	Annex II	3	
<i>Falco biarmicus</i>	LC	Annex II	3	
<i>Falco tinnunculus</i>	LC	Annex II	3	
<i>Falco peregrinus</i>	LC	Annex II	3	
<i>Falco Subbuteo</i>	LC	Annex II	3	
<i>Fringilla coelebs</i>	LC	Annex II	3	
<i>Hippolais olivetorum</i>	LC	Annex II	3	
<i>Hirundo rustica</i>	LC	Annex II	3	

Latin Name	IUCN Conservation Status Global / National (if have)	Habitat Directive	Value	Comment on selection
<i>Lanius collurio</i>	LC	Annex II	3	
<i>Lanius minor</i>	LC	Annex II	3	
<i>Lanius senator</i>	LC	Annex II	3	
<i>Linaria cannabina</i>	LC	Annex II	3	
<i>Lullula arborea</i>	LC	Annex II	3	
<i>Motacilla alba</i>	LC	Annex II	3	
<i>Motacilla cinerea</i>	LC	Annex II	3	
<i>Motacilla flava</i>	LC	Annex II	3	
<i>Muscicapa striata</i>	LC	Annex II	3	
<i>Oenanthe oenanthe</i>	LC	Annex II	3	
<i>Oriolus oriolus</i>	LC	Annex II	3	
<i>Otus scops</i>	LC	Annex II	3	
<i>Panurus biarmicus</i>	LC	Annex II	3	
<i>Parus major</i>	LC	Annex II	3	
<i>Passer domesticus</i>	LC	Annex II	3	
<i>Perdix perdix</i>	LC	Annex II	3	
<i>Phylloscopus collybita</i>	LC	Annex II	3	
<i>Phylloscopus trochilus</i>	LC	Annex II	3	
<i>Pica pica</i>	LC	Annex II	3	
<i>Picus viridis</i>	LC	Annex II	3	
<i>Streptopelia decaocto</i>	LC	Annex II	3	
<i>Upupa epops</i>	LC	Annex II	3	
<i>Canis lupus</i>	LC	Annex II / IV	5	Requires good site practice, and mitigation.

5.8.4 Areas of Particular Environmental Importance

All designated sites in the AoI are listed in **Table 17** including Emerald, IPA, IBA and so forth.

Table 17. Sites with the Potential to be Impacted by the Project

Site CODE	Site Name	Chainage (km)	Site Description / Habitats (taken from Natura 2000 designation information)	Impact from The Project	Distance from Zol (m)	Direction from The Project
MK 019	Ovche Pole - proposed Important Bird Area	1-27	Supports following bird species: <i>Neophron percnopterus</i> , <i>Aquila heliaca</i> , <i>Coracias garrulus</i> , <i>Falco naumanni</i> , <i>Burhinus oedicephalus</i> , <i>Lanius minor</i> , etc. The major threats are poisonous baits, pesticides in agriculture and intensive hunting. According to Velevski et al. (2010), Ovche pole is a region that has been recognized as an important bird area (IBA) an initiative implemented by BirdLife International at the global level, aiming to conserve a network of sites that are particularly important for the conservation of birds. However, this has not been officially accepted yet by the responsible authorities on National level.	Crossed by the gas pipeline	0	Online
/	Ovche Pole Bogoslovec proposed Important Plant Area	1-13	The site is distinguished by dry grasslands on Palaeogene sediments - steppes and habitats with halophytic vegetation. This IPA site was selected due to the importance of habitats (namely Criterion C – important habitats – from Annex I of the Habitat Directive or from the Bern Convention), and endangered plant species with a restricted range of distribution (satisfying Criterion A). <i>Galium rhodopeum</i> , <i>Hedysarum macedonicum</i> , <i>Salvia jurisicii</i> , <i>Anchusa macedonica</i> are trigger species.	Crossed by the gas pipeline	0	On-line
MK0000035	Ovche Pole - proposed Emerald site	3- 26	The site encompasses principal halomorphic (saline) soils, where specific halophytic vegetation grows. <i>Camphorosma monspeliaca</i> and <i>Salvia jurisicii</i> are important plant species, <i>Melanocorypha calandra</i> and <i>Anthus campestris</i> are important bird species, <i>Bufo bufo</i> from amphibians, and <i>Vipera ammodytes</i> and <i>Eurotestudo hermanni</i> from reptilians respectively. The area is under pressure due to the conversion to arable land.	Crossed By the gas pipeline	0	On-line
MK0000007	Ovche Pole - proposed Natura 2000	0	Four priority habitat types have been registered in Ovche Pole; Rare "continental salt meadows", the only Balkan steppe-Pannonian salt steppes and salt marshes, Steppe hill pastures-impressive landscape of Ovche Pole-Pseudostepe with grasses and perennials plants <i>Thero-Brachypodietea</i> and Monastery forests of pubescens oak in the sub-Mediterranean area. Viewed from the aspect of the uniqueness of these habitats are recognized at national and European level.	Not crossed by gas pipeline	≈ 5km	At distance
	Ovche pole - Proposed KBA		KBA Ovche Pole (51,622 ha) = IPA Ovche Pole-Bogoslovec which overlaps with IBA Ovche Pole (and partially to IBA Preod-Gjugjance, that does not meet KBA criteria). Bird species that trigger the Vulnerability criterion are <i>Neophron percnopterus</i> (EN) (6 ind.) <i>Aquila heliaca</i> (12-15 pairs) (VU). Plant species that trigger the Irreplaceability criterion - Highly restricted-range species (range <500 km ²) <i>Hedysarum macedonicum</i> Bornm., <i>Salvia jurisicii</i> Kusanin. Plant species that trigger irreplaceability criteria - Restricted range species (range <5,000 km ²) (Threshold -5% of the global population or one of the 5 best sites in RNM) <i>Anchusa macedonica</i> Degen & Dorfl., <i>Galium rhodopeum</i> Velen.	Crossed by the gas pipeline		On-line

5.9 Administrative and Governmental Structure of North Macedonia

Extending on over 25,436³⁷ m², the RNM is inhabited by 1,836,713 people³⁸. The political system is a parliamentary democracy with a President as the head of state, a commander of the army forces and is the president of the Security Council. The political organization of the country is based on the principle of the division of power: legislative, executive and judicial. The Government, along with the Prime Minister holds the executive power. The Government proposes laws, adopts by-laws, determines the policies of carrying out the laws and other regulations, defines and proposes the budget, and performs other activities in accordance with the law. It also monitors the operation of the state administration bodies and the state administration. Macedonian Assembly holds the legislative power. Judicial power is executed by constitutional court and other united courts. The citizens in RNM through non-compulsory and with guaranteed secrecy by law are electing the President, the Assembly, by proportional representation and the local self-government bodies (Mayor and Municipality Councils).

The RNM has 80 local self-governments organized as municipalities and the city of Skopje, which is a specific local self-government unit consisting of ten municipalities. As per Article 115 of the RNM's Constitution, municipalities manage urban planning, communal activities, culture, sport, social security and childcare, preschool education, primary education, and basic health care issues.

There are 43 urban and 37 rural municipalities, 1,767 settlements and 34 cities in the country. In addition, the RNM is divided into eight non-administrative units – statistical regions. North Macedonia's statistical regions exist solely for legal and statistical purposes as well as to ensure a better economic development. These regions include Vardar, East, Southwest, Southeast, Pelagonia, Polog, Northeast, and Skopje. The proposed pipeline route lies within the Vardar Statistical Region in the centre of the country, which is divided into nine municipalities: Chashka, Demir Kapija, Gradsko, Kavadarci, Lozovo, Negotino, Rosoman, Sveti Nikole, and Veles (**Figure 20**).

³⁷ <https://www.stat.gov.mk/publikacii/2022/MK-brojki-2022-mk.pdf>

³⁸ <https://www.stat.gov.mk/InfoGraphic/2022/Broshura-mk-web.pdf>



Figure 20. Statistical Regions and Municipalities in the RNM³⁹

5.10 National Socio-Economic Baseline

5.10.1 Demography

According to 2021 Census the total population of the RNM is 2,097,319 persons, out of which 1,836,713 is the total resident population and 260,606 persons is the total non-resident population, which includes the citizens of the RNM who are abroad for more than 12 months and the foreigners temporarily present in the country for less than 12 months⁴⁰. In 2021 in the total resident population of North Macedonia, 50.4% are women and 49.6% are men. 62% of the total resident population in the country lives in the urban areas, whereas 38% – in rural. There are 598,632 households and 839,174 dwellings. According to the age structure, in 2021 the largest percentage of the resident population in the RNM 7% – are in the age group of 40 to 44 years (**Figure 21**).

³⁹ State Statistical Office of the RNM. Territorial Units. Statistical regions and municipalities in the RNM. https://www.stat.gov.mk/OblastOpsto_en.aspx?id=1

⁴⁰ State Statistical Office of the RNM. Census of Population, Households and Dwellings in the RNM, 2021 - first dataset. https://www.stat.gov.mk/PrikaziSooptenie_en.aspx?rbtxt=146

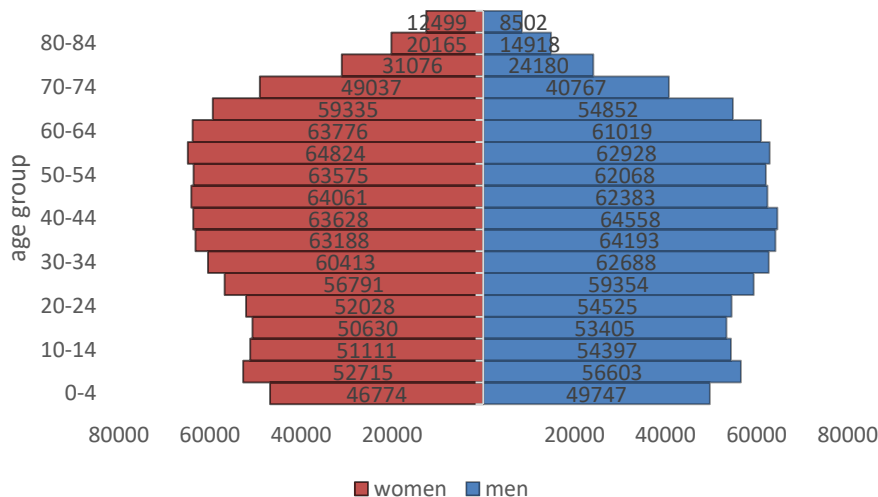


Figure 21. Population Distribution by Five-year Age Groups and Sex in the RNM, 2021⁴¹

Figure 22 illustrates that the total enumerated population in the country has shown a steady trend over the last five years with a slight increase in 2020. There also hasn't been any drastic changes in the sex ratio over the corresponding period.

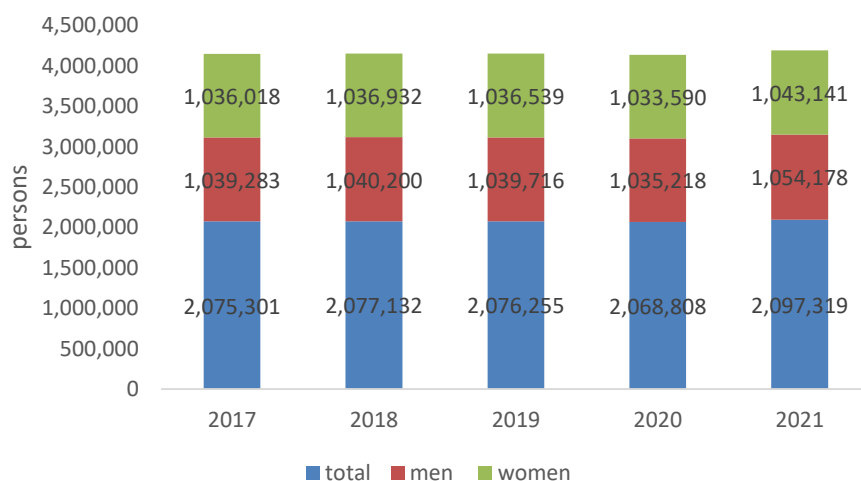


Figure 22. Distribution of Population of the RNM by Sex, 2017–2021^{42,43}

The global trend of aging population is also observed in North Macedonia. In the period of 1994–2020 the number of young population (age group 0–14) was gradually falling while the number of the old population (age group 65 and over) was gradually growing (Figure 23).

⁴¹ State Statistical Office of the RNM. MakStat Database. Censuses. Population Census 2021. Dataset published on 30.03.2022. Total resident population in the RNM by 5-year age groups and sex, by municipalities, Census 2021. https://makstat.stat.gov.mk/PXWeb/pxweb/en/MakStat/MakStat_Popisi_Popis2021_NaselenieSet/T1003P21.px?rxid=ef8122dc-af33-483a-9284-bbdbfee6960d

⁴² Ibid. Total enumerated population, total resident population and total non-resident population - Census 2021. https://makstat.stat.gov.mk/PXWeb/pxweb/en/MakStat/MakStat_Popisi_Popis2021_NaselenieSet/T1008P21a.px?rxid=ef8122dc-af33-483a-9284-bbdbfee6960d

⁴³ Ibid. Population. Estimation of Population. Population of the Republic of Macedonia on 31.12. by single age and sex, by years. 2017 – 2020. https://makstat.stat.gov.mk/PXWeb/pxweb/en/MakStat/MakStat_Naselenie_ProcenkiNaselenie/115_Popis_RM_1Star_Dec_e_ng.px?rxid=ef8122dc-af33-483a-9284-bbdbfee6960d

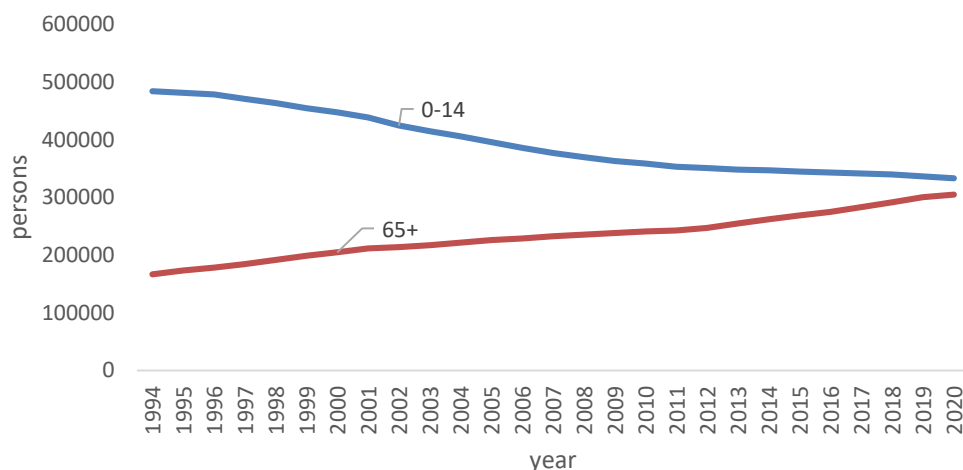
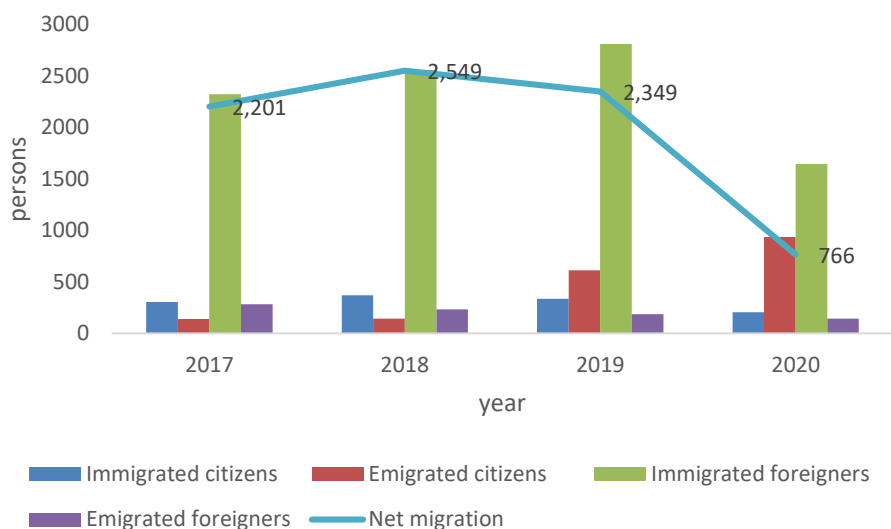


Figure 23. Dynamics of the Young and Aged Population of the Republic of North Macedonia, 1994–2020⁴⁴

Over the period 2017–2020 net international migration in the Republic of Macedonia was positive⁴⁵, however sharply declining in 2020 (Figure 24). This is due to the increase of emigrated citizens and decrease of immigrated foreigners in 2020. In terms of the place of emigration over the corresponding period the European continent was in the lead with the largest number of citizens emigrating to Germany. Whereas the most foreign immigrants came to the country from Albania, Kosovo, Serbia, Turkey, though the highest number of immigrated foreigners registered in 2020 was from Ukraine⁴⁶.



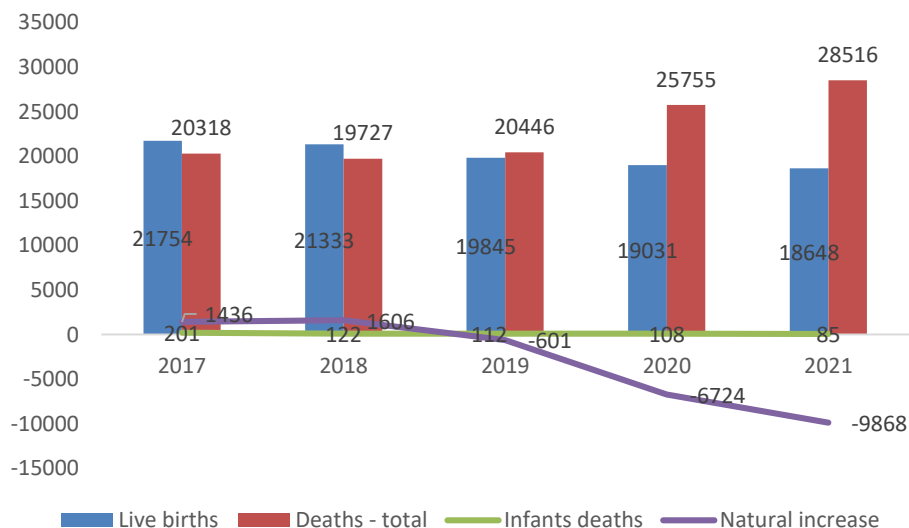
⁴⁴ Ibid. Population. Estimation of Population. Population of the Republic of Macedonia on 31.12, by single age and sex, by years. https://makstat.stat.gov.mk/PXWeb/pxweb/en/MakStat/MakStat_Naselenie_ProcenkiNaselenie/115_Popis_RM_1Star_Dec_e_ang.px/?rxid=ef8122dc-af33-483a-9284-bbdbfee6960d

⁴⁵ According to State Statistical Office of the RNM net international migration is calculated considering number of immigrated citizens, emigrated citizens, immigrated foreigners and emigrated foreigners.

⁴⁶ State Statistical Office of the RNM. MakStat database. Population. External migration. International migration: Immigrated and Emigrated Citizens of the Republic of Macedonia foreigners and net migration, by country, annually. 2017 – 2020. https://makstat.stat.gov.mk/PXWeb/pxweb/en/MakStat/MakStat_Naselenie_NadvoresniMigracii/176_Migracii_drzavi_VkDosOts_ang.px/?rxid=ef8122dc-af33-483a-9284-bbdbfee6960d

Figure 24. Overview of International Migration in the RNM, 2017–2020⁴⁷

According to the State Statistical Office data, the number of live births decreased over the five-year period from 2017 to 2021 whereas the number of deaths increased (**Figure 25**). The number of live births recorded in 2021 was 18,648, a decrease of 2% compared to the previous year. The number of deaths in 2021 increased by 10.7% compared to 2020 and it amounted to 28,516, of which 85 were infant deaths. The natural increase went negative starting from 2019, reaching -9,868 persons in 2021, representing the difference by which the number of live births is smaller than the number of deaths.

**Figure 25. Overview of the Natural Population Change in the RNM, 2017–2021⁴⁸**

5.10.2 Ethnicity, Language and Religion

According to 2021 Census of the total resident population in the RNM, 58.44% declared themselves as Macedonians, 24.30% as Albanians, 3.86% as Turks, 2.53% as Roma, 0.47% as Vlachs, 1.30% as Serbs and 0.87% as Bosniaks⁴⁹. In the total non-resident population included in the Census, which includes the citizens of the RNM absent abroad for more than 12 months and foreigners temporarily present in the RNM for less than 12 months, 24.45% declared themselves as Macedonians, 66.36% as Albanians, 4.79% as Turks, 1.02% as Roma, 0.19% as Vlachs, 0.35 as% Serbs, 0.81% as Bosniaks and others.

According to religious affiliation, 46.14% of the total resident population declared themselves as Orthodox, 32.17% as Muslims (Islam), 13.2% as Christians, 0.37% as Catholics, as well as a number

⁴⁷ State Statistical Office of the RNM. MakStat database. Population. External migration. International migration: Immigrated and Emigrated Citizens of the Republic of Macedonia foreigners and net migration, by country, annually. 2017 – 2020. https://makstat.stat.gov.mk/PXWeb/pxweb/en/MakStat/MakStat_Naselenie_NadvoresniMigracii/176_Migracii_drzavi_VkDosOts_ang.px/?rxid=ef8122dc-af33-483a-9284-bbdbfee6960d

⁴⁸ State Statistical Office of the RNM. MakStat database. Population. Vital. Overview of the natural change in population, 1931–2021. https://makstat.stat.gov.mk/PXWeb/pxweb/en/MakStat/MakStat_Naselenie_Vitalna/125_VitStat_Mk_PrDviz_ang.px/?rxid=ef8122dc-af33-483a-9284-bbdbfee6960d

⁴⁹ State Statistical Office of the RNM. Census of Population, Households and Dwellings in the RNM, 2021 - first dataset. https://www.stat.gov.mk/PrikaziSopstenie_en.aspx?rbtxt=146

of other religious communities that were not present in the previous censuses, such as: Evangelical Protestant Christians, Agnostics, Buddhists, and others⁵⁰.

61.38% of the total resident population stated that their mother tongue is Macedonian, 24.34% Albanian mother tongue, 3.41% Turkish, 1.73% Romani, 0.17% Vlach, 0.61% Serbian, and 0.85% Bosnian.

5.10.3 Economy

According to the preliminary statistical data, the gross domestic product (GDP) in the RNM totalled 723,239 million denars (11.8 billion Euros) at current prices in 2021⁵¹, thus rising by 10.3% compared to 2020, when a sharp drop of GDP occurred (**Figure 26**). The following sectors had the biggest share of value added in the structure of GDP in 2021: wholesale and retail trade; repair of motor vehicles and motorcycles; transportation and storage; accommodation and food service activities (21%)⁵². An increase of 20.6% in these sectors was recorded compared to 2020⁵³. The share of export of goods and services and import of goods and services in GDP rose by 12% and 14% respectively in 2021⁵⁴.

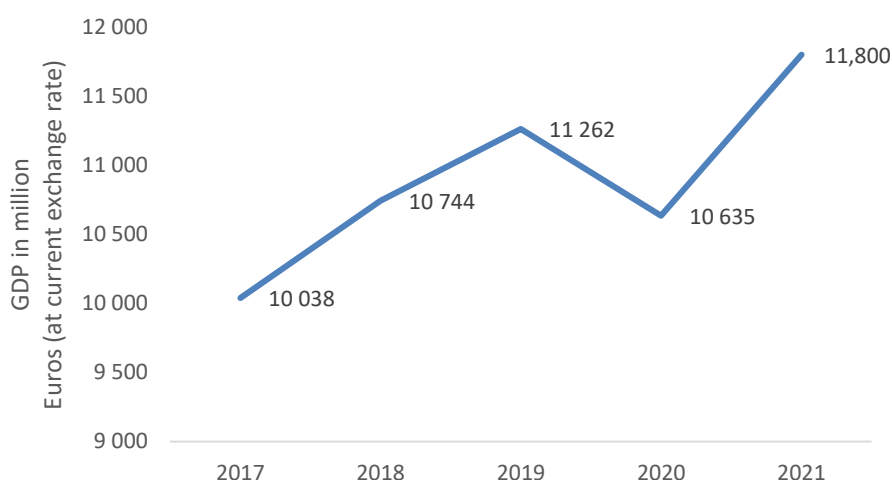


Figure 26. GDP at Current Prices (in million Euros) in the RNM, 2017 – 2021⁵⁵

GDP per capita in Euros in 2020 was 5,132, in 2019 – 5,423, in 2018 – 5,175 and 4,839 in 2017.

In 2020, in the RNM, gross fixed capital formation (GFCF) amounted to 144.779 million denars (2.36 million Euros), which is 0.7% less compared to the previous year. By purpose of investment construction sector had the highest share in the total GFCF in 2020 amounting to 33%, and 37% in

⁵⁰ Ibid.

⁵¹ Petrushevska Dragana. 03.03.2022. SeeNews. N. Macedonia's GDP rises 4% in 2021 - stats office estimate. <https://seenews.com/news/n-macedonias-gdp-rises-4-in-2021-stats-office-estimate-775568>

⁵² State Statistical Office of the RNM. MakStat database. Gross Domestic Product. GDP and GFCF annual data. GDP in accordance with ESA 2010. Gross Domestic Product by production approach, by NKD Rev.2, by years. https://makstat.stat.gov.mk/PXWeb/pxweb/en/MakStat/MakStat_BDP_BDPInvesGodisni_BDPsporedESS2010/125_NacSmA_Mk_03ProGod_01_ml.px/?rxid=ef8122dc-af33-483a-9284-bbdbfee6960d

⁵³ Ibid.

⁵⁴ Ibid. Gross Domestic Product by expenditure approach, by years (from quarterly calculation of GDP). https://makstat.stat.gov.mk/PXWeb/pxweb/en/MakStat/MakStat_BDP_BDPInvesGodisni_BDPsporedESS2010/175_NacSmA_Mk_04RasGod_01_ml.px/?rxid=ef8122dc-af33-483a-9284-bbdbfee6960d

⁵⁵ State Statistical Office of the RNM. 2021. Gross domestic product of the RNM in 2020 - preliminary data. Download tables, https://www.stat.gov.mk/PrikaziSooptenie_en.aspx?rbtxt=32

2019⁵⁶. It was followed by sectors of mining, manufacturing, electricity, gas and water supply, wastewater treatment, waste management, remediation activities: 22% in 2020 and 22.8% in 2019.

In 2021 there were 72,922 active business entities in the country, where 64.5% were micro-sized enterprises, 33% - small-sized, 1.4% - medium-sized, and 0.87% - large⁵⁷. Thus, the share of micro, small and medium enterprises (MSMEs) reached 99.1% in the total number of active business entities in the corresponding year. The number of active enterprises was gradually increasing from 71,419 in 2017 to 75,914 in 2019 when fell by 3.75% in 2020, which was caused by the drop of the number of micro-sized business entities⁵⁸. Majority of the active business entities in 2019, 2020 and 2021 was registered in the wholesale and retail trade; repair of motor vehicles and motorcycles sector, share of which was around 30% each year, followed by manufacturing sector with a share of 11% annually⁵⁹. Out of registered 602,722 employees in the RNM in 2020 55% were men and 45% women. 21.5% of the total employees were employed in the manufacturing sector with majority of manufacture workers working in manufacture of wearing apparel, followed by manufacture of motor vehicles, trailers and semi-trailers and food products⁶⁰. The second most hiring sector in 2020 was wholesale and retail trade; repair of motor vehicles and motorcycles with 18% of the total employees. In April 2022 the total average monthly net wage per employee amounted to 31,407 denars (510 Euro) with the highest indicator by sector in information and communication sector – 60 269 denars (979 Euro), and financial and insurance activities – 45,267 denars (736 Euro)⁶¹.

5.10.4 Poverty and Unemployment

The number of total unemployed persons in the RNM gradually decreased from 213,564 in 2017 to 147,917 in 2021⁶². Among the unemployed in 2021 61% were men and 39% women, whereas in 2021 the former amounted to 63% and the latter to 37%. The main source of livelihood of the majority of unemployed persons – 67% in 2021 was wage/pension of members of the household, followed by social assistance – 18% and financial support from relatives or other persons not members of the household – 5.4%.

The number of the inactive population⁶³ decreased from 725,723 persons in 2017 to 720,805 in 2019, and then rose in 2020 and 2021 to 734,731 and 739,796 persons respectively. The share of women in the inactive population annually increased the share of men, amounting to around 62% in the corresponding period. In 2021 36% of the inactive population were retired persons, 28% –

⁵⁶ Ibid.

⁵⁷ State Statistical Office of the RNM. MakStat database. Business Entities. Active Business Entities. Active business entities by size, by municipalities, by years, situation as of 31 December. https://makstat.stat.gov.mk/PXWeb/pxweb/en/MakStat/MakStat_DelovniSubj_AktDelovniSubjekti/325_DelSub_Op_03AcDSb_D_ang.px/?rxid=ef8122dc-af33-483a-9284-bbdbfee6960d

⁵⁸ Ibid.

⁵⁹ Ibid. Active business entities by sectors of activity according to NKD Rev.2, by municipalities, by years, situation as of 31 Dec. https://makstat.stat.gov.mk/PXWeb/pxweb/en/MakStat/MakStat_DelovniSubj_AktDelovniSubjekti/275_DelSub_Op_02AcDSb_D_ang.px/?rxid=ef8122dc-af33-483a-9284-bbdbfee6960d

⁶⁰ Ibid. Labour Market. Wages. Employees and Net Wages - Status October by Years. Employees in RNM by sectors and divisions of activities by NKD Rev.2, by sex, annual. https://makstat.stat.gov.mk/PXWeb/pxweb/en/MakStat/MakStat_PazarNaTrud_Plati_VraboteniNeto/201_PazTrud_Mk_vrab_otenig1_ang.px/?rxid=ef8122dc-af33-483a-9284-bbdbfee6960d

⁶¹ Ibid. Monthly Gross and Net Wage. Average paid net wage per employee, by sectors of activity, by NKD Rev.2, by months. https://makstat.stat.gov.mk/PXWeb/pxweb/en/MakStat/MakStat_PazarNaTrud_Plati_MesecnaBrutoNeto/175_PazTrud_Mk_neto_ml.px/?rxid=ef8122dc-af33-483a-9284-bbdbfee6960d

⁶² Ibid. Inactive population. Unemployed and inactive persons by gender and main sources of livelihood, annual. https://makstat.stat.gov.mk/PXWeb/pxweb/en/MakStat/MakStat_PazarNaTrud_NeaktivnoNaselenie/053_PazTrud_Mk_NevN_eakSpoPolSredZiv_ang.px/?rxid=ef8122dc-af33-483a-9284-bbdbfee6960d

⁶³ According to Eurostat's Glossary "inactive population" or people outside the labour can include pre-school children, school children, students, pensioners and housewives or -men, for example, provided that they are not working at all and not available or looking for work either; some of these may be of working-age. https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:People_outside_the_labour_force

housewives, and 22% – pupils and students⁶⁴. As for the main source of income for inactive population in 2021 the largest share – 50% was also from wage/pension of members of the household, whereas the second largest source was pension (own or family) – 35%, and then social assistance – 7.1%.

The State Statistical Office, based on the Survey on Income and Living Conditions, which is carried out in accordance with European Union recommendations, calculates Laeken poverty indicators annually. The source for poverty calculations is incomes, and the poverty threshold is defined at 60% of median equivalised income. According to the data, the at-risk-of-poverty rate in the RNM in 2020 was 21.8%, in 2019 – 21.6%⁶⁵. The Gini coefficient (measure of income distribution inequality) in 2020 was 31.4%, in 2019 – 30.7%⁶⁶.

Distribution of households according to the subjective opinion about the ability to make ends meet showed that 34.4% of the total households believe it is done with some difficulty while 25.2% – with great difficulty⁶⁷.

5.10.5 Key Housing and Environmental Problems

As for the key reported housing and environmental issues, 12% were related to leaking roof, damp walls, floors, foundation or rot in window frames or floors, 11% to pollution including coal-generation related grime and/or other environmental problems in the area, 7.5% to noise from neighbouring flats, stairway, industrial enterprises or street noise, 5.5% to crime, violence or vandalism in the area and 4.8% to insufficient lightning⁶⁸.

5.10.6 Gender Issues

The RNM has made significant commitments to advance gender equality⁶⁹, in that it:

- ratified the Convention on Elimination of all Forms of Discrimination Against Women and the Optional Protocol in 1994;
- became a signatory to the Beijing Declaration and Platform of Action (1995) and as such made national commitments for its implementation with the government statement given at the Fourth World Conference of Women in September 1995;
- in 2011 signed and in 2017 ratified the Convention the Council of Europe's Convention on Preventing and Combating Violence against Women (the Istanbul Convention);
- adopted the National Action Plan for the implementation of the Istanbul Convention (2018-2023).

However, women's representation and participation in decision-making is increasing slowly, e.g., the increased representation of women in the National Parliament and municipal councils is made only

⁶⁴ State Statistical Office of the RNM. MakStat database. Labour Market. Inactive population. Inactive population by categories and age, annual. https://makstat.stat.gov.mk/PXWeb/pxweb/en/MakStat/MakStat_PazarNaTrud_NeaktivnoNaselenie/052_PazTrud_Mk_NeaN_asPoKatVoz_ang.px/?rxid=ef8122dc-af33-483a-9284-bbdbfee6960d

⁶⁵ Ibid. Standard of Living. Laeken poverty indicators. Laeken indicators, general indicators for at-risk-of-poverty, annual. https://makstat.stat.gov.mk/PXWeb/pxweb/en/MakStat/MakStat_ZivotenStandard_LaekenIndikatorSiromastija/125_ZivStd_Mk_LaekenOPSTI_ml.px/?rxid=ef8122dc-af33-483a-9284-bbdbfee6960d

⁶⁶ Ibid.

⁶⁷ Ibid. Income and living conditions. Distribution of households according to the subjective opinion about the ability to make ends meet in urban and rural areas, by years. https://makstat.stat.gov.mk/PXWeb/pxweb/en/MakStat/MakStat_ZivotenStandard_PrihodilUsloviZaZiveenje/275_ZivStd_MK_ZADOVOLPOTREBI_ml.px/?rxid=ef8122dc-af33-483a-9284-bbdbfee6960d

⁶⁸ Ibid. Problems of main dwelling and environment in urban and rural areas, by years. https://makstat.stat.gov.mk/PXWeb/pxweb/en/MakStat/MakStat_ZivotenStandard_PrihodilUsloviZaZiveenje/150_ZivStd_MK_PROBLEMI_ml.px/?rxid=ef8122dc-af33-483a-9284-bbdbfee6960d

⁶⁹ UN Women. Europe and Central Asia. North Macedonia, <https://eca.unwomen.org/en/where-we-are/north-macedonia>

to due to electoral quotas⁷⁰. For example, in 2020 women held 35.8% of seats in the national parliaments and 16.7% in the national governments. Women's equal representation and participation in decision-making is also lagging in executive bodies, where quotas do not exist, women's representation is low: out of 15 ministerial posts, women hold only 4, and out of 81 mayoral posts, women hold only 6.

As for the gender-based violence, according to OSCE-led survey on violence against women in 2018 in North Macedonia, nearly half (45%) of women responding said they experienced psychological, physical and/or sexual violence at the hands of an intimate partner⁷¹.

As of December 2020, only 39.4% of indicators needed to monitor the Sustainable Development Goals from a gender perspective were available. Information gaps were noted for such key areas, as women in local governments; gender and poverty, physical and sexual harassment, women's access to assets (including land), and gender and the environment (these topics also lack comparable methodologies for regular monitoring)⁷².

The gender employment gap (difference between the employment rates of men and women of working age) was 19.9% in 2020⁷³.

North Macedonia's Gender Inequality Index ranked 35 in 2018 and performed better than other countries in the region, such as Bulgaria (46) and Romania (68).

5.11 Socio-Economic Baseline of the Affected Municipalities

The primary information used in the below section was collected by Civil Engineering Institute "Macedonia" JSC Skopje and supplemented by information from the Project's Geodetic Report.

5.11.1 Local Administrative and Government Structure

The proposed pipeline route crosses three municipalities of North Macedonia, Sveti Nikole, Lozovo, and Veles, which are part of the Vardar Statistical Region. The Sveti Nikole and Veles Municipalities have towns as capitals and comprises 33 and 30 villages, respectively. The Lozovo Municipality is a rural municipality and includes Lozovo and 10 more villages.

The municipal authorities of Sveti Nikole, Lozovo and Veles are represented by the Mayor and the counsellors, appointed on a four-year period. The current authorities are appointed from 2021 to 2025. There are municipal councils composed of 14 members in the Sveti Nikole Municipality, 9 members in the Lozovo Municipality, and 23 members in the Veles Municipality.

5.11.2 Demography

5.11.2.1 Population, Population Density and Dynamics

The Vardar Statistical Region comprises 16.2% of the RNM's area but is the least populated statistical region in the country. As per the 2021 Census data, the region's resident population totalled 138,722 persons, which was the lowest number among the country's regions, and population density comprised only 37.3 persons per km²⁷⁴.

The total enumerated population in all three affected municipalities slightly decreased over the period of 2017– 2020 and dropped considerably in 2021 in Veles and Sveti Nikole (**Figure 27**). This trend

⁷⁰ Ibid.

⁷¹ https://www.osce.org/files/f/documents/3/5/419264_1.pdf

⁷² UN Women. North Macedonia. <https://data.unwomen.org/country/north-macedonia>

⁷³ State Statistical Office of the RNM. MakStat database. Sustainable Development Goal 5 'Gender equality'.

⁷⁴ State Statistical Office of the RNM. 2021. Regional Yearbook. Regions in the RNM. p. 108. Vardar Statistical Region. https://www.stat.gov.mk/publikacii/2021/Regionite%20vo%20RM%202021_WEB.pdf

is similar to the population dynamics in the Vardar Statistical Region, where total enumerated population gradually decreased from 152,249 persons in 2017 to 145,465 persons in 2021.

In 2021, out of the total enumerated population, the share of the total resident population in Veles, Sveti Nikole and Lozovo Municipalities was around 95% (48,463 persons), 93% (15,320) and 95% (2,264) respectively.

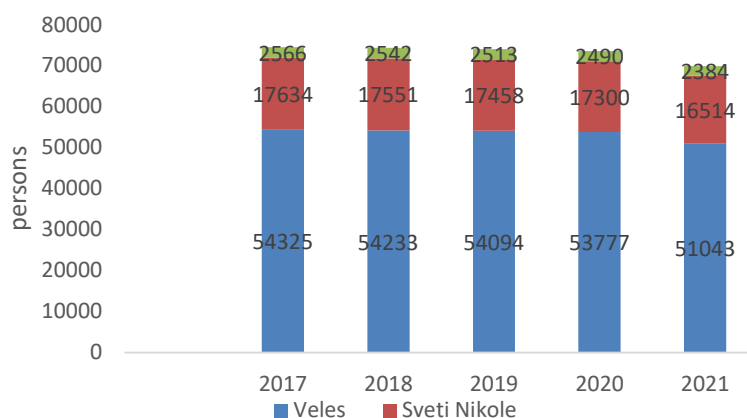


Figure 27. Total Enumerated Population in Veles, Sveti Nikole and Lozovo Municipalities, 2017–2021^{75,76}

Table 18 below shows the data on the household number, average number of household members and number of dwellings as per 2021 Census.

Table 18. Number of Households and Dwellings, and Average Household Members in the Vardar Statistical Region and Affected Municipalities⁷⁷, 2021

	Number of Households	Average Number of Household Members	Number of Dwellings
Vardar Statistical Region	46,793	5.7	59,103
Veles	16,566	2.9	18,630
Sveti Nikole	5,120	3.0	6,812
Lozovo	795	2.8	1,183

In 2021 the population density was 113.4 people/km² in Veles, 31.73 people/km² in Sveti Nikole, and 13.61 people/km² in Lozovo municipalities.

About 69% of the Vardar Statistical Region's population is concentrated in urban areas. In 2021 share of the urban population was 84% in Veles, and 76.5% in Sveti Nikole municipalities whereas 100% of the total resident population of the Lozovo Municipality lived in rural areas.

⁷⁵ Ibid. MakStat Database. Estimation of Population. Population of the Republic of Macedonia at 31.12, by sex and five-year age groups and statistical regions, by years. https://makstat.stat.gov.mk/PXWeb/pxweb/en/MakStat/MakStat_Naselenie_ProcenkiNaselenie/225_Popis_reg_3112_PolVoz_ang.px/?rxid=ef8122dc-af33-483a-9284-bbdbfee6960d

⁷⁶ Ibid. Population of the Republic of Macedonia at 30.06 by the specific age groups, by sex, by municipality, according to the change in the territorial division in 2014, by years. https://makstat.stat.gov.mk/PXWeb/pxweb/en/MakStat/MakStat_Naselenie_ProcenkiNaselenie/124_Popis_Ops80_NasPolSt_ar3006_eng.px/?rxid=ef8122dc-af33-483a-9284-bbdbfee6960d

⁷⁷ Ibid.

5.11.2.2 Age and Sex Structure

Women made up 49% of the total enumerated population in the Vardar Statistical Region in 2021. Whereas the share of women in the total enumerated population was 50% in Veles, 48% in Sveti Nikole and 46% in Lozovo municipalities.

In terms of age structure, the largest percentage of the resident population of the Vardar Statistical Region (7.6%) refers to the age group of 60 to 64 years⁷⁸. In fact, according to statistical data the number of young people (age group 0-14) of the total population of the Vardar Statistical Region declines over the years, whereas the number of old people (age group 65+) increases. As for the affected municipalities, most of the population in Veles Municipality and Sveti Nikole Municipality is also in the age group of 60 to 64 years, whereas in Lozovo Municipality – of 55 to 59 years (**Figure 28, Figure 29, Figure 30**)⁷⁹.

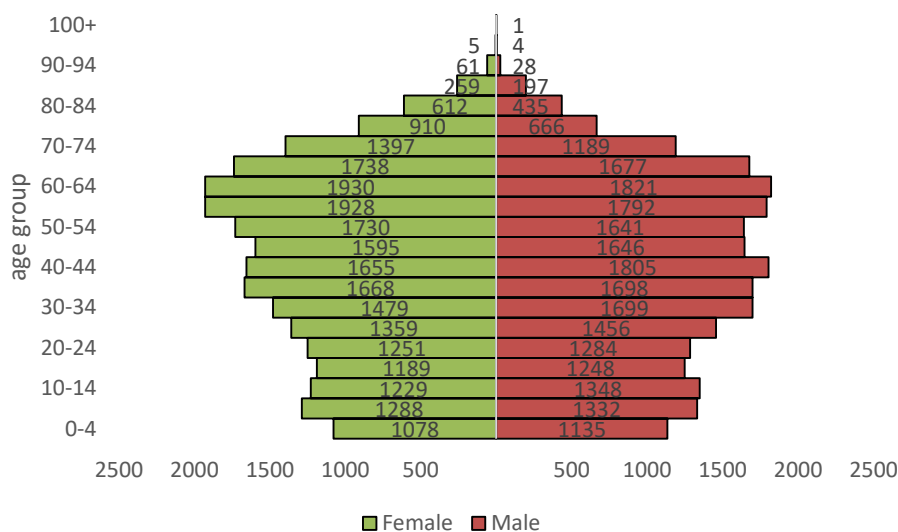


Figure 28. Total Resident Population Distribution by Five-year Age Groups and Sex in the Veles Municipality, 2021

⁷⁸ Ibid. MakStat database. Censuses. Population Census 2021. Total population, households and dwellings. Total resident population by 5-years age groups and sex according to type of the settlement, by municipalities, Census 2021 https://makstat.stat.gov.mk/PXWeb/pxweb/en/MakStat/MakStat_Popisi_Popis2021_NaselenieVkupno_Naselenie_VozrastPol/T1019P21.px/?rxid=ef8122dc-af33-483a-9284-bbdbfee6960d

⁷⁹ Ibid.

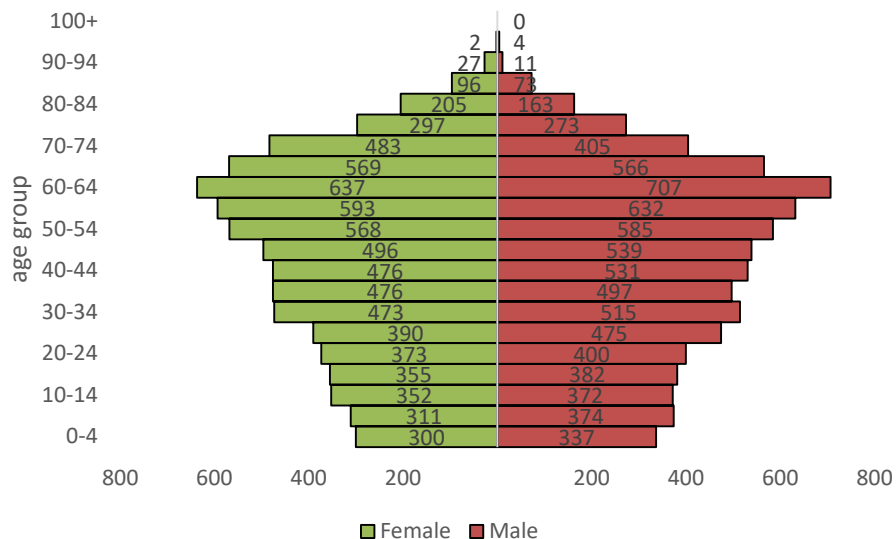


Figure 29. Total Resident Population Distribution by Five-year Age Groups and Sex in the Sveti-Nikole Municipality, 2021

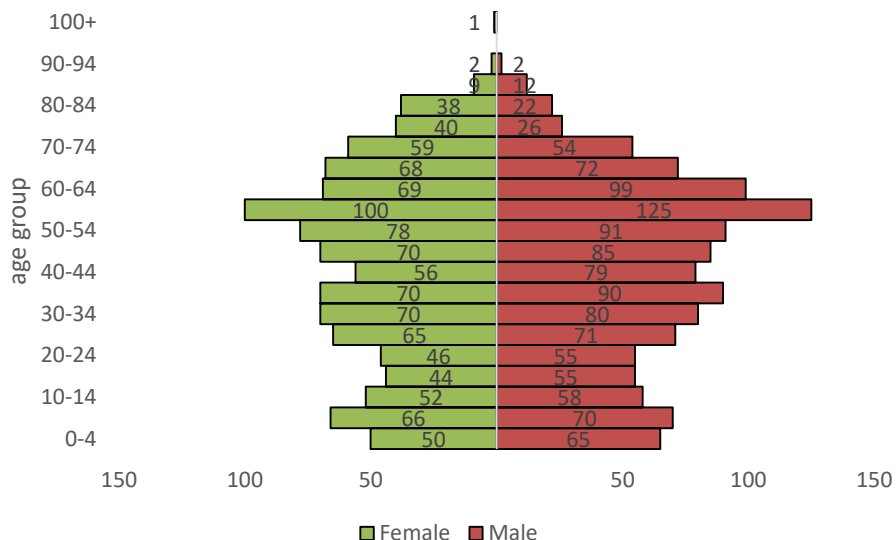


Figure 30. Total Resident Population Distribution by Five-year Age Groups and Sex in the Lozovo Municipality, 2021

5.11.2.3 Natural Population Change

The situation with the natural population changes in the Vardar Statistical Region resembles the national picture where the number of deaths increasingly exceeds the number of live births over the period 2017–2021 thus leading to a natural decrease. The same trend is observed in the three affected municipalities (**Table 19**).

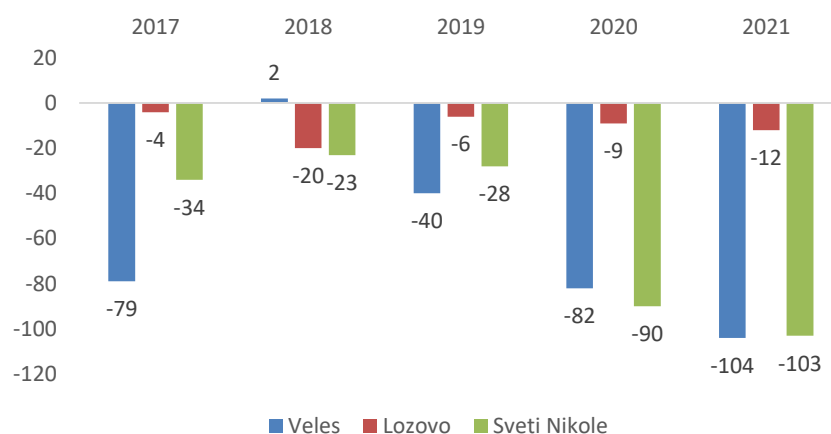
Infant mortality rate in the Vardar Statistical Region was the second lowest in the country in 2021. The number of infant mortalities was two in Sveti Nikole and one in Veles municipalities in that year, and no such cases were reported for the Lozovo Municipality.

Table 19. Overview of Natural Population Change in the Vardar Statistical Region and Affected Municipalities, 2021⁸⁰

	Number of Live Births	Number of Deaths	Natural Increase	Infant Deaths
Vardar Statistical Region	1,257	2,365	-1,108	4
Veles	432	854	-422	1
Sveti Nikole	110	248	-138	2
Lozovo	22	60	-38	-

5.11.2.4 Migration

The net migration in the Vardar Statistical Region in a region as a whole was negative over the years from 2017 to 2021. Thus, more people are leaving the region than moving into it. This trend is similar to the other statistical regions, except for Skopje, where the net migration is positive and stays over 900⁸¹. Net migration in three municipalities has also been negative in the period 2017-2021, except for Veles in 2018 (Figure 31)⁸².

**Figure 31. Net Migration in the Affected Municipalities, 2017–2021**

5.11.3 Ethnicity, Language and Religion

As per the 2021 Census 81% of the total resident population in the Vardar Statistical Region declared themselves as Macedonians; the key minority groups are the Albanians (5%), as the Turks (1.9%), Bosniaks (1.6%), Roma (1.5%), Serbians (0.9%) and Vlachs (0.4%)⁸³. According to religious affiliation, 48.4% of the total resident population of the region declared themselves as Orthodox,

⁸⁰ Ibid. MakStat Database. Population. Vital. https://makstat.stat.gov.mk/PXWeb/pxweb/en/MakStat/MakStat_Naselenie_Vitalna/?rxid=ef8122dc-af33-483a-9284-bbdbfee6960d

⁸¹ Ibid. Internal migration. Immigrated and emigrated by urban and rural areas, by regions. https://makstat.stat.gov.mk/PXWeb/pxweb/en/MakStat/MakStat_Naselenie_VnatresniMigracii/750_N_Migr_reg_grad_selovna_t_ang.px/?rxid=ef8122dc-af33-483a-9284-bbdbfee6960d

⁸² Ibid. Total Immigrated and Emigrated citizens in the Republic of Macedonia, by municipalities, annually. https://makstat.stat.gov.mk/PXWeb/pxweb/en/MakStat/MakStat_Naselenie_VnatresniMigracii/675_Migracii_VMop_DosOts_a_ng.px/?rxid=ef8122dc-af33-483a-9284-bbdbfee6960d

⁸³ Ibid. Censuses. Population Census 2021. Total population, households and dwellings. Ethno-cultural characteristics. Total resident population in the RNM by ethnic affiliation and sex, by municipalities, Census 2021. https://makstat.stat.gov.mk/PXWeb/pxweb/en/MakStat/MakStat_Popisi_Popis2021_NaselenieVkupno_Naselenie_EtnoKu_lturniKarakteristiki/T1008P21.px/?rxid=ef8122dc-af33-483a-9284-bbdbfee6960d

33.3% as Christians, 10.7% as Muslims, 0.12% as Catholics and others⁸⁴. 83.8% of the total resident population in the Vardar Statistical Region stated that their mother tongue was Macedonian, 5% Albanian, 1.6% Bosniak, 1.3% Turkish, 0.6% Romani, 0.34%, Serbian, and 0.2% Vlachs⁸⁵.

As for the Veles, Sveti Nikole, and Lozovo, the lion's share of the total resident population in the municipalities declared themselves as Macedonians (**Table 20**). The key minority group in Veles are Albanians (5.6%) and Bosniaks (3.8%), in Sveti Nikole – Vlachs (0.9%), in Lozovo – Turks (9%). The Roma people comprise 1% of the population in Veles and 0.3% in Sveti Nikole while no Romas are registered in Lozovo. Macedonian was declared to be a mother tongue of 77% of the total resident population in Veles Municipality, 93% in Sveti Nikole Municipality and 84% in Lozovo Municipality.

Table 20. Total Resident Population in the Affected Municipalities by Ethnic Affiliation, Religious Affiliation and Mother Tongue, 2021⁸⁶

Ethnic Affiliation							
	Macedonians	Albanians	Turks	Romas	Vlachs	Serbians	Bosniaks
Veles	36,825	2,736	1,037	507	270	267	1,825
Sveti Nikole	14 170	10	57	45	134	33	1
Lozovo	1 887	20	203	-	42	20	17
Religious Affiliation							
	Orthodox	Muslims	Catholics	Christians	Protestants	Evangelists	Jehovah's Witnesses
Veles	24,107	6,286	50	13,008	8	19	22
Sveti Nikole	6,857	92	15	7,484	5	1	2
Lozovo	1,176	236	1	779	-	-	-
Mother Tongue							
	Macedonian	Albanian	Turkish	Romani	Vlachs	Serbian	Bosniak
Veles	37,354	2,716	1,101	373	153	138	1,793
Sveti Nikole	14,300	14	58	19	65	26	1
Lozovo	1,911	20	194	-	39	15	13

5.11.4 Local Economy

Gross Domestic Product (GDP) in the Vardar Statistical Region reached 53,254 million denars (865 million Euros) in 2020, thus the region having fifth largest GDP among the country's regions and contributing 8.1% to the national GDP⁸⁷. In terms of GDP per capita the Vardar Statistical Region ranked second after the Skopje Region. The region's GDP in 2020 fell by 3% compared to 2019, while GDP per capita – by 2.41%. According to the State Statistical Office the daily migration of the labour force in certain regions enables the creation of gross domestic product to a level that could not be achieved by the resident active population on its own⁸⁸. Therefore, the result is that GDP per

⁸⁴ Ibid. Total population, households and dwellings. Ethno-cultural characteristics. Total resident population in the RNM by religious affiliation and sex, by municipalities, Census 2021. https://makstat.stat.gov.mk/PXWeb/pxweb/en/MakStat/MakStat_Popisi_Popis2021_NaselenieVkupno_Naselenie_EtnoKuItorniKarakteristiki/T1012P21.px/?rxid=ef8122dc-af33-483a-9284-bdbfee6960d

⁸⁵ Ibid. Total resident population in the RNM by mother tongue and sex, by municipalities, Census 2021. https://makstat.stat.gov.mk/PXWeb/pxweb/en/MakStat/MakStat_Popisi_Popis2021_NaselenieVkupno_Naselenie_EtnoKuItorniKarakteristiki/T1015P21.px/?rxid=ef8122dc-af33-483a-9284-bdbfee6960d

⁸⁶ Ibid. Ethno-cultural characteristics. https://makstat.stat.gov.mk/PXWeb/pxweb/en/MakStat/MakStat_Popisi_Popis2021/?rxid=ef8122dc-af33-483a-9284-bdbfee6960d

⁸⁷ Ibid. Gross Domestic Product. GDP and GFCF annual data. GDP in accordance with ESA 2010. Gross Domestic Product, by year, by regions, ESA 2010. https://makstat.stat.gov.mk/PXWeb/pxweb/en/MakStat/MakStat_BDP_BDPInvesGodisni_BDPsporedESS2010/675_NacSmA_Reg_BDPreg_ml.px/?rxid=ef8122dc-af33-483a-9284-bdbfee6960d

⁸⁸ https://www.stat.gov.mk/PrikaziSooopstenie_en.aspx?rbrtxt=36

capita can be overestimated in these regions and underestimated in regions with commuter outflows; data do not present the degree of development by regions from the aspect of households' incomes.

According to the distribution of active business entities by size out of 5,341 enterprises in the Vardar Statistical Region in 2021. 99.4% was micro, small and medium enterprises (MSMEs), with 3,573 micro-sized, 1,677 small-sized, 59 medium-sized and 32 large-sized entities⁸⁹. The number of active business entities in the Vardar Statistical Region was rising gradually from 5,383 entities in 2017 to 5,595 in 2019 then falling to 5,318 in 2020 due to the decreased number of micro-sized enterprises.

As for the municipalities, Veles had the highest number of active business entities in the region over the period 2017-2021, contributing 32.6% to the region's total number in 2021. It was followed by Sveti Nikole, and Lozovo, where the share of active business entities in the region's total number in 2021 was 14% and 0.9% respectively. The latter has the lowest number of registered active business entities in the region. In 2019, 2020 and 2021 around 30% of active enterprises in the region were registered in the wholesale and retail trade; repair of motor vehicles and motorcycles sector resembling the national distribution sector-wise⁹⁰. However, in comparison to the national data, the second highest number in terms of active business entities was in the transportation and storage sector contributing to the total number by around 13% annually from 2019 to 2021. Majority of the total active business entities in the region were in Veles in 2019, 2020 and 2021 amounting to 1,830, 1,743, and 1,739 respectively. As for the sector, most of the enterprises in Veles were in wholesale and retail trade; repair of motor vehicles and motorcycles sector. The lowest number of active business entities was registered in Lozovo in the corresponding period (47, 43 and 46 respectively). Most of the entities in Lozovo were in agriculture, forestry and fishing sector. As for Sveti Nikole, the municipality had the highest number of enterprises in agriculture, forestry and fishing sector in the region in 2019, 2020 and 2021, significantly prevailing the indicator of the other municipalities. The municipality's business entities contributed to the region's total number of business entities in agriculture, forestry and fishing sector by around 53% annually in the period 2019-2021.

As for the average net wage paid per employee, in the Vardar Statistical Region in 2020 it amounted to 23,139 denars (376 Euro) with the highest average gross wage paid per employee in the financial and insurance activities sector – 34,951 denars (568 Euro), followed by electricity, gas, steam and air conditioning supply sector – 34,352 denars (558 Euro). The average net wage paid per employee rose gradually over period 2018-2020.

No information is available on average wages in the affected municipalities.

5.11.5 Poverty and Unemployment, Incomes and Expenditures

The unemployment rate in the Vardar Statistical Region decreased from 15.9% in 2018 to 11.1% in 2020, being lower than the national indicator⁹¹. In fact, in 2020 the region had one of the lowest unemployment rates in the country.

According to the data obtained from the Employment Centre of Sveti Nikole (31st August 2020), the total number of unemployed in the municipalities of Sveti Nikole and Lozovo was 1,566 persons, 43.5% of which were women. According to the age, most unemployed persons (900 persons) are registered in the age category from 55 to 59 years, followed by the category of unemployed persons

⁸⁹ Ibid. Business Entities. Active Business Entities. Active business entities by size, by municipalities, by years, situation as of 31 December.

https://makstat.stat.gov.mk/PXWeb/pxweb/en/MakStat/MakStat_DelovniSubj_AktDelovniSubjekti/325_DelSub_Op_03AcDSbD_ang.px/?rxid=ef8122dc-af33-483a-9284-bdbf6960d

⁹⁰ Ibid. Active business entities by sectors of activity according to NKD Rev.2, by municipalities, by years, situation as of 31 December.

https://makstat.stat.gov.mk/PXWeb/pxweb/en/MakStat/MakStat_DelovniSubj_AktDelovniSubjekti/275_DelSub_Op_02AcDSbD_ang.px/?rxid=ef8122dc-af33-483a-9284-bdbf6960d

⁹¹ State Statistical Office of the RNM. 2021. Regional Yearbook. Regions in the RNM. Activity rates of the population aged 15 years and over. p. 35. https://www.stat.gov.mk/publikacii/2021/Regionite%20vo%20RM%202021_WEB.pdf

from 30 to 34 years (544 persons). According to the level of education, most unemployed persons (636 persons) have completed secondary education which are followed by unemployed persons without education while the ones with completed primary education are at a similar rate (600 persons). In the same year there were 5,181 unemployed persons registered in Veles.

5.11.6 Roads and Communal Infrastructure

5.11.6.1 Roads and Railroads

As of 2021, there are 212.89 kms of railways in the Vardar Statistical Region. The region's railway network is the longest among the country's statistical regions and comprise 31% of the countries' total railways' length⁹².

The existing road infrastructure in the Vardar Statistical Region consists of about 909 km of local roads, 56.5 km of highways, 60.5 km of main roads and 577 km of regional roads⁹³.

In terms of the local road network, in 2020 the Veles Municipality had 141 kms of local roads, the Lozovo Municipality – 11 kms, and the Sveti Nikole Municipality – 104 kms⁹⁴. Most of the roads in the municipalities are earth roads, followed by macadam roads.

As of 2020 there were 36 permanent bridges with a total length of 314 m in the Vardar Statistical Region⁹⁵. Three bridges are located in the Veles Municipality with a total length of 280 m and three with a total length of 34 m – in the Sveti Nikole Municipality. There were no permanent or temporary bridges in the Lozovo Municipality.

The local transportation in the Project-affected municipalities is mainly through regular bus and railway lines but is also individually organized. Bus stops are located next to or on the main local roads.

5.11.6.2 Waste Management Facilities

In 2020 there were eight active landfills in the Vardar Statistical Region with a total surface of 636,000 m²⁹⁶. 89,383 tonnes of waste were generated, and 60,350 tonnes were collected in the Vardar Statistical Region in 2020. **Table 10** shows data on collected municipal waste in Veles and Sveti Nikole over the period 2017–2019.

Most of produced waste is generated in Veles as it is the most populated municipality in the statistical region. Waste management in the Veles Municipality is performed by PCE “Derven” in Veles. Most of the municipal waste collected and transported by PCE “Derven” is deposited at the “Bunar Dere” municipal landfill, managed by a local utility company. There is also a construction waste landfill, and approximately 14 dumpsites. Separate waste collection commenced in the municipalities; segregated waste is collected and handled by an authorised company. The Veles Municipality has signed an agreement for business and technical cooperation for the establishment of services for separate collection and transportation of waste from electrical and electronic equipment between the

⁹² State Statistical Office of the RNM. MakStat database. Transport. Regional statistics. Railway network, km. https://makstat.stat.gov.mk/PXWeb/pxweb/en/MakStat/MakStat_Transport_RegionalniStatistiki/450_Trans_MK_zelreg_en.px/?rxid=ef8122dc-af33-483a-9284-bbdbfee6960d

⁹³ Centre for Development of Vardar Statistical Region Traffic infrastructure. <https://vardarregion.gov.mk/en/region/>

⁹⁴ State Statistical Office of the RNM. MakStat database. Transport. Infrastructure. Local road network, by municipalities, km. https://makstat.stat.gov.mk/PXWeb/pxweb/en/MakStat/MakStat_Transport_Infrastruktura/125_Trans_op_06_11_LokPatMr_a_ng.px/?rxid=ef8122dc-af33-483a-9284-bbdbfee6960d

⁹⁵ State Statistical Office of the RNM. MakStat database. Transport. Infrastructure. Bridges on local network, by municipality, by years. https://makstat.stat.gov.mk/PXWeb/pxweb/en/MakStat/MakStat_Transport_Infrastruktura/150_Trans_most_opst_en.px/?rxid=ef8122dc-af33-483a-9284-bbdbfee6960d

⁹⁶ State Statistical Office of the RNM. 2021. Environment Statistics. p. 59 https://www.stat.gov.mk/publikacii/2021/ZivotnaSredina2021_web.pdf

ZERO WASTE LLC and PCE “Derven”. The municipality regularly adopts an annual Waste Management Plan.

The Sveti Nikole Municipality uses its own Ljubin Dol Municipal Landfill operated by a local utility company. Paper and plastic waste is selected, and there is a location for collecting electrical and electronic waste, as well as battery containers.

Waste management in the Lozovo Municipality is performed by PCE “Lozovo”, a local public enterprise established to perform communal activities on the territory of the municipality. The municipality does not have a local landfill; waste produced in the municipality is deposited at the municipal landfill of the neighbouring Veles Municipality. 81% of the municipality is covered by collection waste services.

5.11.6.3 Electricity Generation and Supply

In terms of electricity production and distribution in the Vardar Statistical Region, the key facilities are a fuel oil-fired plant Negotino Thermal Power Plant (TPP) and Dubrovo Substation, which is critical for transmission of electricity inside the Republic of Macedonia and to (from) Greece. At the same time, Negotino TPP commissioned in 1978, was dormant for 12 years before the government decided to operate it from December 2021 to April 2022 in order to meet demand during the ongoing energy crisis⁹⁷. The RNM's government considers converting Negotino TPP to a natural gas-fired power plant through a public-private partnership or selling the existing facility⁹⁸.

It is planned to use hydro power potential of the Vardar River and its most important tributaries within the Vardar Valley Energy Project⁹⁹. The Vardar Statistical Region has a large number of sunny hours a year, as well as a significant presence of wind, so there is a possibility to use the energy of wind and sun.

At present, there are no electricity generation facilities in the affected municipalities and electricity is imported from other parts of the country. None of such facilities are planned to be constructed on their territories.

In Veles the electricity transmission network consists of transmission lines and substations that provide a stable power supply. The electrical infrastructure of Sveti Nikole includes energy facilities, high voltage and medium voltage distribution. The key facility of the high voltage distribution is the substation TS 110/35/10 kV located in Ovche Pole. It is powered by 110 kV transmission line Veles - Shtip. From this substation, a system of transmission lines is branched, out of which 110 kV and 35 kV transmission line are branched in the direction of TR 35/10 kV Sveti Nikole.

5.11.6.4 Water Supply and Wastewater Treatment

25 businesses were active in the sector of water supply, wastewater treatment, waste management and remediation in the Vardar Statistical Region in 2021. Five of them were registered in Veles, 3 – in Sveti Nikole and 1 – in Lozovo municipalities.

The coverage by the sewerage networks in urban areas is 95% in Veles town and 100% in Sveti Nikole town. In the rural areas this indicator ranges from 0% in some villages 70%. There are no sewerage systems in many rural areas, instead, septic pits are established to manage communal wastewater.

Derven PCE ensures drinking water supply to Veles town. Drinking water is sourced from the Lisiche Hydrosystem and then processed at a water plant in Veles. The communal wastewater from the Veles households and other consumers is mixed with surface runoff and diverted through the existing

⁹⁷ Dragana Petrushevska. Dec 16, 2021. SeeNews. N. Macedonia starts up TEC Negotino power plant – report. <https://seenews.com/news/n-macedonia-starts-up-tec-negotino-power-plant-report-765898>

⁹⁸ Ibid.

⁹⁹ http://www.elem.com.mk/wp-content/uploads/2017/04/Vardar_Valley_2015_EN.pdf

sewerage network. Industrial wastewater from many facilities is discharged directly into the Vardar River without prior treatment.

The Sveti Nikole town is supplied with clean drinking water from two systems:

- A system for alternative water supply Divljak (which is not in operation), and
- PE Hydropower System Zletovica, Probishtip.

The majority of the households in both urban and rural areas in the Vardar Statistical Region are connected to centralised water supply systems¹⁰⁰.

5.11.7 Tourism and Recreation

Number of tourists in the Vardar Statistical Region sharply decreased to 6,845 persons in 2020 compared to 25,136 persons in 2019, and later increased to 13,942 persons in 2021¹⁰¹. If in 2020 72.2% of the total number of tourists in the region were domestic tourists, in 2021 60% of people visiting the region were foreigners. In 2020 and 2021 the Vardar Statistical Region had the second lowest number of tourists in the country. Most of foreign tourists visiting the Vardar Statistical Region in 2021 were from Serbia (42%) and Romania (17%)¹⁰². As of May 2022, the lion's share of tourists in the region visited the Veles Municipality (1,113 people, including 433 domestic tourists and 680 foreign tourists); no tourists were officially registered in Sveti Nikole or Lozovo municipalities¹⁰³.

The capacity for accommodation of tourists in 2021 included 630 rooms and 1,617 beds¹⁰⁴, both indicators being second lowest in the country.

Neither of the affected municipalities can be considered as popular touristic areas.

5.11.8 Social Infrastructure

5.11.8.1 Healthcare Facilities

According to the Health Map of the RNM, the country is divided into 'health regions', and the baseline study area is split between the Sveti Nikole Health Region and Veles Health Region.

The Sveti Nikole Health Region has an area of 651 km² and includes 44 settlements with 20,093 residents in total. The Veles Health Region is 1,552 km² in size and includes 87 settlements with 65,972 residents.

Table 21 below reviews the resources of public health systems of both health regions using a number of quantitative indicators to illustrate their capacity of 2018.

¹⁰⁰ State Statistical Office of the RNM. MakStat database. Population Census 2021. Total population, households and dwellings. Households by water supply system and type of settlement, by municipalities, Census 2021. https://makstat.stat.gov.mk/PXWeb/pxweb/en/MakStat/MakStat_Popisi_Popis2021_NaselenieVkupno_Domakinstva/T2005_P21.px/?rxid=ef8122dc-af33-483a-9284-bbdbfee6960d

¹⁰¹ Ibid. Tourism and catering trade. Tourism. Tourists and nights spent. Number of tourists, by region, by years https://makstat.stat.gov.mk/PXWeb/pxweb/en/MakStat/MakStat_TurizamUgostitel_Turizam_TuristiNokevanja/375_Turizam_Reg_Turisti_ml.px/?rxid=ef8122dc-af33-483a-9284-bbdbfee6960d

¹⁰² Ibid. Number of tourists and nights spent by country of origin, by region, by years. https://makstat.stat.gov.mk/PXWeb/pxweb/en/MakStat/MakStat_TurizamUgostitel_Turizam_TuristiNokevanja/525_Turizam_Reg_ZemjiGod_ml.px/?rxid=ef8122dc-af33-483a-9284-bbdbfee6960d

¹⁰³ Ibid. Number and nights spent of tourists by countries of origin, 2011-2022, by municipality, by month. https://makstat.stat.gov.mk/PXWeb/pxweb/en/MakStat/MakStat_TurizamUgostitel_Turizam_TuristiNokevanja/125_Turizam_Op_BrTurNok_ml.px/?rxid=ef8122dc-af33-483a-9284-bbdbfee6960d

¹⁰⁴ Ibid. Capacity for accommodation, by region, by years. https://makstat.stat.gov.mk/PXWeb/pxweb/en/MakStat/MakStat_TurizamUgostitel_Turizam_TuristiNokevanja/475_Turizam_Reg_Kapac_ml.px/?rxid=ef8122dc-af33-483a-9284-bbdbfee6960d

Table 21. Public Health Systems of the Sveti Nikole and Veles Health Regions (2018)¹⁰⁵

No.	Health Sector Parameters	Sveti Nikole Health Region	Veles Health Region	The RNM
1.	Number of residents per doctor	648.2	362.3	326.2
2.	Total number of doctors, people	31	182	6,364
3.	Number of general practitioners, people	18	57	1 825
4.	Share of general practitioners in the total number of doctors, %	58.1%	31.3%	28.7%
5.	Number of doctors passing specialisation training, people	0	25	708
6.	Share of doctors passing specialisation training, %	0.0%	13.7%	11.1%
7.	Specialists, people	13	100	3 831
8.	Share of specialists in the total number of doctors, %	41.9%	54.9%	60.2%
9.	Number of dentists	10	50	1 861
10.	Number of residents per dentist	2 009.3	1 318.7	1 115.6
11.	Number of pharmacists	4	39	1 105
12.	Number of residents per pharmacist	5 023.3	1 690.6	1 878.9
13.	Staff of the medical units in rural areas			
	- Permanent doctors	3	6	308
	- Periodical doctors	0	0	4

In the Sveti Nikole Health Region there is one Health Centre, which operates two healthcare facilities in the city and three clinics in the surrounding villages: Erdzelija, Mustafino and Gorobinci, which are given under concession to private health facilities.

In the Veles Health Region, health care services are provided through a wide network of private healthcare institutions of primary health practice, 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.

5.11.8.2 Educational Facilities

In 2017 a total of 6 kindergartens / centres for early childhood development were registered in the Vardar Statistical Region with 3,176 students enrolled and 416 staff employed¹⁰⁶. There is one kindergarten in Veles (with the current capacity of 942 children) and one kindergarten in Sveti Nikole (with the current capacity for 390 children); both of them were public¹⁰⁷.

Table 22 shows statistical data on educational facilities and the number of students and teachers including distribution by gender in the Vardar Statistical Region and three Project-affected municipalities in the academic year of 2020/2021. 69% of the total number of schools in the Vardar Statistical Region were regional schools, 26% – central schools and 5% – independent schools¹⁰⁸. The region had the lowest number of primary and lower secondary schools among the country's statistical regions. Regarding the regular upper secondary schools, in the same academic year the

¹⁰⁵ Source: Health map of the Republic of Macedonia 2018, Part I, The Situation in the Republic of Macedonia, Skopje, 2018, <http://iph.mk/wp-content/uploads/2014/09/ZK-MK-2019.pdf>

¹⁰⁶ State Statistical Office of the RNM. Publications. Institutions for care and education of children – centres for early childhood development, 2017. <https://www.stat.gov.mk/Publikacii/2.4.18.02.pdf>

¹⁰⁷ Ibid.

¹⁰⁸ Ibid. Education and Science. Primary and Lower Secondary Education. End of School Year. Regular primary and lower secondary schools according to the organizational form, by region, by school year. https://makstat.stat.gov.mk/PXWeb/pxweb/en/MakStat/MakStat_ObrazovanieNauka_OsnovnoObrazovanie_KrajUcebna/12_5_osnucil_reg_krajT2_ml.px/?rxid=ef8122dc-af33-483a-9284-bbdbfee6960d

index was third lowest in the country. 393 students, 65% of which were women, graduated from universities in the Vardar Statistical Region in 2020. This number comprises 6% of the country's total graduated students¹⁰⁹. There is one university in Veles – St. Clement of Ochrid University of Bitola¹¹⁰ and one in Sveti Nikole – the Gavrilko Romanovich Derzhavin International Slavic University. The latter had 86 teachers in the academic year of 2020/2021, 49% of which were women¹¹¹.

Table 22. Number of Schools and Students in the Vardar Statistical Region and Affected Municipalities in the Academic Year of 2020/2021^{112,113}

	Vardar Statistical Region	Veles Municipality	Sveti Nikole Municipality	Lozovo Municipality
Number of primary and lower secondary schools	78	18	10	5
Number of students in primary and lower secondary schools	12,906 (6,247 female students / 6 659 male students)	4,490 (2,173 female students / 2,317 male students)	1,243 (595 female students / 648 male students)	210 (104 female students / 106 male students)
Number of teachers in primary and lower secondary schools	1,282 (935 women-teachers / 347 men-teachers)	359 (267 women-teachers and 92 men-teachers)	170 (129 women-teachers / 41 men-teachers)	27 (15 women-teachers / 12 men-teachers)
Number of upper secondary schools	11	5	1	-
Number of students in upper secondary schools	4,427 (2,123 female students / 2,304 male students)	2,054 (991 female students / 1,063 male students)	388 (173 female students / 215 male students)	-
Number of teachers in upper secondary schools	445 (252 women-teachers / 193 men-teachers)	190 (111 women-teachers / 79 men-teachers)	52 (25 women-teachers / 27 men-teachers)	-

5.11.8.3 Cultural Facilities

There is one cinema for 420 seats in the region located in Sveti Nikole, one professional theatre in Veles, and two museums: National Museum of Veles having four departments: Archaeology, History, Art History and Ethnology and People's Museum in Sveti Nikole focused on history and archaeology.

¹⁰⁹ Ibid. Tertiary Education. Graduated students(first, second and third cycle). Graduated students by place of permanent residence, by sex and region, by years. https://makstat.stat.gov.mk/PXWeb/pxweb/en/MakStat/MakStat_ObrazovanieNauka_VisokoObrazovanie_DipolmiraniStudenti/125_VisObraz_RM_T1_DiplomiraniRegioni_ml.px/?rxid=ef8122dc-af33-483a-9284-bdbfee6960d

¹¹⁰ Headquartered in Bitola, it has faculties in Veles.

¹¹¹ Statistical Office of the RNM. MakStat database. Education and Science. Tertiary Education. Teachers and supporting staff in the tertiary education institutions. Teachers and supporting staff by age and sex. https://makstat.stat.gov.mk/PXWeb/pxweb/en/MakStat/MakStat_ObrazovanieNauka_VisokoObrazovanie_NastavniciVoVisokoObrazovanie/100_VisObraz_RSM_T1_Nastavnicki_Personal_ml.px/?rxid=ef8122dc-af33-483a-9284-bdbfee6960d

¹¹² Ibid. Primary and Lower Secondary Education. End of School Year. Regular primary and lower secondary schools, class sections, students and teachers according to the time work, by municipality, by sex, by school year. https://makstat.stat.gov.mk/PXWeb/pxweb/en/MakStat/MakStat_ObrazovanieNauka_OsnovnoObrazovanie_KrajUcebna/22_5_osnucil_op_krajT6_ml.px/?rxid=ef8122dc-af33-483a-9284-bdbfee6960d

¹¹³ Ibid. Regular upper secondary schools, class sections, students, teachers, by municipality, by sex, by school year. https://makstat.stat.gov.mk/PXWeb/pxweb/en/MakStat/MakStat_ObrazovanieNauka_SrednoObrazovanie_KrajUcebna/175_sredniucilista_op_t4_ml.px/?rxid=ef8122dc-af33-483a-9284-bdbfee6960d

5.11.9 Socially Less Protected / Vulnerable Groups and Social Protection

The social protection in the RNM is administered through the public centres for social work, the civil associations, and the local authorities.

The public centres for social affairs are responsible for provision of social work services and delivery of financial support to address various social issues including childcare allowances, parental allowances, special allowances, guaranteed minimum assistance payments, etc. Two such centres operate in the Project-affected municipalities: the Inter-Municipal Centre for Social Affairs in Sveti Nikole covering Sveti Nikole and Lozovo municipalities and Inter-Municipal Centre for Social Affairs in Veles covering the municipalities of Veles, Gradsko and Chaska.

The tables below provide an overview of the number of persons who received social allowances via local inter-municipal centres for social affairs in 2020¹¹⁴.

Table 23. Recipients of Childcare Allowances, 2020

Allowance Type	Children	Families
Inter-Municipal Centre for Social Affairs in Veles		
Childcare allowances	1 679	933
Recipients of special allowance	233	229
One-time financial assistance for the first newborn child	204	201
One-time financial assistance for the second newborn child	196	193
Inter-Municipal Centre for Social Affairs in Sveti Nikole		
Childcare allowances	217	102
Recipients of special allowance	65	65
One-time financial assistance for the newborn child	60	60
One-time financial assistance for the second newborn child	56	56

Table 24. Recipients of Parental Allowances, 2020

Allowance Type	Third child	Fourth child
Inter-Municipal Centre for Social Affairs in Veles		
Mother	878	49
Father	5	48
Guardian/other	1	1
Inter-Municipal Centre for Social Affairs in Sveti Nikole		
Mother	153	6
Father	3	-
Guardian/other	-	-

¹¹⁴ State Statistical Office of the RNM. Publications. Social Welfare for Children, Juveniles and Adults, 2020. <https://www.stat.gov.mk/publikacii/2021/2.4.21.03.917.pdf>

Table 25. Juvenile Recipients of Social Welfare, 2020

Recipients	Inter-Municipal Centre for Social Affairs in Veles	Inter-Municipal Centre for Social Affairs in Sveti Nikole
Total including	553	216
Children lacking parental care	54	8
Marriage and family problems	86	124
Children at risk	105	1
Children in conflict with the law	20	10
Persons with visual impairment	-	2
Persons with hearing impairment	11	2
Persons with voice and speech disorders	9	1
Persons with physical disabilities	70	8
Persons with intellectual disabilities	87	18
Autism	15	1
Persons with combined disabilities	88	19
Others	8	22

Table 26. Adult Recipients of Social Welfare, 2020

	Inter-Municipal Centre for Social Affairs in Veles	Inter-Municipal Centre for Social Affairs in Sveti Nikole
Total including	2,977	568
Socially excluded	45	22
Persons with visual impairment	11	42
Persons with hearing impairment	3	38
Persons with physical disabilities	66	49
Persons with intellectual disabilities	95	167
Persons with combined disabilities	29	22
Financially unprotected	62	198
Elderly persons	312	8
Others	2354	22

5.11.10 Gender Issues

As the pipeline will pass through the rural areas of three affected municipalities, it is important to mention the following facts concerning the rural gender issues:

- Only 4% of women in rural areas are owners of homes.
- The unadjusted gender wage gap is 17%.
- 90% of men in agricultural households make decisions related to land.
- 39% of women dedicate time on a daily basis for care and education for their children or grandchildren.
- Findings of a 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.
- Women in agriculture work on average 11.06 hours per day, 41.7% of the total workload is unpaid work.

- Before the COVID-19 pandemic, rural women in North Macedonia already worked more hours every day than men, much of this time unpaid. The health crisis has increased their workload and they struggled to access health services and other support.
- The employment rate of men is higher than that of women in the project affected municipalities.
- Access to education is almost equal for boys and girls.
- More women are employed in the textile industry (especially, in Sveti Nikole Municipality), public services, trade, etc.
- In the rural areas of the project affected municipalities, women are involved in agricultural production as well as men.

5.11.11 Land Use, Agriculture and Livestock

As of 2016 the Vardar Statistical Region had 42,708 ha of used agricultural land¹¹⁵; with 71% of such land being owned by individuals and 29% - by business entities¹¹⁶. 68.5% of used agricultural land was arable land, gardens and kitchen gardens, 22.7% vineyards, 6.8% orchards, 1.5% meadows, 0.5% pastures. The region has about 47% of all the vineyard area in the country, contributing 48% to the country's total number of grape wines¹¹⁷.

The crop production in the region has gradually decreased from 72,663 tonnes in 2019 to 63,911 tonnes in 2021. In 2021 the region had the second lowest crop production in the country – about 6% of the country's total crop production. Maize had the highest share (30%) in the region's crop production in 2021, followed by tomatoes (23%), and pepper (21%) (**Table 27**).

Table 27. Crop Production in the Vardar Statistical Region, Tonnes, 2021¹¹⁸

Crop Production, tonnes							
Wheat	Maize	Tobacco	Potato	Onion	Tomatoes	Pepper	Cucumbers
19,090	2,820	1,659	6,868	2,272	14,601	13,712	2,889

In 2021 the total number of livestock, poultry and beehives in the Vardar Statistical Region was 141,372, decreasing by 25% compared to 2020. The region had the lowest number of livestock, poultry and beehives in the country, about 5% of the country's total number. Pigs made up the largest part of the region's total livestock (34%), followed by poultry (31%) (**Table 28**). The region had the highest number of pigs in the country in 2021, share of which was around 26% in the country's total number.

Table 28. Total Number of Livestock, Poultry, and Beehives in the Vardar Statistical Region, 2021¹¹⁹

Total Stock, capita/pieces						
Horses	Cattles	Pigs	Sheep	Goats	Poultry	Beehives
729	10,066	48,509	33,525	3,867	43,428	1,248

¹¹⁵ Utilised agricultural area means land used for cultivation of agricultural crops.

¹¹⁶ State Statistical Office of the RNM. Publications. Structure and Typology of Agricultural Holdings, 2016. <https://www.stat.gov.mk/Publikacii/5.4.17.02.pdf>

¹¹⁷ Ibid.

¹¹⁸ Ibid. Agriculture. Crop Production. Crop production in tonnes, by years, by regions. https://makstat.stat.gov.mk/PXWeb/pxweb/en/MakStat/MakStat_Zemjodelstvo_RastitelnoProizvodstvo/175_RastPro_Reg_Zit_aIndustr_ml.px/?rxid=ef8122dc-af33-483a-9284-bbdbfee6960d

¹¹⁹ Ibid. Animal Production. Total number of livestock, poultry and beehives, by regions and by years. https://makstat.stat.gov.mk/PXWeb/pxweb/en/MakStat/MakStat_Zemjodelstvo_DobitocnoProizvodstvo/175_DobPro_Reg_Do_bZivPc_ml.px/?rxid=ef8122dc-af33-483a-9284-bbdbfee6960d

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%, while pastures and meadows – 74.6% (**Table 29**).

Table 29. Agricultural Land by Use Category, ha, 2021¹²⁰

	Municipality	Total Area, ha	Land Use Categories, ha						
			Agricultural Land	Cultivated Land	Arable Land and Gardens	Orchards	Vineyards	Meadows	Pastures
1	Sveti Nikole	48,290	30,648	11,509	10,404	42	589	474	19,114
2	Lozovo	16,630	4,368	4,219	3,570	103	392	154	149
3	Veles	42,740	56,898	8,362	6,978	362	937	85	48,536
	TOTAL	107,660	91,914	24,090	20,952	507	1,918	713	67,799

Regarding the crops, the largest area is sown by wheat (5,981.66 ha) and barley (2,726.58 ha).

By the number of fruit trees and fruit production of 2021, in the Veles Municipality the most common fruit is the pear with a total number of 6,390 trees, followed by peaches with 5,950 trees¹²¹. In the Sveti Nikole Municipality plums dominate with 10,000 trees followed by pears with 1,915 trees. In the Lozovo Municipality walnuts (25,525 trees) and plums (3,697 trees) are the most planted.

The livestock breeding is particularly important in the economy of the Project-affected municipalities. Pastures with a total area of about 67,799 ha or 75.0% of the total agricultural land, are an extremely important resource for livestock. Small and large cattle are raised in the municipalities.

There are agricultural holdings in the municipalities that raise firstly poultry, and also pigs, cattle, sheep, and goats.

Although the dominant landscapes of the affected municipalities are agricultural ones, there are small parcels of forest land in the area. The percentage of forests land of the total municipality area is 1.5% for Sveti Nikole, 1.3% for Lozovo, and 0.9% for Veles municipalities. The lion's share of forest land are clean plantations of deciduous trees (mainly oak in Sveti Nikole and Veles and mainly beech in Lozovo) (**Table 30**). Forest land is owned by 643 households in Sveti Nikole, 34 households in Lozovo, and 449 households in Veles municipalities.

¹²⁰ Ibid. Agricultural area by category of use in hectares, by years, by municipalities, According to the NTES 2013. https://makstat.stat.gov.mk/PXWeb/pxweb/en/MakStat/MakStat__Zemjodelstvo__RastitelnoProizvodstvo/425_RastPr_Op_PovrsNtes13_ml.px/?rxid=ef8122dc-af33-483a-9284-bbdbfee6960d

¹²¹ Ibid. Number of fruit trees and production of fruit, by year, by municipality, according to the NTES 2013. https://makstat.stat.gov.mk/PXWeb/pxweb/en/MakStat/MakStat__Zemjodelstvo__RastitelnoProizvodstvo/525_RastPr_Op_OvoskiNtes13_ml.px/?rxid=ef8122dc-af33-483a-9284-bbdbfee6960d

Table 30. Forest Land in the Affected Municipalities, ha, 2019

No.	Municipality	Total Area, ha	Total Forest Land, ha	Clean Deciduous Forest Plantations, ha	Clean Oak Plantations, ha	Clean Beech Plantations, ha
1	Sveti Nikole	42,740	728.97	703.75	677.89	n/a
2	Lozovo	43,890	214.27	214.12	n/a	170.51
3	Veles	16,630	379.93	363.24	290.14	n/a

5.12 Socio-Economic Description of Project-affected Settlements

5.12.1 Introduction

The social baseline study was conducted in May-July 2021. This summary of socio-economic characteristics of the Project-affected settlements is based on the empirical data obtained during May – July 2021 through a desk study review of statistical data¹²² and reports available, as well as on-line, phone or in person interviews with key stakeholders, informants and residents in the Project-affected municipalities and settlements, meetings with representatives of the Project affected municipalities and field observations made during the field visits to the settlements along the proposed pipeline route.

As shown in the location map of the route (**Figure 2**) the proposed pipeline will cross 11 settlements including two urban and nine rural settlements with one of them (Novo Selo village) completely depopulated. As shown in **Table 31** the route (and the pipeline's construction corridor) passes closest to Veles town (the distance from the route to the nearest residential area is only 300 m). The largest distance to the route is from Erdzelija village's residential area (2.8 km). The longest part of the route will pass through Gorno Crnilishte village (7 km). The second longest part of the route (6 km) Karatmanovo. The shortest route section is within Peshirovo village (0.1 km).

Table 31. Overview of Settlements along the Proposed Pipeline's Route

No.	Settlement / Cadastral Municipality (CM) ¹²³	Type of settlement	Length of the pipeline route within the settlement, km	Distance from the residential area to the pipeline construction corridor, km
1.	Sveti Nikole Municipality			
1.1.	Erdzelija / CM Erdzelija outside area for construction	Rural	3.0	2.8
1.2.	Sveti Nikole / CM Sveti Nikole outside area for construction	Urban	3.0	1.6
1.3.	Peshirovo / CM Peshirovo	Rural	0.1	2.5
1.4.	Gorno Crnilishte / CM Crnilishte outside area for construction	Rural	7.0	0.9
2.	Lozovo Municipality			
2.1.	Adzimatovo / CM	Rural	< 1.0	2.5

¹²² The 2021 Census data of the settlement level has not been published. For this reason, 2002 Census data are used to describe socio-economic conditions in the Project-affected villages.

¹²³ Cadastral municipality (CM) is a cadastral unit. A territory of a settlement may belong to one cadastral municipality or be split into several cadastral municipalities. In many cases settlement's land for construction and territory outside this area belong to different municipalities.

No.	Settlement / Cadastral Municipality (CM) ¹²³	Type of settlement	Length of the pipeline route within the settlement, km	Distance from the residential area to the pipeline construction corridor, km
2.2.	Lozovo / CM Lozovo outside area for construction	Rural	1.5	2.5
2.3.	Milino / CM Milino outside area for construction	Rural	4.3	0.6
2.4.	Milino / CM Milino area for construction	Rural	0.7	0.6
2.5.	Karatmanovo / CM Karatmanovo outside area for construction	Rural	6.0	1.0
3.	Veles Municipality			
3.1.	Novo Selo / CM Novo Selo	Rural	0.3	-
3.2.	Chaloshevo / CM Chalossevo	Rural	0.3	2.4
3.3.	Veles / CM Veles	Urban	3.5	0.3

The key socio-economic characteristics of the Project-affected settlements are reviewed in [Table 32](#), [Table 33](#), and [Table 34](#) below. The key social facilities of these settlements are shown in [Figure 32](#).

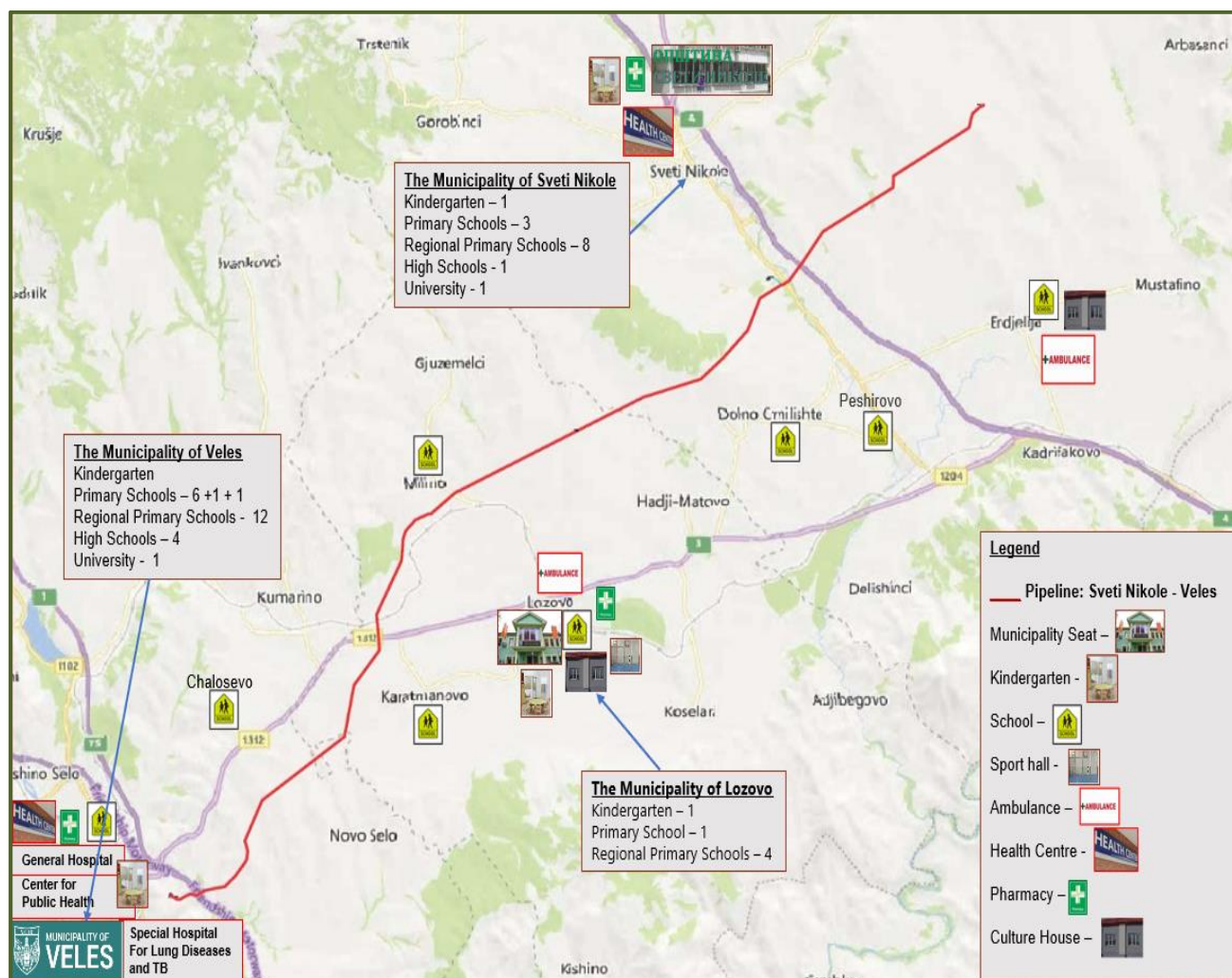





Figure 32. Sveti Nikole - Veles Section Route with the Key Social Facilities in the Project-affected Settlements

5.12.2 Sveti Nikole Municipality

Table 32. Settlements along the Proposed Pipeline's Route: Sveti Nikole Municipality





Description	Illustrations																					
Erdzelija village <p>Erdzelija is the rural largest settlement within the Sveti Nikole Municipality. It is located within the south-eastern part of the municipality, in the centre of the Ovche Pole Plain. It has lowland landscape and is at an elevation of 275 m.</p> <p>The distance between Erdzelija and the town of Sveti Nikole is more than 7.5 km.</p> <p>According to 2002 Census, the key indicators of village population are as follows:</p> <table><tr><th colspan="3">Population:</th></tr><tr><td>Male</td><td>536</td><td>53.0%</td></tr><tr><td>Female</td><td>476</td><td>47.0%</td></tr><tr><td>Total</td><td>1,012</td><td>100.0%</td></tr><tr><th colspan="3">Number of households and dwellings:</th></tr><tr><td>Households</td><td>321</td><td></td></tr><tr><td>Dwellings</td><td>383</td><td></td></tr></table> <p>With regard to the ethnic composition of population of 2002, 979 residents of Erdzelija (96.7%) declared themselves as Macedonians, 31 as Vlachs and 2 as members of the other ethnic groups.</p> <p>According to data of interviews with local respondents and secondary information sources (such as voter lists), the village population has increased by more than a hundred residents since the 2002 Census.</p> <p>In Erdzelija there is a central primary school (“Dame Gruev”) which is attended by students from neighboring settlements Kadrifakovo, Mustafino, Peshirovo, and Amzabegovo. Erdzelija has a post, an out-patient department, a football field, a retirement home, a house of culture¹²⁴. The main streets in Erdzelija are asphalted and in good condition, while the side-streets are covered with scraped asphalt.</p> <p>There are drinking water and energy supply networks, and communication facilities in the settlement.</p>	Population:			Male	536	53.0%	Female	476	47.0%	Total	1,012	100.0%	Number of households and dwellings:			Households	321		Dwellings	383		 <p>The main street in Erdzelija</p>  <p>Houses in Erdzelija</p>  <p>Arable land in Erdzelija</p>
Population:																						
Male	536	53.0%																				
Female	476	47.0%																				
Total	1,012	100.0%																				
Number of households and dwellings:																						
Households	321																					
Dwellings	383																					

¹²⁴ As per observations and local informants, the House of Culture is ruined.

Description	Illustrations
<p>Erdzelija covers 24.2 km². The territory is dominated by arable land with a total area of 1,938 ha, as well as 248 ha of pastures and only 67 ha of forests.</p> <p>Significant part of the population in Erdzelija earns income from employment at various business entities in the municipality and in the surrounding areas. About 40% of the village population relies on two sources of livelihood: they are engaged in agriculture and employed at non-agricultural businesses. Based on the primary data obtained from the interviews and field conversations, it is estimated that about 10% of the residents of Erdzelija are engaged only in agriculture.</p> <p>Part of Erdzelija's territory falls into a hunting area¹²⁵.</p> <p>The settlement's spatial structure is compacted and organized around the central street with the primary school, the church, and other public facilities.</p> <p>The houses are built close to each other. The residential part of the village is surrounded by arable land serviced by an irrigation system.</p> <p>For the second quarter of 2021 there were a total of 68 recipients of social support payments in Erdzelija¹²⁶.</p> <p>The pipeline route passes beyond land designated for construction (built and unbuilt). Land within the construction corridor includes 104 private and state-owned land plots classified as arable land, vineyards, pastures and forest land. 45 land plots (43% of the total number of affected plots) within the corridor are private-owned. 62% of private owned affected landplots and 76% of state owned affected landplots is arable; arable land is not irrigated and mostly used for growing cereals.</p> <p>With regard to private land plots to be acquired permanently and temporarily for this section, 62% of plots are arable; and vineyards occupy 18% and forests 16% of the affected private-owned land.</p> <p>The 3km section of the proposed pipeline within Erdzelija will intersect with six earth roads, a canal, and an irrigation pipeline.</p> <p>The residential area of Erdzelija is at the distance of more than 2.8 km from the construction corridor. The distance between the centre of the settlement and the construction corridor is more than 4 km.</p>	 <p>Dame Gruev primary school</p>  <p>The beginning of the pipeline in Erdzelija</p>  <p>Barley fields at the beginning of the pipeline route</p>

¹²⁵ The Erdzelija hunting area is designated for hunting small game species.



¹²⁶ In the second quarter of 2021 in Erdzelija, local residents benefitted from the following types of social support payments: i) guaranteed minimum assistance (20 recipients); ii) disability allowances (2 recipients); iii) monetary compensation for assistance and care to another person (21 recipients); iv) one-time financial allowance (1 recipient); v) guaranteed childcare allowance (9 recipients); parental allowance for a third child (2 recipients); vi) parental allowance for a fourth child (1 recipient); and vii) educational allowance (12 recipients).

Description	Illustrations																																										
Sveti Nikole town <p>The Sveti Nikole Municipality occupies the largest part of the famous Ovche Pole area. The town of Sveti Nikole is the administrative centre of the municipality and is located along the Kumanovo – Shtip Regional Road.</p> <p>As per the town's Master Plan, its area totals 427 ha including:</p> <ul style="list-style-type: none">• Land under housing (154.8 ha);• Areas of general functions (84.5 ha);• Traffic areas (101.8 ha);• Areas for economic activities (78.9 ha);• Land under traffic facilities (7.0 ha). <p>Sveti Nikole town occupies an area of 3,516 ha. The largest part of the town territory is classified as arable land (2,868 ha); in addition, it includes 439 ha of pastures and 209 ha of forests.</p> <p>According to 2002 Census, the key indicators of Sveti Nikole town population are as follows:</p> <table><tr><th colspan="3">Population:</th></tr><tr><td>Male</td><td>7,058</td><td>51.3%</td></tr><tr><td>Female</td><td>6,688</td><td>48.7%</td></tr><tr><td>Total</td><td>13,746</td><td>100.0%</td></tr><tr><th colspan="3">Number of households and dwellings:</th></tr><tr><td>Households</td><td>4,070</td><td></td></tr><tr><td>Dwellings</td><td>4,763</td><td></td></tr></table> <p>The ethnic composition of town population (as per 2002 Census) is as follows:</p> <table><tr><th>Total population:</th><th>13,746</th><th>100.0%</th></tr><tr><td>Macedonians</td><td>13,367</td><td>97.2%</td></tr><tr><td>Turks</td><td>80</td><td>0.6%</td></tr><tr><td>Roma</td><td>72</td><td>0.5%</td></tr><tr><td>Vlachs</td><td>149</td><td>1.1%</td></tr><tr><td>Serbs</td><td>52</td><td>0.4%</td></tr><tr><td>Other</td><td>25</td><td>0.2%</td></tr></table>	Population:			Male	7,058	51.3%	Female	6,688	48.7%	Total	13,746	100.0%	Number of households and dwellings:			Households	4,070		Dwellings	4,763		Total population:	13,746	100.0%	Macedonians	13,367	97.2%	Turks	80	0.6%	Roma	72	0.5%	Vlachs	149	1.1%	Serbs	52	0.4%	Other	25	0.2%	 <p>Sveti Nikole</p>  <p>Panorama of Sveti Nikole with Ovche Pole</p>  <p>Bus station in Sveti Nikole</p>  <p>St. Cyril and Methodius elementary school</p>
Population:																																											
Male	7,058	51.3%																																									
Female	6,688	48.7%																																									
Total	13,746	100.0%																																									
Number of households and dwellings:																																											
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Vlachs	149	1.1%																																									
Serbs	52	0.4%																																									
Other	25	0.2%																																									

Description	Illustrations
<p>In terms of the religious affiliation, 97.9% of town population declared themselves as Orthodox and 1.1% as Muslims.</p> <p>The number of active business entities in the municipality of Sveti Nikole was 773 in 2019, and the majority them are located in the town of Sveti Nikole. In the Sveti Nikole Municipality, the most developed economic sectors are food industry, textile industry, trade, service, agriculture and animal husbandry.</p> <p>Ovche Pole is a famous agricultural region with fertile soil, large number of sunny days and the irrigation system. These factors are crucial for growing grains and technical crops and horticulture.</p> <p>There is a kindergarten, three primary schools, a high school and a university (with five departments) in the town. Sveti Nikole has a health centre, which operates in two healthcare facilities in the town and three clinics in the surrounding settlements.</p> <p>For the second quarter of 2021 there were a total of 689 recipients of social support payments in Sveti Nikole town ¹²⁷.</p> <p>The 3km section of the proposed pipeline within the Sveti Nikole Municipality will intersect with earth roads, pipelines, a river, a highway, a regional road, a transmission line, etc. Land within the construction corridor includes 82 private and state-owned land plots classified as arable land, pastures, forest land and various types of infertile land. 12 land plots (15% of the total number of affected plots) within the corridor are private-owned. All private landplots to be acquired permanently and temporarily for this section are arable.</p> <p>The residential area of Sveti Nikole town is at a distance of more than 1.6 km from the construction corridor. On that distance a Sveti Nikole BS, Sveti Nikole MMRS as well as a connection to the town are located.</p>	 <p>The entrance to Sveti Nikole via R1204</p>  <p>Location of Sveti Nikole BS and Sveti Nikole MMRS</p>

¹²⁷ In the second quarter of 2021 in the town of Sveti Nikole, local residents benefitted from the following types of social support payments: i) guaranteed minimum assistance (107 recipients); ii) disability allowances (359 recipients); iii) monetary compensation for assistance and care to another person (55 recipients); iv) reimbursement for part-time employment (2 recipients); v) one-time financial allowance (14 recipients); vi) social pension (9 recipients); vii) healthcare allowance (36 recipients); viii) guaranteed childcare allowance (21 recipients); ix) special allowance (30 recipients); x) one-time financial allowance for a newborn (11 recipients); xi) parental allowance for a third child (33 recipients); xii) parental allowance for a fourth child (1 recipient); xiii) educational allowance (10 recipients), and xiv) civil disability allowance.





Description	Illustrations																					
Peshirovo village <p>Peshirovo is a rural settlement southeast of the town of Sveti Nikole. It has lowland landscape and is at an elevation of 260 m. The settlement is 6km from the centre of Sveti Nikole town.</p> <p>Peshirovo is a small settlement inhabited by Macedonians. In 2002 it had 247 residents.</p> <p>According to 2002 Census, the key indicators of village population are as follows:</p> <table><tr><th colspan="3">Population:</th></tr><tr><td>Male</td><td>137</td><td>55.5%</td></tr><tr><td>Female</td><td>110</td><td>44.5%</td></tr><tr><td>Total</td><td>247</td><td>100.0%</td></tr><tr><th colspan="3">Number of households and dwellings:</th></tr><tr><td>Households</td><td>62</td><td></td></tr><tr><td>Dwellings</td><td>77</td><td></td></tr></table> <p>The Peshirovo population has grown since 2002; at present it is estimated as about 300 residents. The number of dwellings has also increased and reached 100 units. Around 10 new houses are built in the last period. All Peshirovo residents declared themselves as Orthodox during the 2002 Census.</p> <p>There is a five-year primary school in Peshirovo. After completion of the 5th grade, children continue their education in the primary school in Erdzelija. About fifty children were enrolled in the school year of 2012-2022.</p> <p>Peshirovo is connected to an old substation and often faces power failures. A village's water supply system was built in 2003. The design documentation for the local sewerage network has been prepared, but construction has not commenced.</p> <p>The village has a meeting hall and a shop. There are no asphalted streets in Peshirovo.</p> <p>There is no public transport service to Sveti Nikole. Residents use taxi and private cars.</p>	Population:			Male	137	55.5%	Female	110	44.5%	Total	247	100.0%	Number of households and dwellings:			Households	62		Dwellings	77		 <p>Peshirovo</p>  <p>School in Peshirovo</p>  <p>The satellite imagery of the airport in Peshirovo</p>  <p>The airport in Peshirovo</p>
Population:																						
Male	137	55.5%																				
Female	110	44.5%																				
Total	247	100.0%																				
Number of households and dwellings:																						
Households	62																					
Dwellings	77																					

Description	Illustrations
<p>For the second quarter of 2021 there were a total of 46 recipients of social support payments in Peshirovo¹²⁸.</p> <p>The territory of Peshirovo is 7.7 km². It is dominated by arable land with an area of 667 ha. Only 10% of the local population is engaged solely in agriculture. In Peshirovo there are vineyards; in addition, early vegetables are grown in greenhouses. Grains (wheat and barley) and corn are the primary agricultural crops. The territory of Peshirovo is part of the Djumajlija hunting area¹²⁹.</p> <p>Most residents in Peshirovo rely on two sources of livelihood: they are engaged in agriculture and employed at non-agricultural businesses. Peshirovo residents are mostly employed at the enterprises located in the surrounding settlements.</p> <p>In Peshirovo there is an airport. Bonair air company uses this base airport with the permanent fleet of 10 airplanes of the 'An 2' type¹³⁰. The airport is located at a distance of 2 km from the construction corridor.</p> <p>The residential area of Peshirovo is located at the distance of approximately 2.5 km from the construction corridor. A significant part of the arable land in the vicinity of Peshirovo is state-owned and leased. There is an irrigation system in the area.</p> <p>Only 100 m of the proposed gas pipeline's route falls within Peshirovo's territory. The pipeline route passes through state owned land classified as arable and natural infertile land (ravines); only five land plots to be acquired permanently and temporarily for this section. No private land plots are to be affected by land acquisition.</p> <p>It should be noted that there is a residential building nearby the construction corridor (a weekend house), which may be affected by construction noise and other construction-related impacts.</p>	 <p style="text-align: center;">Vineyards in Peshirovo</p>  <p style="text-align: center;">The weekend house near the pipeline</p>
Crnilishte village	



¹²⁸ In the second quarter of 2021 in Peshirovo, local residents benefitted from the following types of social support payments: i) guaranteed minimum assistance (13 recipients); ii) financial compensation for assistance and care to another person (7 recipients); iii) healthcare allowances (1 recipient); iv) guaranteed childcare allowance (12 recipients); v) parental allowance for a third child (7 recipients) and vi) educational allowance (6 recipients).

¹²⁹ The Djumajlija hunting area is designated for hunting small game species.

¹³⁰ In the frames of the overall activities of the company there are the following: work in the agriculture, in forestry, spraying against mosquitoes, extinguishing forest fire, recording from air, pilot training, modification of the meteorological conditions, as well as work in the sphere of tourism, through realization of panoramiv and air taxi flights. [BONIAIR - Air services company \(bonier.com.mk\)](http://BONIAIR.com.mk), accessed on 10th June 2021

Description	Illustrations																					
<p>Gorno Crnilishte is a village located within the Ovche Pole Plain, in the southern part of the municipality of Sveti Nikole. It has lowland landscape, and at an elevation of 320 m. The village is in 8.3 km from the centre of the Sveti Nikole Municipality.</p> <p>According to 2002 Census, the key indicators of village population are as follows:</p> <table><tr><th colspan="3">Population:</th></tr><tr><td>Male</td><td>177</td><td>51.3%</td></tr><tr><td>Female</td><td>168</td><td>48.7%</td></tr><tr><td>Total</td><td>345</td><td>100.0%</td></tr><tr><th colspan="3">Number of households and dwellings:</th></tr><tr><td>Households</td><td>114</td><td>-</td></tr><tr><td>Dwellings</td><td>135</td><td>-</td></tr></table>	Population:			Male	177	51.3%	Female	168	48.7%	Total	345	100.0%	Number of households and dwellings:			Households	114	-	Dwellings	135	-	 <p>Dolno Crnilishte: general view</p>  <p>Arable land in Dolno Crnilishte</p>  <p>Dolno Crnilishte</p>  <p>Out-patient department in Crnilishte</p>
Population:																						
Male	177	51.3%																				
Female	168	48.7%																				
Total	345	100.0%																				
Number of households and dwellings:																						
Households	114	-																				
Dwellings	135	-																				




¹³¹ The out-patient department was closed at the time of the field visit.





Description	Illustrations
<p>For the second quarter of 2021 there were a total of 30 recipients of social support payments in Crnilishte ¹³².</p> <p>The irrigation system installed in Crnilishte enables growing alfalfa, watermelon and early vegetables. Both cadastral municipalities of Crnilishte comprise private owned land plots.</p> <p>The territory of Crnilishte is part of Djumajlija hunting area.</p> <p>A 7km pipeline section passing through Crnilishte intersects with 16 earth roads, and irrigation canal, a pipeline, a transmission line, a canal, etc.</p> <p>The pipeline route passes through Gorno Crnilishte territory. Land within the construction corridor includes 183 private and state-owned land plots classified as arable land, vineyards, pastures, forest land and infertile land. 52 land plots (28% of the total number of affected plots) within the corridor are private-owned. 87% of these private land plots subject to permanent and temporary land acquisition are arable; vineyards occupy 8%, pastures 4%, and forests 2% of the affected private-owned landplots. One affected private land plot is classified as land under building and is subject to permanent land acquisition.</p> <p>The pipeline route is more than 900 m from the residential area of Gorno Crnilishte. It is important to note that the route passes in the immediate vicinity of the forest area in Crnilishte.</p>	 <p>Shop in Crnilishte</p>  <p>Arable land and forest near the pipeline route</p>



¹³² In the second quarter of 2021 in Crnilishte, local residents benefitted from the following types of social support payments: i) guaranteed minimum assistance (2 recipients); ii) disability allowance (4 recipients); iii) financial compensation for assistance and care to another person (12 recipients); iv) social pension (2 recipients); v) health care allowance (2 recipients); vi) childcare allowance (1 recipient); vii) parental allowance for the third child (6 recipients); viii) educational allowance (1 recipient).

5.12.3 Lozovo Municipality





Table 33. Settlements along the Proposed Pipeline's Route: Lozovo Municipality

Description	Illustrations																		
Adzimatovo village <p>Adzimatovo is a small village within the municipality of Sveti Nikole. Adzimatovo is located in the southern part of the Ovche Pole Plain. It has lowland landscape and is at an elevation of 275 m.</p> <p>According to 2002 Census, the key indicators of village population are as follows:</p> <table><tr><th colspan="3">Population:</th></tr><tr><td>Male</td><td>37</td><td>50.0%</td></tr><tr><td>Female</td><td>37</td><td>50.0%</td></tr><tr><td>Total</td><td>74</td><td>100.0%</td></tr></table> <table><tr><th colspan="2">Number of household and dwellings:</th></tr><tr><td>Households</td><td>24</td></tr><tr><td>Dwellings</td><td>31</td></tr></table> <p>In 1961 Adzimatovo had 148 residents. By 2002 the population decreased to 74 inhabitants. The village's population is exclusively Macedonian. Based on data of interviews with local respondents and field observations, it is assumed that the village population is almost unchanged since 2002 Census.</p> <p>There is no school in the settlement.</p> <p>There is an electricity supply network and communication facilities in the area.</p> <p>A new sewerage and water supply systems have been built in Adzimatovo.</p> <p>Adzimatovo is not serviced by regular bus or van lines. Residents usually uses their own cars or the regular van line of the neighbouring settlement Saramzalino, which is located at a distance of about 1 km.</p> <p>The total area of Adzimatovo is 6.2 km². The territory comprises mainly arable land (564.7 ha), as well as pastures (35.2 ha) and forest land (4.6 ha).</p> <p>The territory of Adzimatovo is part of the Djumajlija hunting area.</p> <p>About 30% of the village population is engaged only in agriculture. There are numerous greenhouses for growing early vegetables and are several cows and sheep farms in Adzimatovo.</p> <p>A significant part of population receives income from non-agricultural activities: they are employed in the business entities in Lozovo or neighbouring municipalities as well as at the administration.</p>	Population:			Male	37	50.0%	Female	37	50.0%	Total	74	100.0%	Number of household and dwellings:		Households	24	Dwellings	31	 <p>Adzimatovo</p>  <p>Adzimatovo: entrance to the village</p>  <p>Greenhouses in Adzimatovo</p>
Population:																			
Male	37	50.0%																	
Female	37	50.0%																	
Total	74	100.0%																	
Number of household and dwellings:																			
Households	24																		
Dwellings	31																		

Description	Illustrations																					
<p>The pipeline route will pass outside of the residential area of Adzimatovo. The distance between the construction corridor of the pipeline and centre of Adzimatovo is 2.5 km.</p> <p>Less than 1 km of the pipeline route is within the Adzimatovo's territory. Land within the construction corridor include nine private and state-owned land plots classified as arable land and land under roads. Only three land plots to be acquired permanently and temporarily for this section are private owned.</p>	<div></div> <div>Arable land in Adzimatovo</div>																					
<p>Lozovo village</p> <p>Lozovo is the seat of the Lozovo Municipality's administration and the largest municipality's settlement with 896 residents.</p> <p>Fifty years ago, the settlement of Djumajlija was renamed as Lozovo due to the expansion of the vineyards. Lozovo has lowland landscape and is at an elevation is of 290 m.</p> <p>The area of Lozovo totals 24.5 km². Arable land occupies a significant part of the village's territory (1,908 ha or 78% of its total area). The total area of the pastures in Lozovo is 248 ha.</p> <p>According to 2002 Census, the key indicators of Lozovo village population are as follows:</p> <table><tr><th colspan="3">Population:</th></tr><tr><td>Male</td><td>456</td><td>50.9%</td></tr><tr><td>Female</td><td>440</td><td>49.1%</td></tr><tr><td>Total</td><td>896</td><td>100.0%</td></tr><tr><th colspan="3">Number of household and dwellings:</th></tr><tr><td>Households</td><td colspan="2">300</td></tr><tr><td>Dwellings</td><td colspan="2">332</td></tr></table>	Population:			Male	456	50.9%	Female	440	49.1%	Total	896	100.0%	Number of household and dwellings:			Households	300		Dwellings	332		<div></div> <div>Lozovo: general view</div> <div></div> <div>Asphalted streets in Lozovo</div> <div></div> <div>Primary school in Lozovo</div>
Population:																						
Male	456	50.9%																				
Female	440	49.1%																				
Total	896	100.0%																				
Number of household and dwellings:																						
Households	300																					
Dwellings	332																					




Description	Illustrations																		
<p>The ethnic composition of village (as per 2002 Census) is as follows:</p> <table><tr><td>Total population:</td><td>896</td><td>100.0%</td></tr><tr><td><i>Macedonians</i></td><td>851</td><td>95.0%</td></tr><tr><td><i>Turks</i></td><td>8</td><td>0.9%</td></tr><tr><td><i>Vlachs</i></td><td>26</td><td>2.9%</td></tr><tr><td><i>Serbs</i></td><td>5</td><td>0.6%</td></tr><tr><td><i>Other</i></td><td>6</td><td>0.7%</td></tr></table> <p>There is a kindergarten, primary school, an out-patient department and a dentist ordination in this settlement.</p> <p>For the second quarter of 2021 there were a total of 70 recipients of social support payments in Lozovo¹³³.</p> <p>An irrigation system of agricultural areas in Lozovo and neighbouring settlements is supplied with water from the hydro-meliorative system Kalimanci. The total length of the open canal, closed pipelines and furrows is 60 km.</p> <p>Agriculture in Lozovo has a long tradition. A lot of tobacco, vines and grains are grown in Lozovo. The picturesque barley plantations resemble the characteristics of the popular Microsoft wallpaper (Brill).</p> <p>The territory of Lozovo is part of the Djumajlija hunting area.</p> <p>The main sources of income of the inhabitants of Lozovo are agriculture and employment at non-agricultural enterprises.</p> <p>The distance from the construction corridor of the pipeline to the nearest residential area of Lozovo is about 2.5 km.</p> <p>A short 1.5km section of the proposed pipeline's route is within the Lozovo's territory. The route intersects with several earth roads.</p> <p>The pipeline route passes through 20 state owned land plots classified as arable land, pastures, and infertile land. 14 affected land plots are arable. No private land plots are to be affected by land acquisition.</p>	Total population:	896	100.0%	<i>Macedonians</i>	851	95.0%	<i>Turks</i>	8	0.9%	<i>Vlachs</i>	26	2.9%	<i>Serbs</i>	5	0.6%	<i>Other</i>	6	0.7%	<div></div> <div><p>Barley fields in Lozovo</p></div> <div><p>Tobacco plantation in Lozovo</p></div>
Total population:	896	100.0%																	
<i>Macedonians</i>	851	95.0%																	
<i>Turks</i>	8	0.9%																	
<i>Vlachs</i>	26	2.9%																	
<i>Serbs</i>	5	0.6%																	
<i>Other</i>	6	0.7%																	

¹³³ In the second quarter of 2021 in Lozovo, local residents benefitted from the following types of social support payments: i) guaranteed minimum assistance (13 recipients); ii) disability allowances (5 recipients); iii) financial compensation for assistance and care to another person (32 recipients); iv) one-time financial assistance (2 recipients); v) health care allowance (3 recipients); vi) guaranteed childcare allowance (3 recipients); vii) special allowance (2 recipients); viii) one-time financial assistance for a newborn (1 recipient); ix) childcare allowance for the third-year child (14 recipients), and x) educational allowance (3 recipients).

Description	Illustrations																								
Milino village																									
<p>Milino is located within the Ovche Pole Plain, in the western part of Lozovo Municipality.</p> <p>Milino's landscape is both flat and hilly with an elevation is 320 m.</p> <p>In 1961 Milino had 736 residents. By 2002 the population dropped to 334 residents.</p> <p>According to 2002 Census, the key indicators of Milino village population are as follows:</p> <table><tr><th colspan="3">Population:</th></tr><tr><td>Male</td><td>180</td><td>53.9%</td></tr><tr><td>Female</td><td>154</td><td>46.1%</td></tr><tr><td>Total</td><td>334</td><td>100.0%</td></tr><tr><th colspan="3">Number of household and dwellings:</th></tr><tr><td>Households</td><td>89</td><td></td></tr><tr><td>Dwellings</td><td>118</td><td></td></tr></table>	Population:			Male	180	53.9%	Female	154	46.1%	Total	334	100.0%	Number of household and dwellings:			Households	89		Dwellings	118		 <p>Milino: general view</p>  <p>Tošo Arsov railway station in Milino</p>  <p>Playground in Milino</p>  <p>Arable land in Milino</p>			
Population:																									
Male	180	53.9%																							
Female	154	46.1%																							
Total	334	100.0%																							
Number of household and dwellings:																									
Households	89																								
Dwellings	118																								
<p>The ethnic composition of village (as per the 2002 Census) is as follows:</p> <table><tr><th>Total Population:</th><th>334</th><th>100.0%</th></tr><tr><td>Macedonians</td><td>237</td><td>71.0%</td></tr><tr><td>Albanians</td><td>35</td><td>10.5%</td></tr><tr><td>Turks</td><td>21</td><td>6.3%</td></tr><tr><td>Vlachs</td><td>1</td><td>0.3%</td></tr><tr><td>Serbs</td><td>2</td><td>0.6%</td></tr><tr><td>Bosniaks</td><td>34</td><td>10.2%</td></tr><tr><td>Other</td><td>4</td><td>1.2%</td></tr></table>	Total Population:	334	100.0%	Macedonians	237	71.0%	Albanians	35	10.5%	Turks	21	6.3%	Vlachs	1	0.3%	Serbs	2	0.6%	Bosniaks	34	10.2%	Other	4	1.2%	
Total Population:	334	100.0%																							
Macedonians	237	71.0%																							
Albanians	35	10.5%																							
Turks	21	6.3%																							
Vlachs	1	0.3%																							
Serbs	2	0.6%																							
Bosniaks	34	10.2%																							
Other	4	1.2%																							
<p>Based on field observations and interviews with the local respondents, the village population slightly decreased to 300 residents since the 2002 Census.</p>																									



Description	Illustrations
<p>For the second quarter of 2021 in Milino there were a total of 68 recipients of social support payments¹³⁴.</p> <p>There are drinking water and electricity supply and sewerage networks in the settlement. There is a railway station (Tošo Arsov) in the village.</p> <p>Milino has a regular traffic connection with Veles town. This village's population is served by a regular van line transporting passengers twice a day.</p> <p>The proposed pipeline route is at a distance of about 300 m from the nearest building in Milino. The building and the adjacent land plot are in state ownership. The nearest privately owned building is located at a distance of 460 m from the pipeline route. The residential area of Milino is about 600 m from the pipeline's construction corridor.</p> <p>The 5km section of the proposed pipeline within Milino's territory will intersect with earth roads, a regional road, pipeline, local asphalted road, etc.</p> <p>Land within the construction corridor includes 156 private and state-owned land plots classified as arable land, pastures and various types of infertile land. 53 land plots (34% of the total number of affected plots) within the corridor are private owned. With regard to private land plots to be acquired permanently and temporarily for this section, 50 land plots (94% of affected private owned landplots) are arable.</p>	 <p>Rehabilitation and improvement of an earth road to agricultural land in Milino</p>

¹³⁴ In the second quarter of 2021 in Milino, local residents benefitted from the following types of social support payments: i) guaranteed minimum assistance (8 recipients); ii) disability allowance (1 recipient); iii) financial compensation for assistance and care to another person (7 recipients); iv) one-time financial assistance (1 recipient); v) guaranteed childcare allowance (3 recipients), and vi) educational allowance (10 recipients).

Description	Illustrations																					
Karatmanovo village																						
<p>Karatmanovo is located in the extreme western part of the Lozovo Municipality. The distance from the centre of Karatmanovo to the centre of Lozovo municipality is 3.4 km.</p> <p>Karatmanovo has lowland landscape, and it is at an elevation of 310 m.</p> <p>According to 2002 Census, the key indicators of Karatmanovo village population are as follows:</p> <table><tr><th colspan="3">Population:</th></tr><tr><td>Male</td><td>283</td><td>54.4%</td></tr><tr><td>Female</td><td>237</td><td>45.6%</td></tr><tr><td>Total</td><td>520</td><td>100.0%</td></tr><tr><th colspan="3">Number of household and dwellings:</th></tr><tr><td>Households</td><td>153</td><td></td></tr><tr><td>Dwellings</td><td>170</td><td></td></tr></table> <p>In 1961 Karatmanovo had 619 residents including 535 Macedonians, 76 Turks, four Albanians and two Serbs. According to the 2002 Census, the Turkish population emigrated, while the Macedonian population remained almost unchanged. In 2002 only five inhabitants of Karatmanovo declared themselves as Turks, while the others and all others as Macedonians (515 residents).</p> <p>In Karatmanovo there is a five-year primary school, an out-patient department ¹³⁵, two shops and a restaurant.</p> <p>For the second quarter of 2021 in Karatmanovo there were a total of 32 recipients of social support payments¹³⁶.</p> <p>Karatmanovo has its own centralised water supply system.</p> <p>The residents of Karatmanovo mostly cultivate grain, tobacco and vineyards.</p> <p>In Karatmanovo was located the Veles airport. This airport with the landing strip was used mainly in agriculture and forestry. Recently, the airport premises</p>	Population:			Male	283	54.4%	Female	237	45.6%	Total	520	100.0%	Number of household and dwellings:			Households	153		Dwellings	170		 <p>Karatmanovo: general view</p>  <p>Asphalted streets in Karatmanovo</p> 
Population:																						
Male	283	54.4%																				
Female	237	45.6%																				
Total	520	100.0%																				
Number of household and dwellings:																						
Households	153																					
Dwellings	170																					


¹³⁵ The out-patient department was closed.

¹³⁶ In the second quarter of 2021 in Karatmanovo, local residents benefitted from the following types of social support payments: i) guaranteed minimum assistance (6 recipients); ii) disability allowance (2 recipients); iii) financial compensation for assistance and care to another person (12 recipients); iv) healthcare allowance (2 recipients); v) parental allowance for the third child (4 recipients), and vi) educational allowance (6 recipients).




Description	Illustrations
<p>were leased to a company. The airport is at present not operational.</p> <p>The area of Karatmanovo totals 14.7 km². It is dominated by arable land with an area of 1,300 ha. The pastures cover an area of 121 ha. There are no forest areas. The territory of Karatmanovo is part of the following hunting areas: Djumajlija and Kishino¹³⁷.</p> <p>The old premises of the Veles airport is located at a distance of 276 m from the pipeline's construction corridor. At a distance of more than 600 m of the pipeline route, there are production facilities of an agricultural company.</p> <p>The 6km section of the proposed pipeline within Karatmanovo's territory will intersect with few earth roads, a railway, a regional road, transmission lines, and ravines. It will be at a distance of about 1 km of the nearest residential area.</p> <p>Land within the construction corridor includes 31 private and state owned land plots are classified as arable land and infertile land (land under buildings and roads). All private landplots to be acquired permanently and temporarily for this section (2 plots) are arable.</p>	<p>Arable land in Karatmanovo</p>  <p>Arable land in Karatmanovo</p>  <p>The airport in Karatmanovo</p>

5.12.4 Veles Municipality

Table 34. Settlements along the Proposed Pipeline's Route: Veles Municipality

Description	Illustrations
<p>Novo Selo village</p> <p>Novo Selo is located on the territory of the municipality of Veles, at an elevation of 400 m. Having only two residents in 1971, at present Novo Selo is completely depopulated.</p> <p>The area of Novo Selo is only 1.2 km². It is part of the Kalaslari hunting area.</p> <p>A relatively small part of the pipeline route will pass through the territory of Novo Selo (300 m). The pipeline route passes through state owned land classified as arable; only six land plots to be acquired permanently and temporarily for this section. No private land plots are to be affected by land acquisition.</p>	 <p>Map of Novo Selo Cadastre Municipality with Project-affected part in the white circle</p>

¹³⁷ The Kishino hunting area is designated for hunting small and big game species.




Description	Illustrations																																	
Chaloshevo village																																		
<p>Chaloshevo is a rural settlement located in the central part of the Veles Municipality, about 5km of the town of Veles. Chalossevo is a lowland village, at an elevation of 260 m.</p> <p>The settlement is small and in 1994 there were 187 residents.</p> <p>According to 2002 Census, the key indicators of Chalossevo village population are as follows:</p> <table><tr><td>Population:</td><td></td><td></td></tr><tr><td>Male</td><td>107</td><td>50.9%</td></tr><tr><td>Female</td><td>103</td><td>49.1%</td></tr><tr><td>Total</td><td>210</td><td>100.0%</td></tr><tr><td colspan="3">Number of household and dwellings:</td></tr><tr><td>Households</td><td>66</td><td></td></tr><tr><td>Dwellings</td><td>76</td><td></td></tr></table> <p>It is important to note that the migration is relatively small. The population of Chalossevo is aging.</p> <p>The ethnic composition of village population (as per 2002 Census) is as follows:</p> <table><tr><td>Total population:</td><td>210</td><td>100.0%</td></tr><tr><td>Macedonians</td><td>206</td><td>98.1%</td></tr><tr><td>Serbs</td><td>3</td><td>1.4%</td></tr><tr><td>Other</td><td>1</td><td>0.5%</td></tr></table> <p>There is a five-year primary school in Chalossevo. After completion of the 5th grade children from Chalossevo continue their education in Veles.</p> <p>There is no out-patient department in Chalossevo. The store is closed.</p> <p>For the second quarter of 2021 in Chalossevo there were a total of 26 recipients of social support payments¹³⁸.</p>	Population:			Male	107	50.9%	Female	103	49.1%	Total	210	100.0%	Number of household and dwellings:			Households	66		Dwellings	76		Total population:	210	100.0%	Macedonians	206	98.1%	Serbs	3	1.4%	Other	1	0.5%	 <p>Chaloshevo: general view</p>  <p>Houses in Chalossevo</p>  <p>The new streets in Chalossevo</p>
Population:																																		
Male	107	50.9%																																
Female	103	49.1%																																
Total	210	100.0%																																
Number of household and dwellings:																																		
Households	66																																	
Dwellings	76																																	
Total population:	210	100.0%																																
Macedonians	206	98.1%																																
Serbs	3	1.4%																																
Other	1	0.5%																																


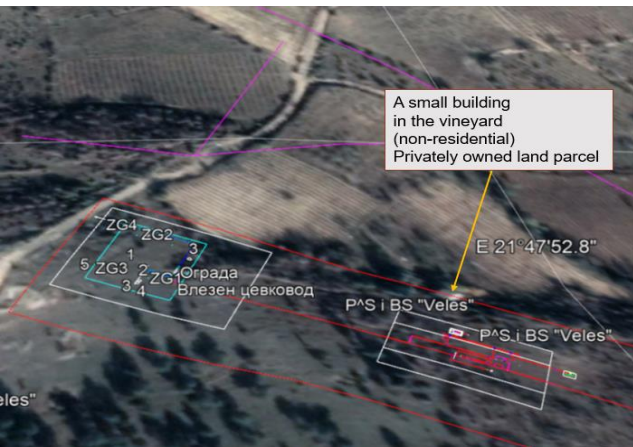

¹³⁸ In the second quarter of 2021 in Chalossevo, local residents benefitted from the following types of social support payments: i) guaranteed minimum assistance (6 recipients); ii) guaranteed childcare allowance (2 recipients); iii) healthcare allowance (3 recipients); iv) educational allowance (2 recipients); v) financial compensation for assistance and care to another person (7

Description	Illustrations
<p>A water supply system is being built in Chaloshevo and not operational. The sewerage network was built in 2005 and currently operates. Chaloshevo is not connected with Veles by a regular bus line. The students use a van which runs 2 times a day. The inhabitants use their own vehicles for transportation.</p> <p>An Orthodox church is being built in Chaloshevo.</p> <p>The area of Chaloshevo totals 6.3 km². Arable land of 407 ha prevails within the village territory, pastures occupy 142 ha.</p> <p>The territory of Chaloshevo is part of the Kalaslari hunting area¹³⁹.</p> <p>The majority of Chaloshevo residents earns income from two sources: they are engaged in agricultural activities (mainly animal husbandry) and non-agricultural activities.</p> <p>Several families in the village have one or two cows each, and only two families have seven-eight cows each.</p> <p>Grains (wheat and barley) and tobacco are the primary agricultural crops. The Chaloshevo residents produce most of the agricultural products necessary for the household, and they sell the surplus in Veles.</p> <p>A significant part of the Chaloshevo residents work for construction companies.</p> <p>A relatively small part of the route (300 m) will pass through the village territory. The pipeline route is designed to go outside of the residential area of Chaloshevo. It will pass through state owned land and is classified as arable; only two land plots to be acquired permanently and temporarily for the this section of the pipeline. No private land plots are to be affected by land acquisition.</p> <p>The distance between the construction corridor of the pipeline and the nearest residential area of settlement is about 2.4 km.</p>	 <p>Construction of the water supply system</p>  <p>Arable land in Chaloshevo</p>

recipients); vi) disability allowance (1 recipient); vii) special allowance (1 recipient); viii) parental allowance for the third child (3 recipients) and ix) social pension (1 recipient).

¹³⁹ The Kalaslari hunting area is designated for hunting small game species.

Description	Illustrations																																																
Veles town <p>The town of Veles is the administrative centre of the Veles Municipality and a seat of the municipal authorities. Veles is situated in the central part of North Macedonia, on the banks of the Vardar River at an elevation of 206 m.</p> <p>According to 2002 Census, the key indicators of Veles town population are as follows:</p> <table><tr><th colspan="3">Population:</th></tr><tr><td>Male</td><td>21,754</td><td>49.8%</td></tr><tr><td>Female</td><td>21,962</td><td>50.2%</td></tr><tr><td>Total</td><td>43,716</td><td>100.0%</td></tr><tr><th colspan="3">Number of household and dwellings:</th></tr><tr><td>Households</td><td>13,648</td><td></td></tr><tr><td>Dwellings</td><td>16,129</td><td></td></tr></table> <p>The ethnic composition of town population (as per 2002 Census) is as follows:</p> <table><tr><th>Total population:</th><th>43,716</th><th>100.0%</th></tr><tr><td>Macedonians</td><td>40,269</td><td>92.1%</td></tr><tr><td>Albanians</td><td>91</td><td>0.2%</td></tr><tr><td>Turks</td><td>1,694</td><td>3.9%</td></tr><tr><td>Romas</td><td>799</td><td>1.8%</td></tr><tr><td>Vlachs</td><td>340</td><td>0.8%</td></tr><tr><td>Serbs</td><td>297</td><td>0.7%</td></tr><tr><td>Bosniaks</td><td>35</td><td>0.08%</td></tr><tr><td>Other</td><td>190</td><td>0.4%</td></tr></table> <p>Located in the heart of the country, the Veles Municipality is the main crossroad connecting the entire country with International Corridor 10 that links the Mediterranean sea, Middle East and Africa. International railroad lines (Belgrade – Skopje – Veles – Thessaloniki and Shtip – Veles – Bitola) and proximity to Alexander the Great International Airport in Skopje (30 km away) additionally strengthen the excellent geo-strategic position of Veles.</p> <p>Veles is known as industrial centre and recently, as a leader in the implementing of digital technologies in the local administration in North Macedonia.</p>	Population:			Male	21,754	49.8%	Female	21,962	50.2%	Total	43,716	100.0%	Number of household and dwellings:			Households	13,648		Dwellings	16,129		Total population:	43,716	100.0%	Macedonians	40,269	92.1%	Albanians	91	0.2%	Turks	1,694	3.9%	Romas	799	1.8%	Vlachs	340	0.8%	Serbs	297	0.7%	Bosniaks	35	0.08%	Other	190	0.4%	 <p>Veles: general view</p>  <p>Veles from above</p>  <p>The end of the pipeline route</p>
Population:																																																	
Male	21,754	49.8%																																															
Female	21,962	50.2%																																															
Total	43,716	100.0%																																															
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Vlachs	340	0.8%																																															
Serbs	297	0.7%																																															
Bosniaks	35	0.08%																																															
Other	190	0.4%																																															

Description	Illustrations
<p>The geographic location of the town of Veles makes it suitable for hiking and camping, especially to the west of the town. One such location is a tranquil Bogomila village. Nearby there is the artificial Mladost lake, which is known as the town's recreational centre.</p> <p>In Veles, healthcare services are provided through a wide network of private health institutions from primary health practice, Health Centre, Centre for Public Health, General Hospital, Special Hospital for Lung Diseases and TB, as well as branched network of pharmacies.</p> <p>For the second quarter of 2021 in Veles there were a total of 4,127 recipients of social support payments ¹⁴⁰.</p> <p>There is a kindergarten, which operates in 6 purpose-built organizational units - clones. There are six primary schools in Veles and a network of regional schools in the surroundings settlements.</p> <p>There are four high schools in the municipality of Veles. There is a university / Centre for lifelong education, learning crafts, languages and computers.</p> <p>There are several developed industries in the municipality, including construction materials industry, food, leather, textile, ceramics, commerce, metal industry, agriculture, and service sector.</p> <p>The pipeline is designed to pass and end outside of the residential area of Veles. Less than 4 km of the pipeline will be within the town's territory. Land within the construction corridor includes 161 private and state owned land plots classified as arable land, pastures, vineyards and various types of infertile land (e.g., land under buildings, roads). 113 land plots (70% of the total number of affected plots) within the pipeline corridor are private-owned. 46% of these private land plots subject to permanent and temporary land acquisition are arable; vineyards occupy 11%, and pastures 42% of the affected private-owned landplots.</p> <p>The end of the pipeline Veles MMRS and Veles BS are to be sited within the agricultural land plots. The distance between the fence of the above-ground pipeline facilities and the nearest residential area is more than 0.3 km. At the same time, there is a small, reportedly non-residential building in 25 m of the site of the proposed Veles BS, which will be within the Restriction Zone 2 of the operational pipeline.</p>	 <p>Location of the small building near the end of the pipeline route (Cadastral Parcel 12842 - CM Veles)</p>  <p>Location of a small building nearby the proposed Veles BS (Parcel 12842 – CM Veles)</p>  <p>Veles at a glance from the end point of the pipeline</p>

¹⁴⁰ In the second quarter of 2021 in the town of Veles local residents benefitted from the following types of social support payments: i) guaranteed minimum assistance (948 recipients); ii) guaranteed childcare allowance (309 recipients); iii) foster parents (new – 9 recipients); iv) healthcare allowance (144 recipients); v) educational allowance (293 recipients); vi) allowance (studying faculty) (5 recipients); vii) financial compensation for assistance and care to another person (1524 recipients); viii) reimbursement for part-time employment (7 recipients); ix) financial assistance for social housing (2 recipients); x) disability allowance (391 recipients); xi) special allowance (124 recipients); xii) parental allowance for the third child (264 recipients); xiii) parental allowance for the fourth child (14 recipients); xiv) social pension (90 recipients), and xv) civil disability (3 recipients).

Description	Illustrations
The territory of the end of the route is part of the Kalaslari hunting area. Savory is collected on hilly surfaces.	

5.13 Cultural Heritage

5.13.1 Introduction

The areas currently occupied by Sveti Nikole, Lozovo and Veles municipalities have a very long and rich history: archaeological excavations there trace back to V millennium BC, Neolithic period, and have been mentioned in the official historic documents since III century BC. The area held a strategic position from the pre-historic days until present, and during this time people created buildings, assets and values that have formed part of Macedonian cultural heritage.

The cultural heritage assets identified within the Project-affected municipalities include archaeological sites, buildings and complexes, intangible heritage, and cultural landscapes described below.

The below sections rely on a few background sources and fieldwork completed by Civil Engineering Institute Macedonia J.S.C Skopje (see [Annex 2](#))¹⁴¹, as well as on the reports issued by the state bodies:

- Report No. 08-58/4 from 25.02.2021 covering km 0+000 - km 24+300 of the pipeline prepared by the Institute for Preserving Cultural Monuments and Museum, Stip, RNM; and
- Report No. 08-73/3 from 25.03.2021 covering km 24+300 -km 27+500 of the pipeline, prepared by the National Conservation Centre of Cultural Heritage-Skopje, RNM.

5.13.2 Tangible Cultural Heritage

5.13.2.1 Archaeological Sites

There are more than 200 registered protected archaeological sites within Sveti Nikole, Lozovo and Veles Municipalities. They include around 50 sites of the Neolithic period dated 8,000-3,000 BC, which is attributed to the Neolithic cultural group of Anzabegovo-Vrshnik and many sites of Bronze and Iron Age dated 3,000-600 BC. Because of historical agricultural and construction activities the sites are not well preserved.

The peak of the cultural development in the region in the antiquity were the Hellenistic, Antique and Roman periods, which covered the period of 500 BC-400 AD. There are more than 150 archaeological sites from Hellenistic, Late Antique and Roman periods. Usually, these archaeological sites are represented by settlements and necropolis. They are well preserved and can be used as touristic attraction in the region. The main archaeological site from this period is Stobi that is located in Gradsko, near Veles, and it is currently the only archaeological site in the region that is promoted as a touristic centre.

The Byzantine and Medieval periods in the region date to 500-1,500 AD in the area. This is the period of decline of the culture in the area. So far, more than 50 early Christian and Medieval basilicas have been excavated. The Islamic architecture is presented through mosques and tekjes in the villages and cities.

¹⁴¹ The source is the Heritage Impact Assessment Study of the Construction of the Sveti Nikole-Veles Section, Main Gas Pipeline. Civil Engineering Institute Macedonia J.S.C Skopje, 2022.

According to the detailed studies of the proposed pipeline route and adjacent areas (see **Annex 2** for details), no national designated archaeological areas or areas proposed for protection are within the proposed construction corridor of the pipeline.

14 registered archaeological sites have been identified within up to 3 km from the proposed pipeline. These are settlements and necropolis mostly of late Antique and Roman times. **Table 35** below lists these sites and indicates their location, type, distance to the construction corridor, sensitivity and potential to extend to the construction corridor. All of these sites have a protection status under the national regulations.

All the identified archaeological sites are outside the construction corridor. However, seven of them have a potential to extend to the construction corridor underground and, therefore, be damaged during the construction work (see **Table 35**). Two closest sites - Kula and Kanda Geoglyph have not only a potential to extend towards the construction corridor, but also bear cultural importance and value and thus are considered as highly sensitive archaeological receptors. Other sites are of medium sensitivity.



Table 35. Registered Archaeological Sites along the Proposed Pipeline Route

No.	Name	Location	Type / period of the site	Proximity to proposed pipeline / chainage	Sensitivity	Potential to extend in the construction corridor
Sveti Nikole Municipality						
1	Sulejmanec	4 km east of Sveti Nikole town	Settlement and necropolis/ Roman	800 m/ km 2+500.00	Medium	Likely
2	Medovo Anishte	3.7 km southeast of Sveti Nikole town	Settlement and necropolis/ Late Antique	700 m/ km 5+000.00	Medium	Likely
3	Gjurche	2.5 km south-east of Sveti Nikole town	Necropolis / Roman	1,000 m/ km 5+000.00	Medium	Unlikely
4	Dudin Dol	4.5 km south of Sveti Nikole town	Settlement/ Roman	1,000 m/ km 9+500.00	Medium	Unlikely
5	Antarla-Bela Cuka	3 km south-east of Sveti Nikole town	Settlement/ Late Antique	800 m/ km 5+000.00	Medium	Unlikely
6	Kanda Geoglyph	2 km north of Dolno Crnilishte	Late antique site	300 m/ km 8+000.00	High	Likely
Lozovo Municipality						
7	Koliba Bair	2 km north-west of Adzimatovo village	Settlement and necropolis/ Late Antique	500 m/ km 11+000.00	Medium	Likely
8	Golem Rid	1.5 km south-east from the Gjuzemelci village	Settlement/ Late Antique	1,000 m/ km 12+500.00	Medium	Unlikely
9	Livadi-Ogradi	1 km eastern from Lozovo village	Settlement/ Neolithic and Roman	1,700 m/ km 18+500.00	Medium	Unlikely
10	Srma	1 km north from Karatmanovo village	Necropolis/ Late Antique	500 m/ km 20+000.00	Medium	Likely
11	Mashatli'k	1.5 km east from Karatmanovo village	Necropolis/ Roman	800 m/ km 21+000.00	Medium	Likely
12	Vrshnik-Dzamaldziski Grobishta	2.5 km south from Karatmanovo village	Settlement and necropolis/ Late Antique	1,500 m/ km 22+500.00	Medium	Unlikely

No.	Name	Location	Type / period of the site	Proximity to proposed pipeline / chainage	Sensitivity	Potential to extend in the construction corridor
Veles Municipality						
13	Kula	2 km south-east from Chaloshevo village	Tumulus / Roman	200 m/ km 24+000.00	High	Likely
14	Milinski Dol	3 km eastern to Mamutchevo village	Settlement/ Roman	1,000 m/ km 21+250.00	Medium	Unlikely

Description of the archaeological sites that might be affected by the Project due to their potential to extend to the pipeline's construction corridor or cause visual impact is provided in **Table 36**.

Table 36. Description of Archaeological Sites along the Proposed Pipeline Route

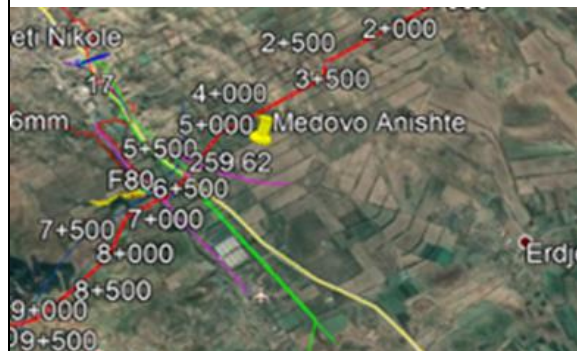
<p>Sulejmanec</p> <p>The Sulejmanec archaeological site is located 4 km to the east from Sveti Nikole Town. The site presents settlement and necropolis of the Roman period. On the surface of the site, many fragments of ceramic pots, pitos and tegulae, as well as building material were discovered. Also, a fragment of stelae with depiction of deceased was found on the site. The fragment of the stelae is exposed in the Museum of Shtip. The graves of Sulejmanec necropolis chronologically belong to the Roman period. The site is registered and has protected status. The site is part of the register of the Archaeological Map of the RNM.</p> <p>The site Sulejmanec is 800 m westwards of the proposed pipeline. This site is insufficiently explored, it has not been conserved recently and is not marked as 'a site' in situ. There is no access route, and the only access road is a non-regulated walkway. As a receptor it can be graded with medium sensitivity.</p> <p>The proposed gas pipeline section will not change the accessibility to the site. Although the gas pipeline section is located at a distance of 800 m, there is a possibility for the site to extend to the pipeline's construction corridor. Therefore, the Project may affect the archaeological remains or excavations of the site during construction and operational phases. Views on the site are not expected to be affected.</p>	 <p>Location of Sulejmanec archaeological site in relation to the proposed pipeline</p>  <p>Stelae from the Sulejmanec archaeological site</p>
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Medovo Anishte

The Medovo Anishte archaeological site lays next to the Sveti Nikole Town, 3.7 km south-east from it. The site is settlement and necropolis from the Late Antique period. On the surface of the site many fragments of ceramic pots, pitos and tegula, as well as building material were discovered. The site is registered and has a protected status. It has not been systematically excavated.

The Medovo Anishte site is located 700 m eastwards of the projected pipeline route. It is insufficiently explored and is not marked as 'a site' in situ. There is no access route to it and the only access is via a non-regulated walkway. As a receptor it can be graded with medium sensitivity.

The proposed gas pipeline section will not change the accessibility to the site. Although the site is located at a distance of 700 m from the future pipeline, there is a possibility to extend in the construction corridor. Therefore, the Project may affect the archaeological remains or excavations of the site during construction and operational phases.



Location of Medovo Anishte archaeological site in relation to the proposed pipeline

Kanda Geoglyph

The Kanda Geoglyph site is 2 km north to the village of Dolno Crnilishte. The Kanda Geoglyph is an oval-shaped hill. An aerial analysis using an infrared camera revealed a different composition of the soil in the hill compared to the surrounding soil. In 2014 international researchers investigated the Kanda Geoglyph and concluded that the variance corresponds to the presence of a cavity inside the hill presumably only a few tens of meters beneath the surface. It is believed that the hill at Kanda Geoglyph is a cairn with an inner chamber or that was raised on top of an existing hill to form the cairn thus increasing its original height.

The site is located 300 m east of the proposed pipeline. This site has been explored; it is not marked as a site. The only access route is via a non-regulated walkway. As a receptor it can be graded with high sensitivity due to its rarity.

The proposed gas pipeline may change the accessibility to the site. Because the gas pipeline will be located at a distance of 300 m from the site, there is a possibility for it to extend in the pipeline's construction corridor; and the Project may have influence on the site during construction and operational phase.



Location of Kanda Geoglyph archaeological site in relation to the proposed pipeline



Aerial view of archaeological site of Kanda Geoglyph

Koliba Bair, Adzimatovo






2 km north-west of the village of Adzimatovo, on a small hill, lays the Koliba Bair archaeological site. It is a settlement and necropolis from Late Antique period. Many fragments of ceramic pots, pitos, tegula, and building material were discovered on the site. Also, basement and parts from different buildings are found on the site, as well as many stone tiles from grave constructions. The site was not excavated systematically. It is registered and has a protected status.

This site is located 500 m east of the proposed gas pipeline. It is insufficiently explored; it has not been conserved and is not marked as a site. The only access route is via a non-regulated walkway. The sensitivity of the site can be graded as medium.

The proposed gas pipeline will not change the accessibility to the site because it will not pass near to it. Although the gas



Location of Koliba Bair archaeological site in relation to the proposed pipeline

<p>pipeline will be located at a distance of 500 m, there is a potential for the necropolis to extend into the construction corridor.</p>	
<p>Srma</p> <p>The Srma archaeological site is located 1 km north from Karatmanovo village. The site presents a settlement and Necropolis from the Late Antique period. On the surface of the site many fragments of ceramic pots and tegula, as well as building material were discovered. Also, fragments from stone tiles from grave constructions were found at the site. The site is registered and has a protected status.</p> <p>The site is located 500 m east of the proposed gas pipeline. It is insufficiently explored; it has not been conserved and is not marked as a site. There is no access route and the only access route is via a non-regulated walkway. The only access route is via a non-regulated walkway. The sensitivity of the site can be graded as medium.</p> <p>The proposed pipeline section may change the accessibility to the site. Although the gas pipeline section is located at a distance of 500 m, there is a potential for the necropolis to extend into the construction corridor. This may have influence on the remains of the site, as well as archaeological excavations during construction or operational phase.</p>	 <p>Location of Srma archaeological site in relation to the proposed pipeline</p>  <p>View on the Srma archaeological site</p>
<p>Masatl'k</p> <p>The Masatl'k archaeological site is located 1.5 km east from Karatmanovo village. The site is a settlement and necropolis from the Roman period. On the surface of the site, many fragments of ceramic pots, pitos and tegula, as well as building material was discovered. The site is registered and has a protected status.</p> <p>The site is located 800 m east of the proposed gas pipeline. It is insufficiently explored, has not been conserved recently and is not marked as a site. The only access route is via a non-regulated walkway. The sensitivity of the site can be graded as medium.</p> <p>The proposed gas pipeline will not change the accessibility to the site because it will not pass near to it. The gas pipeline is located at a distance of 800 m and it may affect the remains and further archaeological excavation of the site during Project construction and operational phases (this is because there is a potential that the site limits may extend into the construction corridor). The views on the site are not expected to be affected.</p>	 <p>Location of Masatl'k archaeological site in relation to the proposed pipeline</p>  <p>Roman pottery from the site area</p>
<p>Kula</p> <p>The Kula archaeological site is 2 km south-east from the village of Chaloshchevo. The site is a tumulus from the Roman period. The tumulus is to be located on a flatted hill, on the left side of the Veles-Shtip road. The tumulus is 3-4 m high and has a base of 20 m in diameter. On the surface of the site many fragments of ceramic pots, pitos and tegula, as well as building material were discovered. The site was not excavated systematically. It is registered and has a protected status.</p> <p>The site is located 200 m west of the proposed gas pipeline. It is insufficiently explored, has not been conserved and is not</p>	

marked as a site. The only access route is via a non-regulated walkway. The sensitivity of the site can be graded as high.

The proposed gas pipeline will change the accessibility to the site because it will pass not that far from it. The gas pipeline, being located at a distance of 200 m from the site, may affect the site remains and further archaeological excavation during Project construction and operational phases (this is because there is a potential that the site limits may extend into the construction corridor). The views on the site may be affected as well.

According to Report No. 08-73/3 from 25.03.2021 by the National Conservation Centre of Cultural Heritage Skopje, the Kula archaeological site No. 4-831-088/319 END needs to be studied in detail by the National Conservation Centre prior to any construction works.

Location of Kula archaeological site in relation to the proposed pipeline



Roman pottery from the site area

5.13.2.2 Historical Buildings and Complexes

Buildings and complexes in settlements along the pipeline route belong to various epochs and are featured by various styles. The key groups of such buildings and complexes are considered below. According to the scoping study and expert judgment, this type of cultural heritage is not expected to be affected by the Project and thus it is provided only to set out the overall context.

Profane traditional architecture

In the region there is 'rural traditional' and 'urban traditional' architecture. The city of Veles is characterized with unique urban traditional architecture. At the same time, the local villages are characterized by specific rural-architectural qualities.

Villages and agglomerations have relatively compact rural structure that are formed around access roads. This is typical for most villages in eastern part of North Macedonia. Their central areas are village squares with a spring or a fountain in the middle. There is clear division between the neighbourhoods that form along the smaller streets that branch from the main road and comprise the street network. The panorama of the villages is obscured with vegetation. One or two churches are typically located in the central part of every village.

Architectural-construction features

Usually, the buildings follow the stretching of the terrain, and depending on the location and orientation they are with their axis longitudinally or transversely towards the configuration of the terrain. The buildings are always open towards the south, east and west with the necessary sunshine and good views of the field. They usually have ground floor and first floor, and sometimes a second floor. On the ground floor, there is a basement with porches, which represents the economic part of the building. On the first floor are the rooms which can be reached by external or internal stairs through an open veranda.

Building materials and construction

Authentic buildings in villages are not typically preserved; due to historic anthropogenic impacts they are often ruined. In the cities, especially in Veles many authentic buildings are found to be preserved. The main concept is the construction of stone walls with mud and reinforced with wooden layers visible on the façade. One concept has a stone wall to the roof and the other with mud plaster filled with earthen bricks on the first floor. Sometimes, if the floor is made of earthen bricks, is coated with wooden slats and mortar of mud reinforced with straw sawdust or animal fibres. In the wealthier houses the finishing work on the facade with lime mortar is to be seen. The stone buildings often end up with a crown of stone tiles or travertine. The roof is usually four-sided with a cover of roof tiles. Window openings are rarer and smaller on the ground floor while upstairs they are larger and usually do not have some special decoration.

Sacral architecture

Sacral religious architecture is widespread in the area – there are more than 50 churches (**Figure 33**).

In the city of Sveti Nikole there are five churches, including St. Nikola, St. Ilijah and St. Petka. In the city of Veles there are 12 churches, the most important are St. Panteleimon, St. Holy Mother of God, St. Cosma and Damian, St. Cyril and Methodius, St. Maria Magdalena, St. Nedela, and St. Petka.

Every village has at least one church. For instance, there are the following churches in villages: church of St. Pavle/Erdzelija, St. Prohor Pciniski/Pesirovo, St. Ilija/Gorno Crnilishte, St. Petka/Lozovo, St. Holy Mother/Karatmanovo, St. Ilija/Chaloshevo, etc.



Church of St. Holy Mother/ Karatmanovo



Church of St. Petka/Lozovo



Turkish Tekje/ Lozovo



Church of St. Paul/Erdzelija

Figure 33. Churches in the Project-affected Municipalities

Many churches from the early Christian period are excavated in the region, as well. The most widespread type is the basilica type. Religious architecture continues through Byzantine period and Post Byzantine period. In the Ottoman period many mosques, and tekjes were built in the region. There is an old Turkish tekje (mosque) in Lozovo.

At the eastern edge of Milino village (Lozovo Municipality), there is an abandoned Islamic Cemetery. The closest distance between its graves and the proposed pipeline is ca. 130m (at km 16+100). This cemetery is not in use and the consultations have shown very limited value assigned to it.

5.13.3 Intangible Cultural Heritage

5.13.3.1 Traditions and Civil Events

The RNM is characterized by the remarkable intangible cultural heritage connected with ethnographic and ethnological characteristics as well as numerous traditions and events that are created for different purposes. Tradition is one of the most important values of the different entities in this area. It provides opportunities for creating a comprehensive tourist offer. Organizing different events is often directly related to traditions that are an important part of human life and are present throughout the development of human civilization.

The region where the gas pipeline is planned is not characterized by important events of regional and national character. Only the city of Veles represents a spatial unit where events of this type are held and are an important part of the tourist activities. Such events include the Racin Poetry Meetings, International Folklore Festival Veles, International Festival for Antique Epic Stobi, and Veles Summer and typically have a multinational character (**Figure 34**). Sveti Nikole hosts events called 'International Festival of Traditional Folklore Todorica'.



Feast of Todorica/Sveti Nikole



Racin Poetry Meetings/ Veles

Figure 34. Events in the Project region

Five elements of intangible cultural heritage of the RNM that are inscribed on the UNESCO Representative List¹⁴² have not been found to be practised in the villages along the pipeline.

5.13.3.2 Religious Events

The settlements along the route of the gas pipeline are characterized by traditions and events of local type with religious character associated with the visit to churches or celebrations of saints' days. Most significant events related to religious customs are the following:

- Sveti Nikole - City celebration of St. Theodore's day on 7th March. People go to the church, everyone takes their crosses, celebrates at home and receive guests. The house celebrations are St. Nikola and St. Peter.
- Village of Erdzelija - Village celebration of Govedarov stone, which is located on the periphery of the village, people come to it and pray for health, happiness and children. House celebration of St. Petka and St. Nikola.
- Village of Anzabegovo - Village celebration of Govedarov stone, which is located on the periphery of the village, people come to it and pray for health, happiness and children. House celebration of St. Demetrius and St. Nikola.
- Village of Dolno Crnilishte - Village celebration is St. John the Baptist on 18 and 19 January. People go to church, and everyone celebrates at home and receives lunch.
- Village of Lozovo - Village celebration is St. Petka on 27 October. People go to church, and celebrate with music, dancing, food and everyone celebrates at home and receives lunch. The saint's day draws hundreds of others from the surrounding areas.
- Village of Milino - Village celebration is St. John the Baptist on 18 and 19 January. People go to church, and everyone celebrates at home.
- Village of Karatmanovo - Village celebration is Feast of the Holy Mother of God Ascension. People to church, and after everyone at home receives guests and

¹⁴² <https://ich.unesco.org/en/state/north-macedonia-MK>

provides lunch. On Pentecost they take out their crosses. House celebrations are St. George, St. Varvara and St. Nikola.

- Village of Mamutchevo - House celebrations: St. George, St. Petka and St. Nikola.
- Village of Chaloshevo - House celebrations: St. Panteleimon, St. George, St. Demetrius and St. Nikola.
- Veles- City celebration in the honour of St. Panteleimon (the main patron of the city) on 9 August. People usually go to church, and after everyone provides lunch at home and hosts guests. House celebrations are St. Nikola, St. Demetrius and St. Varvara.

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

In addition, it is important to emphasize that in the overviews that are concerning the settlements, material cultural heritage and immaterial (spiritual) heritage is included, as well.

5.13.4 Cultural Landscapes

Cultural landscapes in the region are divided into rural vernacular landscapes and urban ethnographic landscapes. There are no designated or protected rural vernacular and/or urban ethnographic landscapes in the vicinities of the proposed gas pipeline.

Rural vernacular landscapes in the region are located near the villages, and usually present a small settlement with farm or near rivers.

On the other hand, side, the ethnographic landscapes can be found in the cities, they are urban and usually include urban traditional architecture.

Villages in Sveti Nikole-Lozovo-Veles area that form the cultural landscapes can be divided into two large groups according to their structure and type. The first group includes the nucleated villages, clustered around a central point, such as a village church. The second group are linear villages, clustered around a central public space, but along a line; the line can be natural, such as a river bank or seashore or a transportation route, such as a road. Also, villages can be of dispersed and of compact type. According to their positions the analysed villages can be lowland villages located in the plain part, as well as on the peripheries of the planes of the municipalities and on the small hill slopes. According to their population, the villages can be inhabited and abandoned.

Near the Project pipeline, there are many villages with tangible cultural heritage that form part of the rural cultural landscape of the region. Tangible cultural heritage of the villages includes the traditional and sacral buildings and architecture. As said above, there are no protected cultural buildings, monuments and complexes in the villages near the pipeline.

5.14 Key Sensitivities within the Project Aols

5.14.1 Environmental Sensitivities

- **Climate and climate change:** Area is arid and prone to drying out in the summer which means that dusts management will be potentially challenging in this time. Climate change is also likely exacerbating the situation.
- **Hydrology:** The area is prone to drought with rivers sometimes drying up during the summer. Water scarcity may be an issue during construction of the pipeline. Springs in the area are to be avoided.
- **Ambient air quality:** Particulate matter (PM) standards are regularly exceeded especially during the colder winter months. That means that the key source of PM is the combustion of coal and oil.
- **Soil:** Soil has high fecundity and so much of the land use traversed by the pipe is arable. There is evidence of some soil contamination most likely deposition from industrial air pollution.
- **Waste management:** There are no good practise landfills in the area and no hazardous waste landfills.

- **Biodiversity:**

- One IPA, one IBA, one EMERALD site and one identified KBA will be crossed by the gas pipeline. There are no national protected areas, or areas proposed for protection in the Aol.
- A total of 13 habitats were identified within the Sveti Nikole - Veles pipeline alignment corridor. Of these, specific mitigation required for some habitats, with impacts to all other habitats considered fully mitigated through standard Good International Practice mitigation.
- Approximately 140 species (mostly bird species) are notable potential receptors which could be impacted by the proposed pipeline. Of these, 8 species are listed in II or IV Annex of Habitat Directive. Specific mitigation was deemed necessary for those species or species groups - impacts to others can be successfully mitigated through Good International Practice mitigation.

5.14.2 Social Sensitivities

- **Cultural heritage:** Seven archaeological sites have potential to extend into the pipeline's construction corridor, of which two – Kula and Kanda Geoglyph – are the closest to the proposed route and are of higher sensitivity.
- **Linear infrastructure** to be crossed by the pipeline route: roads (a highway, two regional roads, local asphalted and earth roads); irrigation infrastructure (canals and pipelines); a railway, and others.
- Local roads to be used by construction vehicles: road surface and bridges.
- **Agricultural land use and livelihood:**
 - owners and formal and informal users of land plots to be permanently and temporarily acquired for the Project (individuals and businesses);
 - owners and formal and informal user of land plots within the Restriction Zones 1 and 2 (20 m and 60 m along the pipeline axis respectively) of the operational pipeline;
- **Community health, safety, and security:**
 - Residents of settlements (assumably towns of Veles and/or Sveti Nikole) where construction workers and visiting maintenance crews will be accommodated;
 - Residents of settlements crossed by roads to be used by Project's construction vehicles:
 - people living within 15m to both sides of the roads; they may be affected by noise, vibration and artificial lighting from headlights (in the dark) of the Project's construction vehicles;
 - people living along local roads (children, aged people, people with disabilities might be at higher risk) and road users; they may be involved in road traffic accidents with the Project vehicles;
 - Owners and users of the following buildings of the vicinity of the pipeline route:
 - A weekend house nearby the pipeline route in Peshirovo village, Sveti Nikole Municipality (the distance from the construction corridor to the residential building is not known, assumingly outside 60m Restriction Zone 2 of the operational pipeline);
 - A small, non-residential building in town of Veles, Veles Municipality, in about 25 m north from boundary of the Veles BS site, on the border of the construction (see [Figure 35](#)); it is expected to fall into Restriction Zone 2 for the operational where construction of the residential houses is prohibited.

- Two-three assumingly residential houses in 130-160 m southwest from the pipeline construction corridor and in 150-180 m from Veles MMRS site (see **Figure 35**).
Those who live in residential houses may be affected by construction noise and emissions.
- **Local businesses** i) providing transportation, security, accommodation and catering services and owners of small shops; ii) producing construction materials and food.



Figure 35. Residential and Non-residential Buildings in the Vicinity of the Proposed Veles BS and Veles MMRS

6 ASSESSMENT OF POTENTIAL E&S IMPACTS AND RISKS AND MITIGATION MEASURES

6.1 Introduction

This chapter considers the Project's potential E&S impacts defined using the methodology described in **Chapter 4**. The assumptions and projections regarding the impact's receptors and their sensitivity, Aols, impact magnitude and conclusions on the significance of the impacts and risks considered herein are based on information about the proposed design solutions presented in **Chapter 3**, and available data on baseline environmental and socio-economic conditions (**Chapter 0**).

Potential impacts caused by various activities taking place within the Project Aols during the construction and operational phases under normal operating conditions are considered in **Sections 6.2 to 6.19**. The analysis of potential impacts from the Project facilities in emergency situations caused by natural disasters or technogenic accidents is presented in **Section 6.20**. **Section 7** identifies and assess cumulative impacts from the Project and parallel or forthcoming projects or activities.

E&S sensitivities identified as a result of the baseline analysis (**Section 5.14**) are considered as receptors in the specialist impact assessment sections.

6.2 Impact on Geology and Soil

In establishing the pipeline, extensive earthworks activities are planned along the route, which may result in an adverse impact on the soil and soil structure. In the following section the possible manifestation of such impacts is detailed and assessed under the headings of environmental aspects, impacts, receptor sensitivity, impact magnitude, impact significance and management and mitigation.

6.2.1 Construction Phase

Activities

The following activities will take place during the construction phase which would result in potentially significant impacts on soils:

- Removal of trees and shrubs;
- Clearing and grubbing;
- Removal and temporary stockpiling of topsoil;
- Vehicle and machinery movement;
- Refuelling of vehicles and machinery;
- Excavation of the trench and temporary stockpiling of the excavated material;
- Coating with corrosion protection; and
- Backfilling of the trench and reinstatement of topsoil.

Aspects

Environmental aspects associated with construction activities include:

- Spillages of hazardous materials especially oils, fuels and lubricants but also paints and solvents, waste cement and others;
- Compaction of soils by the movement of heavy vehicles;
- Surface transformation through clearing and grubbing of all vegetation;
- Mechanical generation of dust, through vehicle movement and transport of excavated soils;
- Erosion of soil as a result of stormwater runoff and aeolian process; and
- Disruption of existing soil profiles because of excavations and subsequent backfilling.

Impacts

These various environmental aspects will bring about changes in the soil and its fecundity, which even with good land rehabilitation efforts will still likely lose fertility and thereby reduce agricultural productivity.

Receptor sensitivity

All soils should be viewed as sensitive receptors because soil is a scarce resource, especially those soils that support natural or critical habitat and agriculture. In general terms the bulk of the soil profile that would be affected by the construction of the pipeline is currently used for agriculture. This in no way reduces the importance of effective rehabilitation but it is relatively easier to reinstate soil conditions to meet agriculture objectives than recreating an entirely natural system, even if there is reduced fertility in the construction corridor. As such the soil that would be potentially affected by the construction activities is deemed to be of **high sensitivity**.

Impact magnitude

The magnitude of the impact is limited by the areal extent of the construction footprint for the pipeline which is no more than a small percent of the entire soil resource in the area. At the same time, given the reinstatement of the soil profile following the installation of the pipeline there would at least be some recovery of the soil in the construction footprint. For these reasons the impact magnitude is no more than **low**. It should be noted that this assessment excludes impacts on natural and critical habitat areas where the requirements of no-net loss and net gain, respectively, would ensure no worse than a neutral impact.

Impact significance

The net effect of the two descriptors is that the impact significance of potential impacts on soils is ranked as **moderate**.

Management and mitigation

The following mitigation must be implemented during construction of the proposed pipeline:

Develop and implement a Soil Rehabilitation Plan that includes *inter alia*:

- Record available depth of topsoil / fertile soil (depending on land use) – use to plan depth of strip, soil protection risk mitigation and monitoring of soil replacement and rehabilitation;
- Stripping in sensitive areas needs to be adapted – if wetlands or rivers are being crossed – narrow the stripped areas by creating wider servitude for larger laydown areas outside of the sensitive areas;
- Use bogmats in wet areas – they take away the need for tricky rehab by avoiding stripping and spreading weight of plant to reduce compaction;
- Only strip across the work areas of the servitude – no need to strip the area under the stockpile itself;
- Make provision for drainage in and out of the project footprint and erosion protection at toe of slope;
- Strip fertile soil over the trench or other excavations that need to be reinstated, stockpile separately adjacent to trench, making provision for battering back of trench sides, plan drainage and erosion protection;
- Avoid mixing of subsoils or imported material with the in situ or stockpiled top and fertile soils especially getting stones into agricultural soils;
- Avoid compaction where possible and apply mitigation to restore soil structure and function;
- During excavation check (record as evidence) characteristics of the soil profile and ID areas with impervious layers (rock, compact clays etc) these layers need to be

reinstated to ensure that their function in the landscape is not impacted on the long term;

- Remove imported material / debris from the soil before landscaping and shaping;
- Ensure decompaction of lower layers before topsoil is replaced;
- Limit access to rehabilitated areas;
- Apply soil amelioration where laboratory testing indicates a reduction in soil quality;
- Only cover soil stockpiles if there is a significant risk of soil losses and in the right season;
- Careful management of weeds can help bind soils but these need to be cut short regularly to avoid seeding; and
- Apply additional erosion protection measures on steep slopes.

Residual impact

By applying apposite mitigation during the implementation of the project the impact magnitude could be reduced to low, which would mean a residual significance rating of **moderate**. It is, however, extremely important that the mitigation be implemented consistently right from the outset of the construction activities.

6.2.2 Operational Phase

Activities

During the operational phase there are far fewer activities that would pose a risk to soil. However, there would still need to be the following:

- Excavation in the event of a pipe fault that requires repairing;
- Repairs of erosion rills; and
- Vehicle movement to different parts of the pipeline.

Aspects

Environmental aspects associated with construction activities include:

- Spillages of hazardous materials especially oils, fuels and lubricants; and
- Compaction of soils by the movement of heavy vehicles;

Note that where repairs or maintenance of the pipeline involves excavation this would have the same characteristics and risks as construction activities.

Impacts

The most likely impact is small pockets of soil contamination as a result of spills of hydrocarbon-based products.

Receptor sensitivity

All soils should be viewed as sensitive receptors because soil is a scarce resource, especially those soils that support natural or critical habitat and agriculture. As such the soil that would be potentially affected by the construction activities is deemed to be of **high sensitivity**.

Impact magnitude

The magnitude of the impacts would be significantly less than for the construction phase and no more than **negligible**.

Impact significance

The net effect of the two descriptors is that the impact significance of potential impacts on soils is ranked as **moderate**. That significance cannot be further reduced because of the sensitivity of the soil but mitigation can still be applied especially in the event of a spill of a hazardous material.

Management and mitigation

The following mitigation must be implemented during operations of the proposed pipeline:

- Refuelling must be done in a manner that minimises the risk of spills such as cut of switches, use of drip trays, overfilling protection and so forth; and
- If there is a spill, it must be immediately stopped and countermeasures implemented to clean up the spill as quickly and as effectively as possible;

Residual impact

The residual impact will remain of **minor** significance.

6.3 Impact on Surface and Groundwater

6.3.1 Construction Phase

Activities

The following activities will take place during the construction phase which would result in potentially significant impacts on surface and groundwater:

- River and/or stream crossings by the pipeline;
- Pressure testing the pipeline with water;
- Refuelling plant and/or vehicles;
- Vehicle movement on the site; and
- Coating of the pipeline for corrosion protection.

Aspects

Environmental aspects associated with construction activities include:

- Spillages of hazardous materials especially oils, fuels and lubricants but also paints and solvents, waste cement and others;
- Erosion of soil as a result of stormwater runoff and sedimentation;
- Pumping groundwater to keep pipeline trenches free of water; and
- Discharge of water used for pressure testing.

Impacts

The above activities and aspects could result in contamination of runoff water which might reduce surface and/or ground water quality and further knock-on effects such as reducing aquatic habitat and aquatic fauna populations.

Receptor sensitivity

Receptor sensitivity must be viewed as **high** as water is an extremely scarce resource generally but especially in the type of arid environment in which the pipeline will be built.

Impact magnitude

Impact magnitude is **low** even though there would be limited areas in which surface water could be affected by the pipeline construction. Obviously, the key areas of concern would be any direct interfacing with surface water especially but also groundwater.

Impact significance

Impact significance would be **moderate** as a function of the high receptor sensitivity and the low impact magnitude. However, the impact magnitude could be further reduced through apposite mitigation which is detailed below.

Management and mitigation

The following mitigation must be implemented during the construction of the pipeline to reduce the potential impact magnitude on surface and ground water:

Develop and implement a Construction Hazardous Materials and Spill Prevention and Countermeasures Management Plan that includes *inter alia*:

- Ensure that all hazardous materials are correctly stored, transferred, transported and used following good international practise;
- Refuelling must be done in a manner that minimises the risk of spills such as cut of switches, use of drip trays, overfilling protection and so forth;
- No manual syphoning or decanting of fuel products. Fuel products may only be transferred using a pump to pump the fuel from one container to another;
- If there is a spill, it must be immediately stopped and countermeasures implemented to clean up the spill as quickly and as effectively as possible;
- All water courses are to be crossed using HDD only. No excavations of water course will be allowed on the project;
- Water used for pressure testing must not contain any residual chemicals that would render the water contaminated. If water used for pressure testing is contaminated it must be disposed in a system that can be used to treat the water before it is discharged¹⁴³ to a surface water environment;
- Identify materials that may not be used on the project including substances banned by the Montreal protocol and subsequent conventions, persistent organic pollutants and so forth and include this list in the environmental specification;
- Determine quality and characteristics of ground and surface water that will be affected by trench excavation or river crossings to provide a baseline against which future changes can be assessed;
- Determine water quality and flow targets appropriate to the sensitivity of the receiving water environment so that the effects of construction can be monitored, and corrective action implemented timeously;
- Treat all pumped groundwater to remove sediment either through a settling pond, or filtration;
- Manage surface drainage during construction in such a way as to prevent scouring of backfill and topsoil and/or sedimentation of runoff water; and
- Maintain downstream real-time water quality monitoring of those parameters that could be affected by the construction activities while they unfold, and urgent corrective action implemented, including cessation of work if required should changes in water quality be detected.

Residual impact

¹⁴³ Relevant water discharge permits shall be obtained for this activity.

With the correct application of the mitigation the impact magnitude could be reduced to low implying **an overall residual significance rating of minor**.

6.3.2 Operational Phase

Activities

The following activities will take place during operations which would result in potentially significant impacts on surface and groundwater:

- Refuelling plant and/or vehicles; and
- Vehicle movement on the site;

Aspects

Environmental aspects associated with operational activities include:

- Spillages of hazardous materials especially oils, fuels and lubricants but also paints and solvents, waste cement and others.

Note that where repairs or maintenance of the pipeline involves excavation this would have the same characteristics and risks as construction activities.

Impacts

Spillages of hydrocarbon-based project could impact negatively on ground and/or surface water quality.

Receptor sensitivity

Receptor sensitivity must be viewed as **high** as water is an extremely scarce resource generally but especially in the type of arid environment in which the pipeline will be built

Impact magnitude

Impact magnitude is **negligible** once the pipeline is operational.

Impact significance

Impact significance would be **moderate** due to the high sensitivity of surface or ground water.

Management and mitigation

Develop and implement an Operations Hazardous Materials and Spill Prevention and Countermeasures Management Plan that includes *inter alia*:

- Refuelling must be done in a manner that minimises the risk of spills such as cut of switches, use of drip trays, overfilling protection and so forth; and
- If there is a spill, it must be immediately stopped and countermeasures implemented to clean up the spill as quickly and as effectively as possible.

Residual impact

The residual impact would become **minor**.

6.4 Impact on Air

6.4.1 Construction Phase

Activities

The following activities will take place during the construction phase which would result in potentially significant impacts on air quality:

- Use of vehicles and machinery with internal combustion engines;
- Vehicle movements;
- Welding;

- Vegetation stripping, grading, topsoil excavation and stockpiling, trench excavations;
- Transport of soil and backfill material; and
- Backfilling trenches and reinstatement of vegetation layer.

Aspects

Environmental aspects associated with construction activities include:

- Dust;
- Tailpipe emissions (carbon dioxide, carbon monoxide, nitrogen oxides and aromatic hydrocarbons);
- Welding fumes; and
- Solvent fumes;

Impacts

The activities and aspects detailed above would bring about changes in air quality that could in turn result in adverse human health and/or human health effects and potentially have an adverse impact on habitat.

Receptor sensitivity

The primary receptor for changes in air quality are people and so must rate as a receptor of high sensitivity. Habitat sensitivity would rate as low sensitivity except in those areas where natural or critical habitat exists.

Impact magnitude

NRM ambient air quality standards align with the air quality standards set in Annex 11 to the EU Directive 2008/50/EC on ambient air, with **Table 37** an extract from Table B of the Directive. No dispersion modelling has been done to determine the likely ambient air quality changes during construction of the pipeline, but these changes are unlikely to be significant. Although a broad range of atmospheric emissions is likely these will be relatively small. Dust generation may be much more of an issue during the dry summer months but is unlikely to be much more than a nuisance off site due to the relatively small emissions and the distance to receptors. Peak background concentrations are seen to occur in the winter months when especially coal is being used as a heat source and this would coincide with the time at which dust generation would be least likely at least in relative terms. As such the impact magnitude is likely to be **low**.

Table 37. Limit Values ($\mu\text{g}/\text{m}^3$) for Relevant Air Quality Pollutants as Determined in Directive 2008/50/EC

Pollutant	Hourly	24 hourly	Annual
NO ₂	200 (18 exceedances permitted per year)	-	40
PM ₁₀	-	50 (35 exceedances permitted per year)	40
PM _{2.5}	-	-	25
SO ₂	350 (24 exceedances permitted per year)	125 (3 exceedances permitted per year)	-

CO	-	10,000 (8 hourly mean)	-
Benzene	-	-	5

Impact significance

The effect of the high sensitivity of receptors and the low impact magnitude implies a significance rating of **moderate** which is much more to do with the sensitivity of the receptors rather than the impact magnitude.

Management and mitigation

The following mitigation must be implemented during the construction of the pipeline to reduce the potential impact magnitude on air quality:

Develop and implement a Construction Atmospheric Emissions Management Plan that includes *inter alia*:

- Do not allow vehicles and machinery to idle. If vehicles and machinery are not being used then they must be switched off;
- Operating machinery must be under load so as to operate at higher revs and to have more complete combustion of fuel;
- Any vehicle or machinery emitting smoke must be tuned for better performance;
- Water can be used for dust suppression but chemical palliatives provide better dust control and use less water;
- Dust generating activities must be suspended during high wind speeds;
- Establish vegetation growth on temporary stockpiles of at least topsoil to minimise wind-blown dust;
- Limit vehicle speeds on unpaved roads; and
- Vehicles transporting soil must be covered with tarpaulins.

Residual impact

Mitigation must be implemented which would further reduce the impact magnitude to negligible, implying a residual impact of **minor** significance.

6.4.2 Operational Phase

Activities

The following activities will take place during the operations phase which would result in potentially significant impacts on air quality:

- Purging gas from pipeline sections that require maintenance; and
- Transporting and distributing gas.

Aspects

Environmental aspects associated with operations activities include:

- Emissions of natural gas; and
- Fugitive gas emissions from valves.

Note that where repairs or maintenance of the pipeline involves excavation this would have the same characteristics and risks as construction activities.

Impact

As for construction, activities and aspects detailed above would bring about changes in air quality that could in turn result in adverse human health and/or human health effects and potentially have an adverse impact on habitat.

It should also be recognised that the introduction of natural gas as a replacement for coal and oil will result in significant reductions of especially PM emissions and other pollutants including, NO_x, SO₂ and CO₂.

Receptor sensitivity

The primary receptor for changes in air quality are people and so must rate as a receptor of **high** sensitivity. Habitat sensitivity would rate as low sensitivity except in those areas where natural or critical habitat exists.

Impact magnitude

Impact magnitude is likely to be **negligible** during operations of the gas pipeline as emissions would be very limited. Use of the gas by consumers would obviously result in emissions to atmosphere but the clean burning properties of natural gas mean that none of these emissions would be significant in their own right. There has been no combined assessment of multiple emissions sources but again experience from other parts of Europe suggests that these would not result in significant reductions in air quality to the extent that adverse human health risks would manifest.

Impact significance

Impact significance would be **moderate** (as for construction) due to the high sensitivity of the receptors, rather than as a result of the impact magnitude.

Although it has not been assessed in detail, the effect of fuel substitution in improved air quality is considered to be of **major** positive significance, given the current circumstance of breached air quality standards.

Management and mitigation

The following mitigation must be implemented during operations of the pipeline to reduce the potential impact magnitude on air quality:

Develop and implement an Operations Atmospheric Emissions Management Plan that includes *inter alia*:

- Develop and implement a preventative maintenance regime to reduce the risk of fugitive emissions and to prevent catastrophic failure of any elements of the pipeline infrastructure.

Residual impact

The residual impact would become **minor**.

6.5 Climate Change

The pipeline will both contribute to, and potentially be affected by climate change and it is necessary to assess both possible impact risks.

6.5.1 Climate Resilience

In this project, the following natural events could be relevant:

1. Strong winds

Given that the pipeline is mostly underground (except for the block stations, and MMRSs), the impact of strong wind is not expected to have a significant effect on the pipeline.

2. Extremely low temperatures (snow and ice)

Given that the pipeline is for the most part an underground facility dug to a sufficient depth, the external low temperature and the appearance of snow and ice will not materially affect the pipeline. The steel used for the pipes is also resistant to low temperatures.

3. Floods

Most of the pipeline route passes through areas that are not susceptible to flooding. In parts where there is flooding risk (where the pipeline intersects with rivers), the pipeline is reinforced with concrete.

4. Extremely high temperatures

Extremely high temperatures will similarly not affect the pipeline because it is largely underground. Only block stations and MMRSs will be exposed to high temperatures, but elevated pressure in the pipeline would be released through the automatic safety valves on the pipeline.

5. Fires

In underground pipelines, the danger of expanding the fire which occurred in the vicinity of the pipeline is only aboveground parts, which are fenced and vegetation regularly cleared.

6. Lightning strike

The pipeline is protected by grounded lightning rods.

6.5.2 Greenhouse Gas Emissions

The proposed pipeline will result in emissions of greenhouse gases during construction mostly due to fuel combustion and electricity use (carbon dioxide CO₂ and nitrogen oxides (NO_x)). Carbon sequestration will also be adversely affected due to vegetation being cleared along the pipeline route. During operations of the pipeline the periodic release of natural gas would also constitute greenhouse gas emissions in the form of methane (CH₄) which is the primary constituent of natural gas (about 97%). These greenhouse gas emissions will be small and cannot be considered a significant contribution to global warming.

6.6 Impact Caused by Waste Generation

According to the NMR legislation, the management of waste is the responsibility of the Construction Contractor and the project proponent (construction), and the Pipeline Operator (operations).

6.6.1 Construction Phase

Activities

All construction activities will have an element of waste generation.

Aspects

During construction of the pipeline, solid waste is expected to take the form of:

- Municipal solid waste;
- Spoil (excess excavated material);
- Vegetation waste;
- Packaging waste;
- Demolition waste (building rubble);
- Scrap metal;
- Waste concrete;
- Used welding rods; and
- Hazardous waste in the form of spilled oils, lubricants and fuel and other hazardous materials that may be required for coating and corrosion protection.

By volume, the excavated material will be the largest component of the waste and much of this will be reused in the backfilling of the trench once the pipeline has been laid and in the surface rehabilitation and reestablishment of vegetation. Potential types of waste that will be generated during construction are listed in **Table 38**.

Table 38. Waste Classification

No.	Category of waste	List of types of waste (OG of RM No. 100/05)	Way of handling the waste (processing, storing, transport, disposal etc.)	Title of the legal entity handling the waste and locations on which the waste is disposed of (landfills)
1.	Scrap metal	17 04 05	Temporary storage until it can be sold on to a recognised scrap metal dealer.	Scrap metal dealer
2.	Excavated materials	17 05 04	Utilization in construction activities related to this project, the excess to be used constructively as may be required by the municipality	Municipality
3.	Contaminated soil	17 05 05*	Temporary storage until safe disposal can be assured	Certified hazardous waste management contractor
4.	Municipal solid waste	20 03 01	Transported for disposal at closest registered landfill	Municipal PCEs (PCE "Derven" in Veles, PCE "Lozovo" in Lozovo and PCE "Komunalec" in Sveti Nikole)
5.	Vegetation waste	20 02 01	Transported for disposal at a composting facility	Municipal PCEs (PCE "Derven" in Veles, PCE "Lozovo" in Lozovo and PCE "Komunalec" in Sveti Nikole)
6.	Packaging waste, paper and cardboard, plastic, wood, metal, composite packaging, glass, etc.	15 01 01 15 01 02 15 01 03 15 01 04 15 01 05 15 01 07	Transported for recycling	Legal entity duly authorised to receive recyclable waste

Impact

Impacts from waste are many and varied including risks of contamination of soil, surface and groundwater, unsightliness and odour. Waste may also present a fire risk.

Receptor sensitivity

Overall receptor sensitivity is expected to be **moderate** to **high** depending on the specific receptors that are affected by the waste, where impacts on water resources would be viewed as **high** sensitivity. At the same time, it must be recognized that the landfills in the vicinity of the pipeline route do not generally do not reflect good international practice requirements. Added to that is the fact that there are no general disposal facilities for hazardous waste.

Impact magnitude

The impact magnitude of waste generated during the construction phase is considered to be **low** as the waste volumes will be relatively small, other than for excavated material. As the excavated material is to be mostly reused the volumes can also be effectively minimized, leaving only spoil that cannot be reused. The judicious use of that spoil for other rehabilitation efforts would ensure that the overall effect is one of low or even negligible impact magnitude.

Impact significance

The overall impact significance for waste generated during the construction phase is accordingly deemed no more than **moderate** and probably closer to **low**. Even with low significance, mitigation still needs to be applied to ensure that a small aliquot of waste does not in itself become a source of environmental contamination.

Management and mitigation

The following mitigation must be implemented during construction of the pipeline to reduce the potential impact magnitude of waste:

Develop and implement a Construction Waste Management Plan that includes *inter alia*:

- Specify performance targets for waste generation by the contractors. Performance against targets to be reported monthly;
- All waste streams are to be categorised in terms of quantity, hazard, generation frequency and recyclability and disposal options define and implemented;
- All waste streams are categorised in terms of quantity, hazard, generation frequency and recyclability and disposal options define and implemented;
- Each hazardous waste type must have an MSDS that is always available to accompany the waste;
- Opportunities for source reduction, as well as reuse and recycling must be promoted and maximised;
- Hazardous wastes must be segregated from non-hazardous wastes;
- A project waste register for materials removed from the construction site must be maintained, indicating type, quantity, date, and so forth.
- Waste must be properly segregated into different types, so that opportunities for re-use and recycling are not compromised;
- Transportation of waste must be conducted to prevent or minimize spills, releases, and exposures to employees and the public;
- All waste containers must be secured and labelled with the contents, properly loaded on transport vehicles and accompanied by a shipping paper (i.e., manifest) that describes the load;
- Upon delivery of the waste consignment at the final waste disposal facility, the facility operator must sign the Transfer Note confirming the safe disposal of the waste;
- Construction Contractor's handling, treating and disposing of hazardous waste must be reputable and legitimate enterprises, licensed by the relevant regulatory agencies and follow good international industry practice for waste handling and disposal ensuring compliance with applicable local and international regulations;
- For each construction area provision is made for intermediate storage of wastes generated in that area;
- Suitable spill clean-up materials are kept available on or close to the designated storage area, to deal with any accidental spillages/leakages;
- Oblige contractors to adopt the waste management hierarchy in managing construction waste. Records must be provided of the safe final disposal of all types of waste; and
- The collection and recycling or safe disposal of used welding rods.

Residual impact

The residual impact would remain at **moderate** to **minor**.

6.6.2 Operational Phase

Activities

Operations phase activities are much more limited than construction phase and waste generation is not expected to be significant.

Aspects

During operations of the pipeline, solid waste is expected to take the form of:

- Vegetation waste;
- Waste spare parts linings and paints for maintenance of above-ground and underground facilities;
- Waste packaging; and
- Contaminated soils from spillage of hazardous materials such as oils, fuel and lubricants.

Impact

As with Impacts from waste are many and varied including risks of contamination of soil, surface and groundwater, unsightliness and odour. Waste may also present a fire risk.

Receptor sensitivity

Overall receptor sensitivity is moderate to high depending on the specific receptors that are affected by the waste, where impacts on water resources would be viewed as high sensitivity.

Impact magnitude

Impact magnitude of waste during the operations phase is negligible as the anticipated waste volumes are small and certainly much smaller than would occur during construction.

Impact significance

Impact significance for waste during the operations phase would be no more than **moderate** but only due to the sensitivity of the receptors, especially soil and water. The impact magnitude would however be **negligible**. A well formulated waste management programme for the few wastes that are likely to occur during pipeline operations would ensure that potential impacts would remain no more than negligible.

Residual impact

Residual impact would remain no more than **minor**.

6.7 Impact Caused by Noise and Vibration

A Noise and vibration assessment has been undertaken in alignment with The Environmental Noise Directive (Directive 2002/49/EC)¹⁴⁴ and national legislation. The aims of the Environmental Noise Directive focus on:

- The determination of exposure to environmental noise;
- Ensuring that information on environmental noise and its effects is mitigated; and
- Preventing and reducing environmental noise where necessary and preserving environmental noise where it is good.

Other relevant EU Legislation relating to noise includes:

- Directive 70/157/EEC on the approximation of the laws of the Member States relating to the permissible sound level and the exhaust system of motor vehicles; and
- Directive 2000/14/EC on the approximation of the laws of the Member States relating to the noise emission in the environment by equipment for use outdoors.

During the realization of the project, potential impacts and noise from the planned activities will occur during the construction phase (preparatory and constructive phase).

¹⁴⁴ European Parliament and Council (2002), 2002/49/EC, relative to the assessment and management of environmental noise

6.7.1 Construction Phase

Activities

All construction phase activities will be sources of noise to greater and lesser extents, but the following activities will be particular sources of noise:

- Blasting (if required);
- Rock drilling; and
- Operating vehicles and machinery.

Aspects

Noise is an environmental aspect in its own right.

Impact

The key concern with noise is the risk of noise induced hearing loss amongst construction workers, but that risk is dealt with separately. Noise may cause a disturbance to residents that depending on the intensity may result in acute disturbance.

Receptor sensitivity

Receptor sensitivity is no more than moderate as noise typically manifests as a nuisance effect rather than one that would directly threaten human health. This does not include workers who may suffer noise induced hearing loss, because of prolonged exposure to noise that exceeds health-based limits. It is assumed worker health will be managed in a manner separate to this assessment where worker hazards are identified and managed as part of the implementation of the project which would include the use of Personal Protective Equipment (PPE) as needed.

Magnitude of the impact

The most commonly used construction machines together with associated noise levels at a reference distance of 15 m from the source are shown in **Table 39**.

Table 39. List of Sources of Noise and Vibration

Source Emission	Equipment - a device with a description of maximum power	Emitted noise intensity (dB) expressed through the demonstration value of the equipment	Periods of emissions (number of hours per day)
Heavy vehicles and construction machinery	Bulldozer, excavator, trucks for transporting materials, pneumatic drill, stone drill, concrete mixer, mobile crane etc.	80-90 dB	8 (discontinuous noise)

Limit values for environmental noise are defined in the Rulebook on limit values of noise in the environment (OG of RM No. 147/08) and shown in **Table 40**.

Table 40. Area Noise Level

Area differentiated according to the level of noise protection	Noise level expressed in dB (A)		
	Ld	Lv	Ln
Area of first degree	50	50	40
Area of second degree	55	55	45
Area of third degree	60	60	55

Area of fourth degree	70	70	60
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Legend:

- Ld - day (period from 07:00 h to 19:00 h),
- Lv – evening (period from 19:00 h to 23:00 h),
- Ln – night (period from 23:00 h to 07:00 h).

The areas according to noise tolerance are defined in the Rulebook for locations of measuring stations and measuring points (OG of RM No. 120/08) as follows:

- Area with I degree of noise protection is an area intended for tourism and recreation, an area in the immediate vicinity of health facilities for hospital treatment and an area of national parks and nature reserves;
- Area with II degree of noise protection is an area originally intended for residence, area in the vicinity of facilities for correctional and educational activity, social protection facilities intended for accommodation of children and elderly and facilities for primary health care, area with playgrounds and public parks, areas with public greenery and recreational areas and areas with local parks.
- **Area with III degree of noise protection is an area where the noise pollution is considered to be less significant i.e. trade, business and residential area, which is also intended for residence i.e. where there are facilities with protected areas, craft and related activities of production (mixed area), area intended for agricultural activity and public centres where administrative, trade, service and catering services are carried out.**
- Area with IV degree of noise protection is an area where interventions in the area are allowed, which can cause disturbances with the noise, an area without apartments, intended for industrial and craft or other related activities of production, transport activities, activities for storage and servicing and communal activities that create more noise.

The project will be implemented in an area of III degree of noise protection. Noise limits based on Macedonian requirements are summarised in **Table 41**.

Table 41. Limit Noise Levels in Areas Outside Urban Locations¹⁴⁵

Types of Location	Noise level given in dBA		
	Ld (Day)	Lv (Evening)	Ln (Night)
Locations exposed to intensive road traffic	60	55	50
Locations exposed to intensive rail traffic	65	60	55
Locations exposed to air traffic	65	65	55
Locations with intensive industrial activity	70	70	70
Quiet locations outside settlements	40	35	35

The pipeline alignment is some distance from settlements and so noise from construction activities will not significantly affect the surrounding population. There will also be vibration from the movement of construction and transport machinery but will be temporary and manifest only locally in the immediate vicinity of the site. Where the pipeline is in proximity to the IBA Ovche Pole, special

¹⁴⁵ Article 6 of the Rulebook on limit values of the noise level in the environment (OG of RM No. 147/08)

attention will need to be paid to noise risks and ensuring that these do not result in impacts in the IBA. Based on the above it is concluded that the impact magnitude of noise will be **low**. This assessment excludes the impacts on the IBA which must be viewed as potentially **high**, pending the development of specific mitigation for working in that area.

Impact significance

The net impact significance for the entire pipeline is **low** whereas for the IBA it is potentially **major**.

Management and mitigation

Develop and implement a Construction Noise Management Plan that includes *inter alia*:

- Noise prevention must be applied where predicted or measured noise impacts from the construction area could exceed the applicable noise level guideline at the most sensitive point of reception;
- Noise control measures must be applied at source;
- Noise reduction options include:
 - Limiting the hours of operation for specific operations (e.g., transport); and
 - Use speed limiting to control noise from vehicles;
- A mechanism to record and respond to complaints.
- Ensure routine preventative maintenance of vehicles and machinery to reduce noise; and
- Conduct routine inspections on vehicles and machinery so that excess noise can be corrected timeously.

Residual impact

The residual impact will remain **low** other than for potential impacts on the IBA where it will be **moderate**.

6.7.2 Operational Phase

The operational pipeline will not generate noise or vibration to any great degree and as such is viewed as a negligible source of risk. For that reason, the impact is not further assessed and is concluded to be **low**.

6.8 Biodiversity Impact

6.8.1 Construction Phase

Activities

The following pipeline construction activities would result in the direct loss of habitat along the pipeline route:

- Removal of trees and shrubs; and
- Clearing and grubbing.

Aspects

During construction of the pipeline, the following environmental aspects would pose a risk to biodiversity:

- Habitat transformation;
- Noise, vibration and light;
- Dust generation and deposition;
- Fire risks;

- Poaching;
- Faunal injury or mortality on the construction site;
- Introduction of alien species;
- Wastewater discharge; and
- Waste.

Impacts

A range of impacts on biodiversity are likely including general disturbance, noise and traffic impacts and emissions to air and/or water. The key impacts though will emanate from the destruction of habitat as the pipeline is constructed. Such habitat may be recreated to some degree following the completion of the pipeline but never to the point of exactly replacing what was lost.

Receptor sensitivity

The bulk of the pipeline route is through agricultural land which is of **low** biodiversity sensitivity. There are, however, areas of important biodiversity, which even if they are not impacted directly by construction activities, they could be affected indirectly through disturbance created by the construction activities. These important biodiversity areas are considered to have high receptor sensitivity.

Impact magnitude

All areas that are only indirectly affected by the construction aspects will experience impacts of low magnitude. As previously detailed, the control measures for atmospheric emissions, noise, waste and wastewater together with the relatively small emissions quantities should ensure that the impact magnitude remains **low**. This excludes river crossings where impact magnitude is **moderate** but with the application of mitigation to minimize the transformation of the river crossings, could be reduced to **low**. In particular, the use of HDD for river crossings is strongly advocated.

Critical Habitats

Construction impacts to CH (pseudo-steppe) may impact 1.63 ha, which represents $\approx 0.006\%$ of the habitat's EAAA (25,225 ha). 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 loss will need to be replaced and there will need to be an overall net gain in habitat exceeding the 1.63 ha lost. The impact magnitude is **high** but can be reduced to **low** through the application of the principle of net gain.

Priority Biodiversity Features

Construction impacts on hill pastures and riparian belt (PBF) are expected to result in a loss of 18.5 ha, which represents $\approx 0.4\%$ of the habitat's EAAA.

Construction impacts on riparian willow belts (PBF) are expected to have impact of 1.65 ha, which represents $\approx 0.1\%$ of the habitat's EAAA.

Impact significance

Resultant impact significance is **minor** for the parts of the alignment that go through agricultural areas, **moderate** for river crossings but **major** for areas of CH and PBF. Mitigation will be required to reduce the major and moderate impact significance, with the former requiring offsetting and the latter requiring no transformation of the river system.

Management and mitigation

The following mitigation must be applied in respect of biodiversity:

- The pipeline alignment must be revisited to see whether it is not possible to avoid habitat destruction in the CH and PBF areas;

- The formal protection status of Emerald Sites directly affected by the pipeline footprint must be determined, the protection requirements ascertained and applied to the project, even if that means rerouting the pipeline;
- Set a maximum allowable length of open trench ahead of the pipelaying and backfilling and rehabilitation and strictly enforce that requirement. This will serve to minimise the risk of animals falling into the trench.
- If the pipeline cannot be re-aligned:
 - The CH loss must be offset in a manner that results in net gain of CH.
 - The Natural habitat loss must be offset in a manner that results in no net loss.
- All river crossings must be affected using HDD, but HDD will not be required for anthropogenic water structures such as irrigation canals;
- All mitigation previously defined for the control of dust, other atmospheric emissions, noise, wastewater and waste must be fully implemented;
- Poaching must be strictly outlawed amongst construction workers with punitive consequences;
- Vehicle speeds must be limited in the construction areas and strictly enforced;
- Open trenches must be barricaded to prevent animals falling into the trenches;
- Understand bird reproduction and ensure that construction activities do not impact on breeding/nesting seasons; and
- Any invasive plant species identified in the construction corridor must be removed immediately and care taken not to further propagate the seeds.

Residual impact

Residual impact would be **moderate-minor** if the specified mitigation is implemented.

6.8.2 Operations Phase

Operations phase impacts are unlikely to be significant and so have not been further assessed.

6.9 Impact on Landscape and Visual Amenity

6.9.1 Construction Phase

Activities

All construction activities

Aspects

Physical transformation of the landscape and potentially visible emissions of dust from the construction area.

Impacts

The construction of the pipeline will have several visual impacts that will affect the aesthetics of the landscape through which the pipeline will traverse. The major visual impact will be where the physical construction activities are occurring and this will be due to the presence of plant and machinery as well as the excavated areas and material stockpiles. At the same time there will be a progressive improvement in aesthetics as the construction moves along the alignment and the construction footprint is progressively rehabilitated. It will take some time before the vegetation fully recovers but the visual impact will be transient.

Receptor sensitivity

The receptor sensitivity is **medium** because the visual character of the landscape is aesthetically pleasing and that implies that there is amenity derived from the view.

Impact magnitude



The impact magnitude is **medium** because of the transient nature of the impact and because much of the activities would occur in agricultural areas where landscapes change on an ongoing basis.

Impact significance

The impact significance would be **moderate** as a function of the receptor sensitivity and the impact magnitude.

Management and mitigation

There is no real mitigation that would significantly reduce the visual impacts, other than the effect of other mitigation such as for controlling dust and the efficacy of the rehabilitation function.

Residual impact

The residual impact would be **low** because the rehabilitated areas would progressively return to their pre-construction condition.

6.9.2 Operations Phase

Although there would be visible infrastructure associated with the pipeline during the operations phases such as the block stations and the pipeline markers, the infrastructure is not considered to be visually significant.

6.10 Impacts on Local and National Economies

The Project is expected to enhance economic development of the affected settlements, municipalities, and the country as a whole due to increased demand for goods and services and increased tax revenues. The beneficial impacts are discussed below on top of such major socio-economic (and environmental) benefits that have driven the Project as enhancing energy security, providing industrial users and population with stable gas supply and greening economy by shifting energy production from coal to gas (see [Section 1.1](#) and [3.1](#)).

The AoI for procurement-related impacts covers three affected municipalities and the Vardar Statistical Region while increased tax revenues or employment opportunities may manifest at the level of three affected municipalities and the country as a whole.

6.10.1 Construction Phase

6.10.1.1 Impacts Related to Procurement of Goods and Services

Activities

During the construction phase the Construction Contractor will procure a range of raw materials, various products, equipment, and services to address the Project needs. Many construction goods and necessary equipment will need to be brought afar. However, many necessary products and materials are produced or sold in the affected municipalities or in the Vardar Statistical Region: e.g., construction materials (e.g., sand, cement), diesel fuel (for construction vehicles), food products (for construction workers), etc.

The indicative list of services to be purchased at the construction stage include:

- Transportation of construction materials and equipment;
- Transportation of construction workers;
- Accommodation of skilled construction staff at the existing rented apartments or hotels (a construction camp for the Project is not envisioned);
- Food and catering for Project staff;
- Security services for construction sites and warehouses of construction materials; and
- Removal of construction waste from the construction sites.

Aspects

The socio-economic aspect associated with the construction activities is contracting businesses including local MSMEs to provide necessary goods and services.

Impact

The above activities and aspects could result in **increased demand for some goods produced at the local level or sold at the local market** (e.g., food products, diesel fuel for heavy vehicles, construction materials) and **services provided by existing local businesses including MSMEs** e.g., transportation companies, security agencies, agricultural producers, local shops, catering companies, hotels/real estate agencies, waste collection companies. The assumed further knock-on effects include **increased incomes of local Project's suppliers and sub-contractors**, and then expanding these businesses and potentially opening new ones, and therefore creating new jobs at these businesses benefitting from the Project.

Receptor sensitivity

Receptors of such impact are local markets of specific goods and services including local businesses – potential Project's sub-contractors and suppliers. The sensitivity of these receptors must be viewed as **low** due to large numbers of actors at the markets of concern, and the fact that locally procured goods and services are not unique.

Impact magnitude

Impact magnitude is **medium** as it adds benefits, it is regional to national by extent and relatively short-term by duration, and the number of businesses required to support the Project is assumed to be relatively small.

Impact significance

Impact significance would be **minor** as a function of low sensitivity of the receptors and medium impact magnitude.

However, the magnitude of such beneficial impact could be further increased by applying an opposite enhancement measure, which is detailed below.

Management and mitigation

The following enhancement measure should be implemented to increase magnitude of the potential beneficial impact on local markets including businesses:

- Oblige the Construction Contractor to develop (during the design development) and implement (during the construction phase) **the Procurement Plan** in line with the national legislation and EBRD PR1; such Plans will aim at maximizing local procurement subject to service/product requirements.

Residual impact

With the correct application of the enhancement measure the impact magnitude could be increased to high implying **residual significance rating of this beneficial impact as moderate**.

6.10.1.2 Increased Tax Revenues

Activities

The Project requires permanent and temporary land acquisition (to be completed before the beginning of construction works). During the construction phase the Company will pay land tax for acquired land/property tax, and the Construction Contractor will hire construction workers and procure goods and services (see above).

Aspects

The socio-economic aspects associated with construction activities include the following:

- The Company will pay land and property tax/property tax and the Construction Contractor will pay salary-related social taxes for the employed construction workers; and

- The Project suppliers and sub-contractors supporting the construction works will pay their own taxes (e.g., value added tax (VAT), and/or sales tax, salary-related social taxes for their employees).

Impacts

The above activities and aspects could result in increased tax payments to budgets of affected municipalities and the national budget (compared to the baseline levels).

Receptor sensitivity

Receptors of such impact are budgets of the affected municipalities and the national budget. Assuming that the all taxes, including salary-related social payments related to the Project, comprise insignificant part of the municipal and national budgets, the sensitivity of these receptors is implied as **very low**.

Impact magnitude

Impact magnitude is **low** as it adds minor benefits although extending to the nation level.

Impact significance

Impact significance would be **negligible** as a function of very low sensitivity of the receptors and low impact magnitude.

No enhancement measures are envisioned.

Residual impact

Residual significance rating of this beneficial impact is negligible.

6.10.2 Operational Phase

6.10.2.1 Impacts Related to Procurement of Goods and Services

Activities

During the operational phase the Company will implement regular (and accidental) maintenance and monitoring works assumingly using its in-house staff¹⁴⁶, and will procure the following services:

- Supply of raw and construction materials for pipeline maintenance works;
- Accommodation of maintenance crews from Company's headquarters visiting the Project facilities.

Aspects

The socio-economic aspect associated with the operational activities is contracting businesses including local MSMEs to provide necessary goods and services for above mentioned activities.

Impacts

The above activities and aspects could result in **increased demand for some goods** sold at the local market (e.g., some construction materials, food products) and **services provided by existing local businesses including MSMEs** (e.g., security agencies, local shops, hotels, and catering companies) (compared to the baseline level).

Receptor sensitivity

Receptors of such impact are local markets of specific goods and services including local businesses – potential Project's sub-contractors and suppliers. The sensitivity of these receptors must be viewed

¹⁴⁶ At present, maintenance workers and engineers are not part of NER's staff. However, the Company will be fully equipped with necessary staff by the end of construction phase.

as **low** due to large numbers of actors at the markets of concern, and the fact that locally procured goods and services are not unique.

Impact magnitude

Impact magnitude is **low** as it adds less benefits comparing to the construction phase due to reduced number of Project sub-contractors and suppliers and resulting drop in anticipated benefits.

Impact significance

Impact significance is **minor** once the pipeline is operational as a function of low sensitivity of the receptors and low impact magnitude.

Management and mitigation

No specific enhancement measures are envisioned.

Residual impact

Residual significance rating of this beneficial impact is minor.

6.10.2.2 Increased Tax Revenues

Activities

During operational phase the Company will implement regular (and accidental) maintenance and monitoring works at the pipeline assumingly using its in-house staff and procure the following goods and services:

- Supply of raw and construction materials for pipeline maintenance works;
- Accommodation of maintenance crews from Company's headquarters visiting the Project facilities.

Aspects

The socio-economic aspects associated with operational activities include the following:

- The Company will pay property / land tax and salary-related social taxes for the employed operational staff; and
- The Project suppliers and sub-contractors contracted to support the operational works will pay their own taxes (e.g., value added tax (VAT), and/or sales tax, salary-related social taxes for their employees).

Receptor sensitivity

Receptors of such impact are budgets of the affected municipalities and the national budget. Assuming that the all taxes, including salary-related social payments related to the Project, comprise insignificant part of the municipal and national budgets, the sensitivity of these receptors is implied as **very low**.

Impact

The above activities and aspects could result in increased tax payments to budgets of affected municipalities and the national budget (compared to the baseline levels).

Impact magnitude

Impact magnitude is **negligible** as it adds much less benefits comparing to the construction phase due to reduced number of the Company's staff and Project sub-contractors and suppliers and resulting drop in benefits.

Impact significance

Impact significance would be **negligible** as a function of very low sensitivity of the receptors and negligible impact magnitude.

No enhancement measures are not envisioned.

Residual significance

Residual significance rating is implied as **negligible**.

6.11 Impact on Local Labour Market / Employment

The Project is expected to result in creation of the new jobs at the local labour market during the construction phase. During the operational phase no to few new employment opportunities are expected, whereas the construction-induced job contracts would be closed.

6.11.1 Construction Phase

Activities

During the construction phase the Company and Construction Contractor to employ managers, engineers and skilled, semi-skilled and non-skilled workers.

As per the tentative estimates of the manpower requirements (**Section 3.5.1.3**) 70-80 people will be necessary in total for the construction of the pipeline including 10-20 non-skilled and semi-skilled construction workers and 30-40 skilled workers (welders, surveyors, machinists, crane operators, etc).

Project sub-contractors and suppliers contracted to support the Project may also need to increase their staff to meet the increased demand for their services/products; in the service area new businesses may arise which would also require labour resources.

Aspects

The socio-economic aspects associated with construction activities includes creation of the new jobs including the following:

- **Direct employment opportunities at the local level:** the Construction Contractor will hire non-skilled and semi-skilled construction workers for i) pre-construction, construction and further reinstatement works within the construction corridor and ii) construction and, if necessary, rehabilitation of access roads to the construction sites. Workers from different profiles will be hired for a certain period of time and trained as necessary. It is assumed that:
 - All positions of semi-skilled and non-skilled workers and potentially part of positions of skilled workers will be staffed by residents of settlements along the pipeline route, and
 - Mostly male workers are expected to meet the Project needs during this phase.
- **Opportunities for indirect local employment:** the Project suppliers and sub-contractors supporting the construction works may potentially expand their businesses or open new businesses (compared to the baseline level) and may hire new staff; and both male and female employees of different categories can staff these potential new positions.

Impacts

The above activities and aspects could result in the increased number of vacancies at the aggregated local labour market for: i) non-skilled and semi-skilled, and potentially skilled workers and ii) for skilled, semi-skilled and non-skilled staff of Project's suppliers and sub-contractors (e.g., drivers, sales assistants, cleaning staff at hotels, cooks at the catering agencies, and security guards). The knock-on effect would be a slightly decreased number of the unemployed in the affected municipalities.

Receptor sensitivity

Receptors of such impacts are the unemployed residents, mostly men, of three Project affected municipalities. The municipalities belong to the Vardar Statistical Region, which has one of the lowest unemployment rates in the country (11.1% as of August 2020) (**Section 5.11.5**). The socio-economic survey of the settlements along the pipeline route showed that many residents of rural settlements

rely on two sources of livelihood: they are engaged in agricultural activities (gardening or livestock breeding at their private allotments to produce agricultural products for their own needs and/or for sale) and employed at non-agricultural activities (**Section 5.12**). Therefore, the lack of employment opportunities is not considered as a critical issue for the affected municipalities. Considering these facts and a regional character of the receptor¹⁴⁷, its sensitivity must be viewed as **medium** although in general the unemployed is a sensitive social group.

Impact magnitude

Impact magnitude is **negligible** as it is expected that in total less than 80 new jobs will be added to the aggregated labour market of three Project-affected municipalities, which would comprise only 1.2% of the total number of the registered unemployed in August 2020 (6,747 people). Besides some skilled jobs would be occupied by the specialist from other regions or countries.

Impact significance

During the construction phase the Project impact on employment is **beneficial**, its significance is **minor** as a function of medium sensitivity of the receptor and negligible impact magnitude.

The magnitude of such beneficial impact will be further increased by applying enhancement measures, which are detailed below.

Management and mitigation

- Develop (prior to construction) and implement a Recruitment Policy for the Project in line with the national legislation and EBRD PR1/PR2 and the Company's Human Resource Policy;
- Oblige the Construction Contractor to develop Construction Phase Recruitment Procedure, have it approved by the Company at least a month before the construction, and implement it. The Recruitment Procedure will inter alia:
 - Specify the qualifications and skill levels for the construction staff;
 - Prioritise the employment of people living in the three Project-affected municipalities and in particular of residents of settlements along the pipeline route, subject to their qualification;
 - Contain training provisions for the potential local workforce;
 - Require that construction workers would be provided with an employment reference/ confirmation letter and a skills/training log, to enhance their subsequent employment prospects;
 - Establish a female employment target at 15% for the construction workforce.

Residual significance

With the application of the enhancement measures the impact magnitude would still be the same (negligible) implying the **residual significance of this beneficial impact as minor**. However, they would allow the potential beneficial impact to have a wider coverage and be more transparent and gender-inclusive.

6.11.2 Operational Phase

Activities

¹⁴⁷ People potentially interested in Project-related employment opportunities (both direct and indirect ones) are residents of three affected municipalities, and the geographical scale if this group is greater than the local scale.

During the operational phase the Project will require to engage managers, engineers and skilled, semi-skilled and non-skilled workers to implement regular (and accidental) maintenance and monitoring works.

Estimates of manpower requirements for this phase of the Project are currently not available. The Company plans to use Company's existing operations and maintenance staff organised into maintenance crews, which would include engineers and skilled workers, based in the Company Headquarters. The maintenance crews would conduct regular and accidental visits to the Project facilities as needs be. In addition, few non-skilled workers need to be hired to support the maintenance crews on site, and potentially a community liaison officer. More workers would be required during the five-yearly inspections that would include excavation of the pipeline.

Project sub-contractors and suppliers contracted to support the Project during the construction phase will experience drop in demand for their goods and services compared to the construction phase and may consider reducing their staff; and owners of new businesses may consider closing some of them at the end of construction works. At the same time, the total number of jobs at these companies is expected to exceed the baseline indicator.

Aspects

The socio-economic aspects associated with operational activities includes the following:

- **Direct employment opportunities:**
 - The Company will use own operations and maintenance staff¹⁴⁸; it is not planned to hire new maintenance and monitoring staff during the operational phase of the Project; and
 - The Company may hire a limited number of non-skilled and semi-skilled workers (e.g., for excavation works) presumably using short-term labour contracts; pertinent positions are likely to be staffed with residents of settlements along the pipeline route; the offered positions will be mainly for male workers and will be very few.
- **Opportunities for indirect local employment:** no additional employment opportunities are expected; rather, the Project suppliers and sub-contractors may decide to reduce their staff (male and female) during operational phase.

Impacts

The above activities and aspects could result in no to small number of vacancies at the aggregated local labour market for: i) non-skilled and semi-skilled general-purpose workers and ii) for skilled, semi-skilled and non-skilled staff of Project's suppliers and sub-contractors. In addition, a very slight increase can be expected in the number of unemployed in the affected municipalities as the construction contracts will be closed.

Receptor sensitivity

Receptors of such impacts are the unemployed residents, mainly men, of three Project affected municipalities. As the lack of employment opportunities is not considered as a critical issue for the affected municipalities and regional character of the receptor (see above), its sensitivity must be viewed as **medium**, although in general the unemployed is a sensitive social group.

Impact magnitude

Impact magnitude is **negligible beneficial** as few new job opportunities compared to the pre-project conditions would be created and thus the well-being of only few families will enhance. At the same

¹⁴⁸ Such staff will become available after NER merges with GAMA JSC in late 2022 (GAMA JSC is a gas transmission company <https://www.gama.com.mk/Default.aspx?id=1f2c26c4-2c78-4476-8c09-62ff9a6edad3>)

time, short-term contracts for Project's construction workers and Project sub-contractors and supplies will be closed. Yet, every five years additional workforce may be required for pipeline inspections/excavations.

Impact significance

During the operational phase the Project impact on employment is **beneficial**, its significance is **minor** as a function of medium sensitivity of the receptor and negligible impact magnitude.

Management and mitigation

The following mitigation measures should be implemented to decrease the magnitude of the potential adverse impact and turn it into beneficial impact on the local employment:

- Implement the NER's Recruitment Policy for the Project;
- If the need for non-skilled and semi-skilled workers emerges at the operation stage, prioritise the employment of the residents of the three Project-affected municipalities and in particular of residents of settlements along the pipeline route, subject to their qualification;
- Provide workers with an employment reference/ confirmation letter and a skills/training log, to enhance their subsequent employment prospects; and
- Establish a female employment target at 50% for NER's direct employees.

Residual significance

With the application of the mitigation measures the impact magnitude would still be the same (negligible), and **residual significance rating of this beneficial impact is minor**.

6.12 Impacts on Land, Assets and Land-Based Livelihoods

The Project envisions acquisition of land plots owned by the State, companies, and individuals. The current assessment considers impacts related to acquisition of land owned by natural and legal persons; potential losses the State may face due to the Project are scoped out.

The Project is expected to have an adverse impact on land-based livelihoods both during the construction and operational phases.

6.12.1 Affected Land and Assets

The Project requires land acquisition to place the pipeline and other Project facilities. The land acquisition shall be completed before the start of the construction works; no land allocation (and acquisition) is expected to occur during construction and operational (apart for restrictions to be applied during the operations).

The land acquisition process includes a desk-top expropriation study for area potentially affected by the Project and preparation of the Geodetic Report, which provides a list of all affected land plots, registered assets (i.e., structures) and their owners/right-holders, as recorded in the real estate cadastre. This section summarises information on land to be permanently and temporarily acquired for the Project based on the data presented in the Geodetic Report for the Project¹⁴⁹ completed in 2021.

Table 42 below presents permanent and temporary land take estimates split by ownership. The Project requires acquiring 381 land plots (208,850 m²) permanently and 451 plots (413,670 m²)

¹⁴⁹ Geo-Kat Engineering Company for Geodetic Work, Design and Consulting. 2021. Geodetic Report for Geodetic Work for Special Purposes Elaborate for Permanent and Temporary Expropriation. Business Number: 0801-197/21.

temporarily. Of these, the state owns 236 plots (61.9%) needed permanently and 267 plots (59.2%) needed temporarily. Private land plots comprise 115 land plots (30.2%) to be acquired permanently and 152 plots (33.7%) to be acquired temporarily.

Table 42. Land to be Acquired: Split by Ownership

Ownership	Permanent Land Take Estimates				Temporary Land Take Estimates			
	No. of parcels	% of plots	Area, m ²	%, area	No. of parcels	% of plots	Area, m ²	%, area
Private owned	115	30.2	28,702	13.7	152	33.7	57,745	14.0
State owned	236	61.9	148,965	71.3	267	59.2	291,244	70.4
Co-owned state / private	12	3.1	21,748	10.4	10	2.2	42,584	10.3
Companies	17	4.5	9,312	4.5	21	4.7	21,847	5.3
Islamic Religious Community	1	0.3	123	0.1	1	0.2	250	0.1
TOTAL	381.0	100.0	208,850	100.0	451	100.0	413,670	100.0

Note: the permanent and temporary land take estimates are based on the data from the Geodetic Report for the construction Sveti Nikole-Veles Main Gas Pipeline (2021)

Table 43 presents the split of the affected land by land use categories. Overall, ca. 60% of land plots to be acquired permanently and temporarily are arable; pastures and vineyards occupies about 8% of the affected area.

With regards to **affected private land plots**, about 70% of them are classified as arable land, and vineyards occupy 23% and 22% of permanently and temporarily acquired land plots, respectively. The majority of affected land plots owned by companies are classified as arable land, and only two temporarily needed land plots are pastures. All affected land plots that are co-owned by the state and natural persons are classified as arable land.

Very few permanently required land plots are classified as built land for construction (six land plots). Out of these, only one land plot is privately owned; it is subject to permanent land acquisition, all temporarily needed built land for construction is state-owned.

The largest number of private land plots subject to permanent and temporary land acquisition belong to town of Veles (CM Veles) and village of Gorno Crnilishte (CM Crnilishte and CM Crnilishte outside the area for construction) (**Table 44** and **Table 45**).

The number of the private land plots does not equal to the number of affected owners: one owner can have several plots that are subject to acquisition, and one plot can be co-owned.

As per the interviews with key informants from Project affected settlements, a relatively small percentage of land owners are engaged only in agriculture. Most of them have income from agricultural and non-agricultural activities. It should be noted that part of the land plots in the vicinity of the pipeline route is currently abandoned and not cultivated.

Interviewees from the municipal authorities reported that no informal users use the Project affected land plots; the actual situation is supposed to be clarified by the forthcoming land and assets inventory.

The majority of affected land plots are not to be fully acquired because they partly fall within either the construction or operations and maintenance corridor. 95% of land plots permanently needed for the Project will lose less than 20% of their area; thus, the issue of orphan lands is not expected to be significant for the Project.

Table 43. Land to be Acquired: Split by Land Use Category

	No. of plots	No. of Land Plots by Land Use Category														
		Arable land	Pastures	Vineyards	Built Land for Construction	Rivers	Other natural infertile land	Roads and Railroads	Streams	Uncategorized	Stones	Orchards	Gardens	Ravine	Forests	Non-built Land for Construction
Permanent land take																
Private owned	115	79	7	27	1	1	-	-	-	-	-	-	-	-	-	-
State owned	236	131	24	3	5	6	9	29	4	3	1	1	1	1	18	-
Co-owned state / private	12	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Companies	17	8		-	-	1	-	9								
Islamic Religious Community	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Total No. of plots	381	229	31	30	6	8	9	38	4	3	1	1	1	1	18	1
%, No of plots	100.0	60.3	8.2	7.9	1.6	2.1	2.4	10.0	1.1	0.8	0.3	0.3	0.3	0.3	4.7	0.3
Temporary land take																
Private owned	152	107	7	33	-	1	-	-	-	-	-	-	-	-	-	-
State owned	267	147	29	5	1	9	8	31	4	2	-	1	1	1	23	5
Co-owned state / private	10	10	-	-	-		-	-	-	-	-	-	-	-	-	-
Companies	21	7	2	-	-	1	-	2	-	-	-	-	-	-	-	-
Total No. of plots	450	271	38	38	1	11	8	33	4	2	0	1	1	1	23	5
%, No of plots	100.0	60.2	8.4	8.4	0.2	2.4	1.8	7.3	0.9	0.4	0.0	0.2	0.2	0.2	5.1	1.1

Table 44. Privately Owned Land to be Permanently Acquired: Split by Land Use Categories

Project-affected CM	Total area, m2	Type of land, number of plots						
		Total	Arable land	Pasture	Vineyard	Ground under Building	River	Int. Vineyard
CM Adzimatovo	246	1	1	-	-	-	-	-
CM Crnilishte	4,563	23	19	1	2	1		
CM Erdzelija outside area for construction	4,191	11	8	-	3	-	-	-
CM Karatmanovo outside area for construction	440	1	1	-	-	-	-	-
CM Milino	2,195	12	12	-	-	-	-	-
CM Milino outside area for construction	2,600	10	9	-	-	-	1	-
CM Sveti Nikole outside area for construction	1,862	6	6	-	-	-	-	-
CM Veles	12,605	51	23	6	18	-		4
Total	28,702	115	79	7	23	1	1	4
Rates of temporary acquired land by types of land		100.0%	68.70%	6.09%	20.00%	1.27%	0.87%	3.48%

Table 45. Privately Owned Land to be Temporarily Acquired: Split by Land Use Categories

Project affected CM	Total area, m ²	Type of land, number of plots					
		Total	Arable land	Pasture	Vineyard	River	Int. Vineyard
CM Adzimatovo	930	2	2	-	-	-	-
CM Crnilishte outside area for construction	9,886	29	26	1	2	-	-
CM Erdzelija outside area for construction	5,525	19	14	-	5	-	-
CM Karatmanovo outside area for construction	941	1	1	-	-	-	-
CM Milino	4,934	15	14	-	-	-	1
CM Milino outside area for construction	6,240	16	15	-	-	1	-
CM Sveti Nikole outside area for construction	3,106	6	6	-	-	-	-
CM Veles	26,183	64	29	6	25	-	-
Total	57,745	152	107	7	32	1	1
Rates of temporary acquired land by types of land		100.0%	70.39%	4.61%	21.05%	0.66%	0.66%

6.12.2 Pre-Construction Phase: Impacts Related to Land Acquisition

The Aol for impacts on land, assets and land-based livelihoods covers land plots subject to permanent and temporary acquisition for the Project's needs.

Activities

The following activities will take place during the pre-construction phase which would result in potentially significant impacts on land, assets and land-based livelihoods:

- Selection of the route for the proposed pipeline and sites for its above-ground facilities;
- Conducting the desk-top expropriation study; and
- Completing land acquisition process to acquire property rights on all land plots necessary to accommodate the Project facilities.

Aspects

Socio-economic aspects associated with pre-construction activities include permanent and temporary acquisition of land plots owned by the State, companies and individuals. The focus on the current impact assessment is on land plots owned/used by natural and legal persons.

Impacts

The Project-related land acquisition is not expected to trigger physical displacement; no residential buildings are within the proposed pipeline route and 60m Restriction Zone 2 of the proposed pipeline where residential buildings should not be present.

The above activities and aspects will result only in **economic displacement impacts**, which are **adverse** impacts on owners and formal and informal users of the acquired land plots (the so-called 'Project affected persons' (PAPs)' per the EBRD PR5¹⁵⁰):

- Permanent / temporary loss of ownership rights on the acquired land plots;

¹⁵⁰ The analysis of land acquisition related impacts is provided in the Livelihood Restoration Framework for North Macedonia – Regional Gasification Project (Ecoline International Ltd. 2022).

- Permanent loss of perennial crops (vineyards), and ephemeral crops (cereals);
- Permanent loss of a non-residential, possibly business, structure within a private-owned land plot classified as built land for construction;
- Fragmentation of agricultural land plots and reduction of their reduced market value or size that can make their cultivation economically not viable (land 'orphaning');
- Permanent loss of non-residential structures (fences, barns, sheds, etc.) within the affected land plots; and
- Impacts on livelihoods resulting from the above losses.

Receptor sensitivity

The receptors are owners and formal and informal users of these land plots including individuals and businesses.

The receptors' sensitivity is viewed as **low** as most local residents are engaged in both agriculture and employed at some non-agricultural business. Thus, they are less susceptible to the loss of land (especially given that the scale of permanent land take is not significant).

Impact magnitude

Magnitude of the impacts identified above is graded in **Table 46**.

Table 46 Impacts/risks to PAPs: Magnitude Grades

Impact	Permanent Land Acquisition	Temporary Land Acquisition
Loss of ownership rights on the acquired land plots	About 38% of the total number of land plots subject to permanent land acquisition are owned / co-owned by natural and legal persons; this is a relatively significant share of the acquired land plots, and impact magnitude is graded as medium .	About 41% of the total number of land plots subject to permanent land acquisition are owned / co-owned by natural and legal persons. This is a relatively significant share of the acquired land plots, and impact magnitude is graded as medium .
Permanent loss of perennial crops (vineyards)	7% of the total number of land plots subject to permanent land acquisition are private vineyards; the lost crops are difficult to replace, and it is assumed that the wellbeing of the PAP can be affected to feelable extent, thus impact magnitude is graded as medium .	7.3% of the total number of land plots subject to temporary land acquisition are private vineyards; the lost crops are difficult to replace, and it is assumed that the wellbeing of the PAP can be affected to feelable extent; thus, impact magnitude is graded as medium .
Permanent loss of ephemeral crops, (cereals)	17% of the total number of land plots subject to permanent land acquisition are private arable land; the crop loss is irreversible; a part of arable land plots in the vicinity of the pipeline route is not cultivated and therefore, such impact would be neutral for their owners, lost crops are relatively easy to replace, and impact magnitude is graded as low .	28% of the total number of land plots subject to temporary land acquisition are private arable land; the crop loss is irreversible, a part of arable land plots in the vicinity of the pipeline route is not cultivated and therefore, such impact would be neutral for their owners, lost crops are relatively easy to replace and impact magnitude is graded as low .
Permanent loss of a non-residential, possibly business, structures within a private-owned land plot classified as built land for construction	Only 1 land plot out of 381 land plots subject to permanent land acquisition; in the absence of information about this facility and the extent to which the wellbeing of its owner/use depend on it, it is assumed that the livelihood would be affected to some extent, thus impact magnitude is graded as low .	N/a
Fragmentation of agricultural land plots ('orphaning' land)	As 95% of land plots subject to land acquisition will lose up to 20% of their area; the PAPs wellbeing is not expected to be affected significantly, thus, the impact magnitude is graded as low .	N/a
Permanent loss of non-residential structures (fences, barns, sheds, etc.) within the affected land plots	7% of the total number of land plots subject to permanent land acquisition are private vineyards where such structures are expected to be present; the structures could be relatively easily restored at another locations, impact magnitude is graded as low .	7.3% of the total number of land plots subject to temporary land acquisition are private vineyards where such structures are expected to be present; the structures could be relatively easily restored at another locations or at the same locations after the land is handed back, impact magnitude is graded as low .
Impacts on	The impact magnitude is graded as medium	The impact magnitude is graded as medium as

Impact	Permanent Land Acquisition	Temporary Land Acquisition
livelihoods resulting from the above losses	as losses related to land acquisition would result in partial loss of their means of livelihood.	losses related to land acquisition would result in partial loss of their means of livelihood.

Impact significance

Significance of impacts identified as defined as a function of the receptor sensitivity and the impact magnitude. Significance of impacts is graded in **Table 47**.

Table 47. Impacts/risks to Project-affected Land Owners and Formal and Informal Land Users: Significance Grades

Impact	Permanent Land Acquisition	Temporary Land Acquisition
Loss of ownership rights on the acquired land plots	Minor	Minor
Permanent loss of perennial crops (vineyards)	Minor	Minor
Permanent loss of ephemeral crops (cereals)	Minor	N/a
Permanent loss of a non-residential, possibly business, structure within a private-owned land plot classified as built land for construction	Minor	N/a
Fragmentation of agricultural land plots ('orphaning')	Minor	N/a
Permanent loss of non-residential structures (fences, barns, sheds, etc.) within the affected land plots	Minor	Minor
Impacts on livelihoods resulting from the above losses	Minor	Minor

Management and mitigation

Losses incurred by PAPs will be carefully identified, valued, and compensated per the national legislation and EBRD PR5 requirements. The compensation and livelihood restoration principles and requirements are explained in the "Livelihood Restoration Framework (LRF) for North Macedonia – Regional Gasification Project" (2022) covering three proposed pipelines including the Sveti-Nikole Veles section. The following mitigation must be implemented to reduce the potential impacts:

- Prepare a Livelihood Restoration Plan (LRP) for the Sveti Nikole – Veles Section based on principles and requirements stipulated in the LRF for North Macedonia – Regional Gasification Project, agree the LRP with the EBRD, and implement it; and
- Implement the SEP.

Residual significance

As all compensations will be paid to PAPs prior to the beginning of the construction works and livelihood restoration and vulnerability support will start being provided and will continue into the construction stage, negligible or no adverse residual negative impact is expected.

6.12.3 Construction Phase: Impacts Related to Construction Works

As per the EBRD PR5, land needs should be secured and losses of PAPs shall be identified, valued and compensated *before* construction works commence on this land. No additional land acquisition *during* the construction phase is envisioned. At the same time, some agricultural land plots outside the area of permanent and temporary land acquisition may be affected by the Project if access to which become disrupted as a result of construction activities.

Activity

The following activities will take place during the construction phase which may result in restricted access to land and/or assets:

- The trenching and other works within the construction corridor;
- Crossing local (unpaved) roads by the pipeline.

Aspects:

Socio-economic aspects associated with the above construction activities include:

- Disrupted access to agricultural lands accessible by a local road affected by pipeline' road crossing works.

Impacts

The above activities and aspects could result in the following **adverse** impacts / risks:

- Changes to the cultivation pattern of agricultural land (treatment with fertilisers, pesticides, irrigation, etc.): land users may have difficulties with access to their plots at the time they need this and as a result may produce less agricultural production for own consumption or for sale.

Receptor sensitivity

The receptors are owners and formal and informal users of land plots access to which becomes become disrupted as a result of construction activities. The PAPs may include individuals and businesses.

The sensitivity of the receptors is viewed as **low** as the local road network is developed and it is relatively easy to find by-pass roads to the needed land plot.

Impact magnitude

The magnitude of the impact on the affected land users' livelihood is viewed as **low** because active works within a specific section of the construction corridor that may affect access to agricultural land will not last long. The number of affected land users is assumed to be small.

Impact significance

Impact significance would be **minor** as a function of the low receptor sensitivity and low impact magnitude. At the same time, the impact magnitude could be further reduced through apposite mitigation which is detailed below.

Management and mitigation

- Make announcements on the start and end dates of trenching and road crossing works within a certain pipeline section two weeks before the planned start of the works; such announcements are part of the Stakeholder Engagement Programme within the SEP for North Macedonia – Regional Gasification Project (2022).

Residual significance

With the application of the mitigation the impact magnitude could be reduced to **negligible** implying **residual significance rating of this adverse impact to be negligible**.

6.12.4 Operational Phase: Impacts Related to Pipeline Operations and Maintenance

No additional land acquisition during the operational phase is envisioned, however operational safety restrictions will apply that may lead to economic displacement impacts.

The AoI includes agricultural land plots within restriction zones of the pipeline.

Activities

- Commissioning and operation of the pipeline.

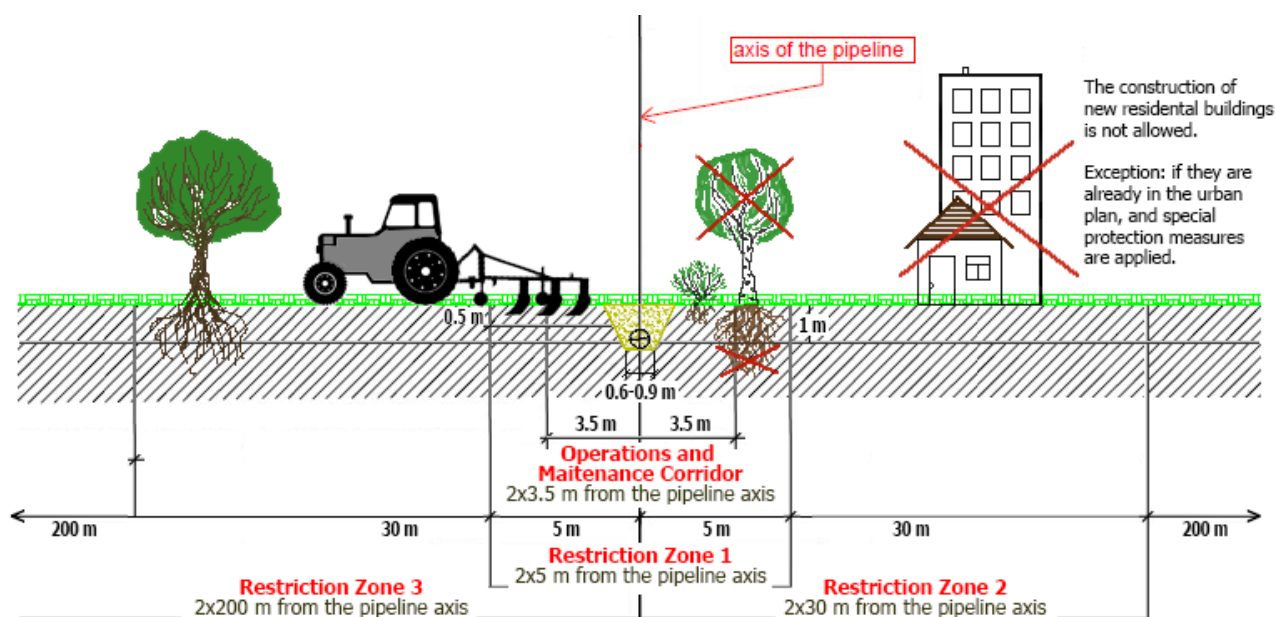
Aspects

Socio-economic aspects associated with operational activities include:

- Establishing Restriction Zones 1, 2 and 3 along the pipeline with special land use regimes (see [Section 3.6.2](#) for details and [Figure 36](#)):
 - **Restriction Zone 1** is 5 m on both sides of the proposed pipeline axis. Within this zone it will be forbidden to grow plants with roots reaching a depth of more than 1m (largely, trees) and to practice ploughing deeper than 0.5 m. Therefore, no deep irrigation channels, drains and ponds are allowed within this zone. Other agricultural activities are allowed, for instance, the PAPs can continue grazing

cattle on this land. The 7 m land strip permanently acquired prior to construction falls within this Zone 1.

- **Restriction Zone 2** is 30m on both sides of the pipeline axis, and within this zone no residential buildings will be allowed with some exceptions (**Section 3.6.2**).
- **Restriction Zone 3** is 200 m on both sides of the pipeline axis; for this zone population density limits apply. The routing of all pipelines took into account the population density data and spatial development plans. The Zone 3 restrictions will be regulated via the state spatial planning documents.



Source: Ecoline International Ltd.

Figure 36. Operations and Maintenance Corridor and Restriction Zones 1 and 2 for the Gas Pipeline

Impacts

The above activities and aspects could result in the following **adverse** impacts on land, assets, and land-based livelihoods:

- Reduction in the market value of privately owned agricultural land within Restriction Zone 1 (1.5m strips along the operations and maintenance corridor) and land for construction within Restriction Zone 2.
- Loss of potential income from cultivation of agricultural land within Restriction Zone 1 (for individuals and businesses).
- A major part of Restriction Zone 1 is the 7m operations and maintenance corridor along the pipeline axis owned by the Company while 1.5 m strips along the corridor are supposed to be returned to previous owners after the completion of construction works and reinstatement the damaged land. The users of agricultural land within these stripes will be restricted in choice of crops and cultivation methods (see above). They may have to choose less profitable crops instead of more profitable ones (e.g., grow forage cultures instead vineyards) and, therefore, may experience loss of potential land-based livelihood (for affected individuals) or income (for affected businesses).
- Loss of potential income from development of land for construction within Restriction Zone 2 (for individuals and businesses).
- With the land use restrictions of Restriction Zone 2, using land plots designated for construction for new residential development will become illegal, and owners of such land plots will experience loss of income.

Receptor sensitivity

- Sensitivity of owners and users of agricultural land within Restriction Zone 1 is viewed as **low** as most local residents are engaged in both agriculture and non-agricultural business; they are less susceptible to the loss of land-based income (especially given that the scale of this permanent restriction is not significant).
- Sensitivity of owners of land for construction within Restriction Zone 2 is viewed as **medium** due to limited potential for substitution of the affected resource (a certain plot cannot be used for construction, so it will need to be sold to purchase another plot for consultation outside the restriction zone).

Impact magnitude

Magnitude of impacts identified above is graded in **Table 48**.

Table 48. Impacts/risks to Project-affected Land Owners and Formal and Informal Land Users: Magnitude Grades

Impact	Affected land owners and users (individuals)	Affected land owners and users (businesses)
Reduction in the market value of agricultural land within Restriction Zone 1	The actual cost of land is supposed to be a minor source of income, and impact magnitude is graded as low .	
Reduction in the market value of privately owned land for construction within Restriction Zone 2	The actual cost of land is supposed to be a minor source of income, and impact magnitude is graded as low .	
Loss of potential income from cultivation of agricultural land within Restriction Zone 1	During the pre-construction phase PAPs would receive compensation payments temporary acquisition of land. These plots would be cleared as part of the 22 m construction corridor, then reinstated and returned to previous owners. During the operational phase PAPs will be able to practice agricultural activities within Restriction Zone 1 but due to legally set restrictions may gain less income than possible. Given a very small width of the impacted area (1.5m on both sides of the operations and maintenance corridor), small parts of land plots will be affected by land use restrictions. As a result, impact magnitude is graded as low .	
Loss of potential income from development of land for construction within Restriction Zone 2	During the operational phase PAPs will not be able to use such land plots for new housing development as this becomes illegal. Therefore, owners will not lose their assets, but quality of these assets will be partially damaged, and impact magnitude is graded as medium .	

Impact significance

Significance of impacts is graded in **Table 49**.

Table 49. Impacts/risks to Project-affected Land Owners and Formal and Informal Land Users: Significance Grades

Impact	Affected land owners (individuals)	Affected land users (individuals)	Affected land owners (businesses)	Affected land users (businesses)
Reduction in the market value of agricultural land within Restriction Zone 1	Minor	n/a	Minor	n/a
Reduction in the market value of privately owned land for construction within Restriction Zone 2	Moderate	n/a	Moderate	n/a
Loss of potential income from cultivation of agricultural land within Restriction Zone 1	Minor	Minor	Minor	Minor
Loss of potential income from development of land for construction within Restriction Zone 2	Moderate	n/a	Moderate	n/a

Losses incurred by PAPs will be carefully identified, valued, and compensated per the national legislation and EBRD PR5 requirements. The compensation and livelihood restoration principles and requirements are explained in the "Livelihood Restoration Framework (LRF) for North Macedonia –

Regional Gasification Project” (2022) covering three proposed pipelines including the Sveti-Nikole Veles Section. The following mitigation must be implemented to reduce the potential impacts:

- Address the operations-related economic displacement impacts in the Livelihood Restoration Plan (LRP) for the Sveti Nikole – Veles Section to be prepared prior to the construction stage.

Residual significance

No adverse residual impact is expected provided the mitigation measures are implemented.

6.13 Impact on Livelihoods Related to Natural Resources and Ecosystem Services

The proposed pipeline route’s vicinity is mainly an agricultural landscape with small parcels of natural and slightly disturbed vegetation including forests¹⁵¹. The Project may bring about some impacts on resources and livelihoods related to such natural and semi-natural areas.

Only about 5% of the land plots to be permanently and temporarily acquired for the Project is classified as forest lands; they are closer to the beginning of the pipeline and are within territories of Erdzelija, Sveti Nikole, and Gorno Crnilishte settlements, Sveti Nikole Municipality.

Local livelihoods mainly rely on both agricultural activities, including subsistence agriculture, and employment at the non-agricultural businesses. According to interviews with key informants, gathering of wood and non-timber forest products (mushrooms, berries, nuts, etc.) is not popular in this area. Few people practice picking forest products for their own needs, and for them this is rather a recreational activity than a source of livelihood. Hunting is also considered as a seasonal hobby and recreational activity (see [Section 6.17](#) for details).

Rivers crossed by the pipeline (the Svetinikolska and Sariderska Rivers with the latter one drying during some periods of the year) were not mentioned as water courses important in term of fishing by the local interviewees.

For that reason, the impact on local livelihoods related to natural resources and ecosystem services is not further assessed and is simply concluded to be **adverse and negligible at the construction phase; no impact is expected at the operational phase**.

6.14 Impact on Public Utilities, Services and Infrastructure

The Project is expected to result in increased pressure on local infrastructure and related adverse impacts during both construction and operational phases.

6.14.1 Construction Phase

Activities

The following activities will take place during the construction phase which would result in potential impacts on various types of the existing public infrastructure:

- Site preparatory works, clearing and grubbing, and removal of topsoil;
- Trenching and vehicle and machinery movement and use of access roads to/from the construction sites; and
- Accommodation of construction workers in the hostels/hotels of the settlements (presumably, towns of Sveti Nikole and Veles).

¹⁵¹ Forest land comprise small parts of the total municipality areas: 1.5% for Sveti Nikole, 1.3% for Lozovo, and 0.9% for Veles municipalities.

Aspects

Aspects associated with the above construction activities include:

- Surface transformation through clearing and grubbing of all vegetation;
- Disruption of existing soil profiles because of excavations and subsequent backfilling; and
- Use of power, water and irrigation, waste, medical, road, railway, telecommunication and other public infrastructure.

Impacts

The proposed pipeline will cross around 100 public infrastructure facilities as listed in [Section 3.5.1.6](#). Therefore, the above aspects and activities may cause the following impacts and risks to the public infrastructure.

- Risk of an increased pressure on medical facilities in Sveti Nikole, Erdzelija, Lozovo, and/or Veles;
- Impact on the existing infrastructure and its users, including the facilities that will be a) used by the Project, and b) crossed by the proposed pipeline:
 - power supply facilities;
 - waste infrastructure;
 - water supply and irrigation system;
 - road and railway infrastructure; and
 - various underground telecommunication, power, and other cables.

Receptor sensitivity

Table 50 Sensitivity of Public Infrastructure Receptors

Infrastructure Receptors	Sensitivity
Medical facilities	Medical facilities in the Project-affected municipalities are quite well developed and equipped and possess sufficient accommodating capacity (see Section 5.11.8). Their sensitivity would be very low. However, given that new outburst of COVID-19 can be expected, their sensitivity may increase. For the purpose of this assessment, it can be graded as low .
Road network	The local road network is sufficiently developed, however many other are earth roads that may not be suitable for heavy vehicles. Thus, the sensitivity is rated as medium .
Power, water, transport, telecommunication and other facilities to be crossed by the pipeline	These facilities are expected to be maintained by their operators in the proper operational state and have own safety protocols. Their sensitivity is seen as low .
Power, water, waste and other facilities that will be used by the Project (except roads); also, users of these facilities	These facilities are expected to be maintained by their operators in the proper operational state and have own connection, use and safety protocols. Their sensitivity is seen as low .

Impact magnitude

Table 51 Magnitude of Impacts/risks to Public Infrastructure Receptors

Infrastructure Receptors	Magnitude
Medical facilities	The construction staff may experience a need to address the local medical centres in case the first aid kits that are to be available at construction site are not sufficient or in case of medical emergencies. As the estimated number of the construction workers is relatively low, a risk of the increased load on the medical facilities can be seen as low . In case of medical emergency, given the proximity of the sites to larger towns, no intervention with the health care / treatment activities of the local residents.
Road network	The Project will intend to use the existing road connections to access the construction sites and minimum additional access roads will be arranged. Where required, existing and new roads used by the Project will be made suitable for

Infrastructure Receptors	Magnitude
	heavy construction machinery and trucks. The use of the roads will be short-term. The number of roads to be built or rehabilitated is not known at this stage. It is not yet confirmed if a portion of the construction materials can be transported to the sites by railway. The magnitude will be medium taking a precautionous approach.
Power, water, transport, telecommunication and other facilities to be crossed by the pipeline	The crossings are envisioned to be completed using the HDD as much as possible or other suitable solutions, thus the extent of the impact is very limited and short-term, and no interruption of services to users is expected. The magnitude of the impacts is assessed as negligible .
Power, water, waste and other facilities that will be used by the Project (except roads); also, users of these facilities	The extent of the impact is very limited and it is short-term. No water from the centralised systems is expected to be used for the Project. For hydrotesting water from nearby rivers will be extracted, however this will not affect river users. Power supply to the sites will not interfere with the local power usage. The Project commits to applying the waste management hierarchy (from prevention of waste generation to safe disposal) and the suitable landfills would be able to accept the remaining waste. Overall, the magnitude is seen as negligible .

Impact significance

Table 52 Significance of impacts/risks to public infrastructure receptors

Infrastructure receptors	Significance
Medical facilities	Minor
Road network	Moderate
Power, water, transport, telecommunication and other facilities to be crossed by the pipeline	Negligible
Power, water, waste and other facilities that will be used by the Project (except roads); also, users of these facilities	Negligible

Management and mitigation

- Oblige the Construction Contractor to:
 - include the medical emergency to the Emergency Preparedness and Response Plan; and
 - provide notice in advance to local hospitals about the number of workforce and duration of work.
- Oblige the Construction Contractor to develop and implement the Waste Management Plan;
- Carry out a Road Safety Audit (RSA) to assess the physical condition of roads and bridge crossings and their safety, including the assessment of the risk of traffic accidents and road pavement/bridge collapse;
- Oblige the Construction Contractor to develop and implement the optimal Construction Traffic Scheme using RSA findings and Construction Traffic Management Plan. As part of its preparation:
 - Assess the conditions of the existing unpaved tracks to determine if their reinforcement is needed to bear the weight of the Project's heavy vehicles, and undertake this enhancement as needed.
 - Where unpaved roads will be used, undertake a pre-construction survey of the public and private buildings within 10m from these roads to document their conditions.
 - Consult and document the consultations with the representatives of the affected municipalities and settlements about which road they would prefer the construction traffic to use.
 - Coordinate any track/road reinforcement or rehabilitation activities with the due municipal and roads authorities, local users, and other stakeholders as needed.
 - Ensure alternative access roads for the users or, if not, possible, confine the road blockage to a minimum duration.

- As per the ESMP and SEP, provide information to the local residents about the start of construction traffic movement at least two weeks before the construction commences.
- Following construction, rehabilitate the used public roads, if affected, to the pre-project or better condition.

Residual impact

No adverse residual impact is expected provided the mitigation measures are implemented.

6.14.2 Operational Phase

Activities

- Repair and maintenance activities.

Aspects

- Generation of noise and dust from vehicle movement and construction works; and
- Work of repair or maintenance personnel at the needed points of the pipeline.

Impacts

As the pipeline is planned to be located outside the settlements, and largely far from them, it is not expected that the above activities and aspects would cause any pressure above negligible on the public infrastructure.

6.15 Impact on Community Health, Safety and Security

The Project is expected to bring about a set of health, safety and security risks for local communities, i.e., potential adverse impacts, associated with both construction and operational phases.

The Project affected communities are settlements in the municipalities of Sveti Nikole, Lozovo and Veles municipalities, which are i) located along the proposed pipeline route, ii) crossed by the existing roads to be used by construction vehicles, and iii) used for accommodation of construction workers.

6.15.1 Construction Phase

The Aol for **risks to / impacts on the community health** includes:

- 250m strips along both sides of the pipeline construction corridor; this 500m corridor is considered as **an indicative aggregated Aol related to pollutant emissions and noise from on-site construction works**¹⁵²;

¹⁵² 1. According to IAQM Guidelines for the Assessment of Dust from Demolition and Construction (2016), at distances above 250 m from fugitive dust emission sources, negative impacts associated with such emissions are rare, at distances over 400 m - such impacts are negligible; the area of significant dust-related impacts does not exceed 100 m for the sites being sources of fugitive dust emissions. https://iaqm.co.uk/text/guidance/mineralsguidance_2016.pdf.

2. Noise attenuation depends on many factors including type of surface cover, landscape, ambient air humidity, etc. According to the generalized data of measurements of noise levels from construction work, the use of noise reduction factors for construction equipment in areas with soft surface cover shows that at a distance of about 240 m from the piling equipment (the noisiest equipment), the calculated noise level should be 55-60 dBA (see the Data on noise reduction factors in the Commission's Construction Noise Assessment Manual on US Nuclear Regulation (US NRC. 2012. Construction Noise Impact Assessment // Biological Assessment Preparation. Advanced Training Manual. <https://www.nrc.gov/docs/ML1225/ML12250A723.pdf>).

3. Vibration from the movement of construction and transport machinery is supposed to manifest within the construction site and its immediate vicinity.

Therefore, for the purpose of this assessment it is assumed that the aggregated indicative area of significant impacts associated with pollutant emissions and noise does not exceed 250 m from the construction site.

- 15m strips along both sides of the existing roads to be used by Project's construction vehicles (access roads to the construction corridor)¹⁵³; this 30m corridor is considered as an indicative aggregated Aol for impacts from noise, vibration and artificial lightning from Project's construction vehicles travelling along the access roads; and
- local settlements where construction workers will be accommodated (assumingly the towns of Sveti Nikole and/or Veles).

Note: the proposed new roads connecting the pipeline construction corridor with the existing road network is assumed to be short and lie within the 500m indicative Aol, which would cover both road routes and their impact corridors.

The Aol for risks **to / impacts on the community safety** includes settlements crossed by access roads to the construction corridor.

Risks to / impacts on the community security may manifest within the local settlements where construction workers will be accommodated (assumingly the towns of Sveti Nikole and/or Veles).

Activities

The following activities will take place during the construction phase which would result in potential community health, safety and security impacts:

Within the pipeline construction corridor and construction sites for Project roads

- Use of vehicles and construction machinery with internal combustion engines within the construction corridor;
- Vehicle movements;
- Welding;
- Site preparatory works including vegetation stripping, grading, topsoil excavation and stockpiling;
- Trench excavations;
- Transport of soil and backfill material;
- Backfilling trenches and reinstatement of vegetation layer;
- Blasting (if required);
- Rock drilling;
- Movement of heavy vehicle along the access roads to/from the construction sites; and
- Accommodation of construction workers in the hostels/hotels of the settlements (presumably, towns of Sveti Nikole and Veles).

Aspects

Aspects associated with the above construction activities which would result in socio-economic impacts include:

¹⁵³ The approximate width of the vibration impact zone on the buildings from roads varies from 15 to 25 m from the roadbed (Kavetsky Y., Kovalska-Kochvara A., Stipulya K. 2011. Analysis of vibration comfort criteria for people in assessing the condition and design of buildings // World Academy of Natural Sciences, Engineering and Technology. T. 59, p. 1496-1502. <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.294.8999&rep=rep1&type=pdf>). The estimated noise level for vicinity of roads with traffic density of 125 vehicles per hour (about 2 vehicles per minute) and a speed limit of 70 km/h is 59-60 dBA at a distance of 15m from the road. It is assumed that during the Project construction phase traffic density at the roads used for Project needs would be lower, and noise level at a distance of 15 m from the road will be within the noise level guideline for residential areas in daytime (55 dBA). Traffic emissions are supposed to be small in volume, and intermittent by nature; therefore, potential emission-related health effects would be within the 15m to either side of the road.

- Tailpipe emissions (carbon dioxide, carbon monoxide, nitrogen oxides and aromatic hydrocarbons) from machinery and vehicles;
- Welding fumes;
- Solvent fumes;
- Noise and vibration from the movement and operation of construction machinery and vehicles within the pipeline construction corridor including construction sites for Project roads;
- Noise, vibration and artificial lightning from Project's construction vehicles travelling along the access roads to the construction corridor;
- Increased road traffic accident (RTA) hazard at the access roads to the construction corridor due to intensive traffic of heavy vehicles; and
- Influx of construction workers, presumably to Sveti Nikole and Veles Towns.

Impacts

These aspects would bring about the following **community health and safety impacts / risks**:

- Physical discomfort related to noise and emissions from the construction sites and Project's construction vehicles travelling along the roads to the construction corridor;
- Psychological discomfort related to vibration and artificial lighting from Project's construction vehicles travelling along the roads to the construction corridor;
- Risk of falling to on-site trenches, especially for children;
- Increased frequency of road traffic accidents (RTA) with the Company or the Construction Contractor 's vehicles on the roads to the Project sites:
 - RTAs involving pedestrians-residents of the affected settlements; most sensitive receptors are children, especially school-age children (due to high mobility and lack of self-control), as well as the elderly and people with disabilities (who may have insufficient mobility to react to approaching traffic).
 - RTAs involving drivers-residents of the affected settlements.
- Potential increase in incidence of communicable and sexually transmitted diseases.

The **security risks for local communities** associated with the construction works is limited to:

- Possible increase in gender-based violence and harassment incidents and social conflicts with the in-coming workers in communities hosting construction workers (assumingly, Sveti Nikole or Veles).

Receptor sensitivity

The receptors are residents of settlements along the proposed pipeline route living and working in the Aol defined above.

Table 53 provides sensitivity assessment for different groups of human receptors present in the Aol.

Table 53 Sensitivity of Human Receptors

Community Health Impact/Risk	Group of Human Receptors	Impact/Risk Sensitivity
Physical discomfort related to noise and emissions from the construction sites	Residents of residential areas closest to the pipeline construction corridor:	
	<ul style="list-style-type: none"> • Erdzelija, Sveti Nikole, Peshirovo, Gorno Crnilishte, Adzimatovo, Lozovo, Milino, Karatmanovo, Novo Selo, Chalossevo 	No impacts on residents of those outskirts of these settlements closest to the pipeline route as the distance between them exceeds 250m indicative Aol
	<ul style="list-style-type: none"> • Part of the town of Veles close to the end of the pipeline 	Two-three standalone buildings, assumingly residential houses southwest of Veles MMRS site (in 150-180 m) and in 130-160 m from the pipeline construction corridor; they fall into the

Community Health Impact/Risk	Group of Human Receptors	Impact/Risk Sensitivity
		250m indicative Aol. These receptors are potentially affected by direct impacts on human health, and their sensitivity is viewed as high .
Physical discomfort related to noise and emissions from Project's construction vehicles travelling along the access roads to the construction corridor	Members of local communities whose houses are along the access roads to the construction corridor.	These receptors are potentially affected by direct impacts on human health, and their sensitivity is viewed as high .
Psychological discomfort related to vibration and artificial lighting from the from Project's construction vehicles travelling along the roads to the construction corridor		
Increased incidents of RTAs with local residents-pedestrians	Residents of local settlements crossed by access roads to the construction corridor	
	<ul style="list-style-type: none"> Children of school-age, the aged, and people with disabilities 	Sensitivity of these groups of receptors is viewed as high .
	<ul style="list-style-type: none"> Other residents of the affected settlements 	Sensitivity of these groups of receptors is viewed as medium .
Increased incidents of RTAs with local residents-drivers	Residents of local settlements crossed by access roads to the construction corridor who drive their private cars	Sensitivity of these groups of receptors is viewed as high .
Increased incidence of communicable and sexually transmitted diseases in communities	Residents of towns of Veles or Sveti Nikole especially women	Sensitivity of these groups of receptors is viewed as high .
<i>Note: At the present design development stage, the construction traffic scheme has not been prepared, and affected settlements cannot be identified.</i>		

Impact magnitude

Magnitude of impacts identified above is graded in **Table 54**.

Table 54. Impacts/risks to Community Health, Safety and Security: Magnitude Grades

Community Health Impact / Risk	Group of Human Receptors	Impact/Risk Magnitude
Physical discomfort related to noise and emissions from the construction sites	Residents of residential areas closest to the pipeline construction corridor:	
	<ul style="list-style-type: none"> Erdzelija, Sveti Nikole, Peshirovo, Gorno Crnilishte, Adzimatovo, Lozovo, Milino, Karatmanovo, Novo Selo, Chaloshevo, 	No impacts on residents of those outskirts of these settlements closest to the pipeline route as the distance between them exceeds 250m indicative Aol.
	<ul style="list-style-type: none"> Part of the town of Veles close to the end of the pipeline 	Due to small number of potential receptors, relatively small volumes and intermittent nature of emissions and short exposure to noise, and relatively large distance to the impacts sources, which enables pollutant dispersion and noise attenuation, the impact magnitude is graded as low .
Physical discomfort related to noise and emissions from Project's construction vehicles travelling along the access roads to the construction corridor	Members of local communities whose houses are along the access roads to the construction corridor.	Due to relatively small volumes and intermittent nature of noise and emissions from construction vehicles, , the impact magnitude is graded as low .
Psychological discomfort related to vibration and artificial lighting from Project's construction vehicles travelling along the		Vibration and artificial lighting are considered as factors causing nuisance (not health effects). For this reason and due to intermittent nature of vibration and artificial lighting from construction vehicles, the impact magnitude is graded as

Community Health Impact / Risk	Group of Human Receptors	Impact/Risk Magnitude
roads to the construction corridor		negligible.
Increased incidents of RTAs with local residents-pedestrians	Residents of local settlements crossed by access roads to the construction corridor:	
	<ul style="list-style-type: none"> Children of school-age, the elderly and people with disabilities 	Due to potential heavy health consequences for the receptors and relatively high probability of RTAs involving this group of receptors, the impacts magnitude is graded as high .
	<ul style="list-style-type: none"> Other residents of the affected settlements 	Due to potential heavy health consequences for the receptors and relatively low probability of RTAs involving this group of receptors, the impacts magnitude is graded as medium .
Increased incidents of RTAs with local residents-drivers	Residents of local settlements crossed by access roads to the construction corridor who drive their private cars	Due to potential heavy health consequences for the receptors and medium probability of RTAs involving this group of receptors, the impact magnitude is graded as medium .
Increased incidence of communicable and sexually transmitted diseases in communities	Residents of towns of Veles or Sveti Nikole especially women	Due to low number of construction workers to be present on site at once (30-40 people), the potential number of relationships between the local people and migrant workers is estimated as low, and impact magnitude is also graded as low .
<i>Note: At the present design development stage, the construction traffic scheme has not been prepared, and affected settlements cannot be identified.</i>		

Impact significance

Significance grades of impacts determined as a function of the receptor sensitivity and the impact magnitude are presented in **Table 55**.

Table 55. Impacts/risks to Community Health, Safety, and Security: Significance Grades

Community Health Impact / Risk	Group of Human Receptors	Impact/Risk Magnitude
Physical discomfort related to noise and emissions from the construction sites	Residents of residential areas closest to the pipeline construction corridor:	
	<ul style="list-style-type: none"> Erdzelija, Sveti Nikole, Peshirovo, Gorno Crnilishte, Adzimatovo, Lozovo, Milino, Karatmanovo, Novo Selo, Chalossevo, 	No impacts on residents of those outskirts of these settlements closest to the pipeline route as the distance between them exceeds 250m indicative Aol.
	<ul style="list-style-type: none"> Part of the town of Veles close to the end of the pipeline 	Moderate
Physical discomfort related to noise and emissions from Project's construction vehicles travelling along the access roads to the construction corridor	Members of local communities whose houses are along the access roads to the construction corridor.	Moderate
Psychological discomfort related to vibration and artificial lighting from Project's construction vehicles travelling along the roads to the construction corridor		Moderate
Increased incidents of RTAs with local residents-pedestrians	Residents of local settlements crossed by access roads to the construction corridor:	
	<ul style="list-style-type: none"> Children of school-age, the elderly and people with disabilities 	Major
	<ul style="list-style-type: none"> Other residents of the affected settlements 	Moderate
Increased incidents of RTAs with local residents-drivers	Residents of local settlements crossed by access roads to the	Major

Community Health Impact / Risk	Group of Human Receptors	Impact/Risk Magnitude
	construction corridor who drive their private cars	
Increased incidence of communicable and sexually transmitted diseases in communities	Residents of towns of Veles or Sveti Nikole especially women	Moderate
<i>Note: At the present design development stage, the construction traffic scheme has not been prepared, and affected settlements cannot be identified.</i>		

Management and mitigation

The following mitigation must be implemented to reduce the potential magnitude of impacts on community health, safety and security:

- Implement the SEP;
- Oblige the Construction Contractor to develop and agree with the Company (during the pre-construction phase) and implement (during the operational phase) the Construction Atmospheric Emissions Management Plan and Construction Noise Management Plan to control emissions, noise and vibration from sources within a construction sites;
- Oblige the Construction Contractor to develop and agree with the Company (during the pre-construction phase) and implement (during the operational phase) a Construction Site Operating Procedure. The Procedure to include, *inter alia* a ban on night-time construction activities and vehicle traffic;
- Carry out road safety audit (RSA) which should inform development of an optimal Construction Traffic Scheme taking into account the location of sensitive receptors including residential areas and social facilities; provide bypass roads to avoid where possible, impacts on local residents (see details in [Section 6.14.1](#));
- Oblige the Construction Contractor to develop (during the pre-construction phase) and implement (during construction phase) a Construction Traffic Management Plan (see details in [Section 6.14.1](#)). The Plan should promote the selection and use of roads in a manner that minimises risks to community safety by giving preference to the roads bypassing human settlements. Where keeping the Project traffic away from human settlements is not possible, the safest route options should be identified that use wider roads and lie away from schools, preschool facilities, polyclinics and hospitals. The Plan should be agreed with the municipal and/or national safety services and local authorities;
- Implement an Emergency Response Plan for the construction phase; and
- Oblige the Construction Contractor to:
 - Maximize the use of the local workforce;
 - Establish or implement an existing worker Code of Conduct that sets clear expectations for worker interaction and behaviour with the local residents;
 - Conduct health awareness training for workers including sexually transmitted diseases and HIV/AIDS at induction and then periodically throughout their employment; and
 - Monitor the implementation of workers' health specification, including among contractors.

Residual impact

With the correct application of the mitigation measures the impacts' magnitude could be reduced to negligible to minor implying an overall residual significance rating of **minor to moderate**.

6.15.2 Operational Phase

During the operational phase the Project's interaction interference with the local communities would be limited to accommodating the small Company's monitoring crews visiting the facility for routine (and if necessary, accidental) inspections.

As these impacts will be short-term and periodic, no increase in the incidence of communicable and sexually transmitted diseases among the hosting communities, increased traffic (and there for incidence of RTAs) is expected.

The noise, vibration and emission from above-ground facilities are expected to be small in volume and manifest only within these sites.

Overall, the overall impact on community health, safety and security during the operational stage is not further assessed and simply concluded to be **adverse and negligible**.

No specific mitigation measures are envisioned during operations to minimise Project's impacts on community health, safety and security, apart from that the SEP is to be implemented routinely, including timely notifications about repair / maintenance works, and the operations Emergency Response Plan should be in place. The residual impact will remain **negligible**.

6.16 Impact on Health and Safety of Employees

The Project operations are associated with occupational health and safety risks to on-site workers at both construction and operational phases.

6.16.1 Construction Phase

Activities

- All construction activities.

Aspects

The following hazards will exist during construction of the pipeline:

- Vehicle and machinery movements;
- Deep excavations;
- Working at heights;
- Dust and vehicle fume exposure;
- Noise;
- Severe weather (hot or cold);
- Dangerous animals;
- Exposure to arc welding;
- Suspended loads; and
- Live circuits.

Impacts

Injuries of different severity, fatalities; poisons and burns due to inhalation of dangerous fumes; spread of virus diseases, incl. COVID 19; occupational diseases.

Receptor sensitivity

Overall receptor sensitivity is expected to be **medium** to **high**. It is assumed that health of the workers will be assessed and only those fit to perform tasks will be assigned.

Impact magnitude

Impact magnitude is **medium** to **high** depending on the severity of accidents, as some of them could cause irreversible changes to workers' health.

Impact significance

Impact significance would be **major** as a function of the medium to high receptor sensitivity and same levels of impact magnitude. However, the impact magnitude could be reduced through application of mitigation measures detailed below.

Management and mitigation

Mitigation must be planned for each hazard based on the mitigation hierarchy where eliminating the hazard is the priority and the use of Personal Protective Equipment (PPE) should only be seen as a last resort. The Contractor must be obliged to comply with the local legislation the Law on Occupational Health and Safety (OG of RM No. 92/07, 136/11, 23/13, 25/13, 137/13, 164/13, 158/14, 15/15, 129/15, 192/15, 30/16, and OG of RM No. 18/20) and the EU Directives on occupational safety and health, as well as on the use of personal protection equipment 89/654/EEC, 89/656/EEC, 89/686/EEC and 2009/104/EC.

In addition, the following mitigation must be implemented during the construction of the pipeline to reduce the potential impact magnitude on health and safety of workers:

- Develop and implement a Construction Occupational Health and Safety Management Plan that includes *inter alia*:
 - Preparation of emergency response plans (see below sections) specifically applicable to construction and operations of the pipeline (especially those parts of the route that may be geographically isolated) and including the provision and maintenance of necessary emergency response and rescue equipment;
 - Sufficient number of first aid trained employees to respond to emergencies;
 - Implementation of specific personnel training on worksite health and safety management including a communication program with a clear message about corporate management's commitment to health and safety. The communication program should also include regular meetings such as daily "toolbox" talks prior to initiation of work shifts;
 - Integration of behavioural considerations into health and safety management, including on- the-job behavioural observation processes;
 - Illumination systems should be adequate and safe for the planned working conditions.
 - Signage in hazardous areas, installations, materials, safety measures, emergency exits, and other such areas should be in accordance with international standards
 - To the extent that alternative technologies, work plans or procedures cannot eliminate or sufficiently reduce a hazard or exposure, workers and visitors must be provided with the necessary personal protective equipment (PPE) and provide instruction and monitoring in their appropriate maintenance and use. Applicable PPE include, at a minimum, safety helmets and footwear, in addition to ear, eye, and hand protection.
 - Control operations by having a permit to work system for performance of high hazardous tasks;
 - Schedule periodic inspection and maintenance of working area and equipment;
 - Control availability of the first aid kits, fire extinguishers, PPEs throughout the construction area in sufficient numbers and properly maintained;
 - Require good housekeeping at all times across the construction area;
 - Prevent unauthorised access to construction areas;
 - Define maximum speed at the construction site, assign dedicated parking areas for employee vehicles; and
 - Prevent workers from entering the trench unless absolutely necessary and where it is necessary, ensure that the trench sides are shored appropriately to prevent trench collapse.
- Reduce occupational health risks by:

- Ensuring equipment is maintained to manufacturers' standards and that noise baffles are fitted;
- Reducing exposure times for people working near noisy machinery;
- Providing workers with appropriate hearing protection;
- Require pre-placement medical examinations of workers;
- Implement a drugs and alcohol policy; and
- Provide preventive treatment to site workers and families, e.g., immunisation; health monitoring.

The list of mitigation measures is not necessarily exhaustive and must be implemented in the spirit of continual improvement.

Residual impact

With the correct application of the mitigation measures the impact magnitude could be reduced to low implying an overall residual significance rating of **minor** to **moderate**.

6.16.2 Operational Phase

Activities

- Pipeline maintenance and inspections;
- Vehicle movement on the site; and
- Response to emergency situations.

If the repairs or maintenance of the pipeline involves excavation this would have the same characteristics and impacts as construction activities.

Aspects

- Corrosion, pipeline / equipment failure;
- Transport accidents; and
- Emergency accidents (gas leaks/release from a pipeline, third party interference).

The following hazards will exist during operations of the pipeline:

- Vehicle and machinery movements;
- Working at heights;
- Severe weather (hot or cold);
- Dangerous animals;
- Live circuits;
- Confined spaces;
- Asphyxiation risk;
- Dangerous (potentially odourless) gases; and
- Fire and explosion.

Impacts

Injuries of different severity, including permanent disability; gas poisoning.

Receptor sensitivity

Impact magnitude is **medium** to **high** as people are a receptor of high sensitivity.

Impact magnitude

Impact magnitude is **medium** to **high** depending on the severity of accidents, as some of them could lead to severe health impacts.

Impact significance

Impact significance would be **major** as a function of the medium to high receptor sensitivity and same levels of impact magnitude. However, the impact magnitude could be reduced through application of mitigation measures detailed below.

Management and mitigation

- Develop and implement an Operational OHS Management Plan that includes *inter alia*:
 - Introduce and enforce OHS instructions on performance of maintenance and inspection works on safe driving;
 - Conduct OHS training for all workers involved in the maintenance/inspection activities;
 - Define minimum qualification requirements for the performance of works;
 - Control operations by having a permit to work system for performance of high hazardous tasks; and
 - Ensure pre-placement medical examinations of workers.

Residual impact

With the correct application of the mitigation measures the impact magnitude could be reduced to low implying an overall residual significance rating of **minor** to **moderate**.

6.17 Impact on Tourism, Recreation and Hunting

The Project may result in adverse impacts on tourism, recreation and hunting patterns during the construction phase. At the operational phase both adverse and beneficial impacts are expected.

6.17.1 Construction Phase

Activities

The following activities will take place during the construction phase which would result in potential impacts on tourism, recreation or hunting activities:

- Site preparatory works, clearing and grubbing, and removal of topsoil;
- Vehicle and machinery movement and use of access roads to/from the construction sites; and
- Accommodation of construction workers in the hostels/hotels of the settlements (presumably, towns of Sveti Nikole and Veles).

Aspects

Aspects associated with the above construction activities include:

- Generation of noise and dust from vehicle movement and construction works; and
- Potentially restricted access to Djumajlija and Kishino hunting areas next to Veles town and villages of Chaloshevo, Novo Selo, Karatmanovo, Lozovo, Adzimatovo, Crnilishte, Peshirovo, and Erdzelija.

Impacts

These aspects would bring about changes to the patterns of tourism, recreation and hunting practiced by the local residents and visitors from other parts of the country or from abroad (mainly, Serbia and Romania).

Receptor sensitivity

The cultural tourism in the Project-affected municipalities is not well developed and income related to it has limited importance to the local population. Hunting is a seasonal hobby and part of recreation activities for the local population. It does not form any important part of local livelihoods (as explained by most of key-informants and an interviewee from Karatmanovo, who is member of a hunting association with a valid hunting permit). Similarly, hunting tourism plays an insignificant role for the

livelihoods of local population, and there are a number of alternative sites that can be used for hunting. The tourism accommodation potential is seen as sufficient to meet the needs of tourists and construction staff (should it be decided to accommodate them in the guesthouses, hostels or hotels). Overall, sensitivity of the tourism, recreation and hunting activities and infrastructure is seen as **low**.

Impact magnitude

The magnitude of adverse impacts on tourism, recreation and hunting patterns could be graded as **low** taking into account that the potential impacts are short-term, limited to the construction corridor and its immediate vicinities, and likely to occur at certain times during a year.

Impact significance

The significance of potential adverse impacts on the existing tourism, recreation and hunting patterns and infrastructure is **minor**.

Management and mitigation

- As part of the Livelihood Restoration Plan's socio-economic survey for the pipeline, determine if hunting activities are part of the livelihood sources of the land-take-affected households, assess the related impacts and develop the commensurate livelihood restoration measures, if necessary; and
- In consultations with the municipal authorities and village representatives, prior to the construction stage, plan the access roads and organize the construction/operation activities so that to ensure access (direct or alternative) to hunting and recreation areas.

Residual impact

No adverse residual impact is expected provided the mitigation measures are implemented.

6.17.2 Operational Phase

Activities

- Gas supply to the local communities, including tourism, recreation and hunting business and infrastructure; and
- Repair and maintenance activities.

Aspects

- Generation of noise and dust from vehicle movement and construction works; and
- Potentially restricted access to hunting areas.

Impacts

These aspects would bring about changes to the patterns of tourism, recreation and hunting practiced by the local residents and visitors.

Receptor sensitivity

As for the construction stage.

Impact magnitude

The magnitude of **adverse** impacts on tourism, recreation and hunting patterns is seen as **negligible** as the impact is extremely short-term, limited to small locations at the pipeline, and is unlikely to occur.

On the positive side, with the exploration of local cultural resources and archaeological sites (see [Section 5.13](#)), there is a potential of turning them into tourist attractions. Stable gas supply will also contribute to the development of local tourism, recreation and hunting infrastructure. Such beneficial impacts can be of **low** magnitude.

Impact significance

The significance of **adverse** potential impacts on the existing tourism, recreation and hunting patterns and infrastructure is **negligible**.

Development of a tourism potential is a **beneficial** impact of **minor** significance.

Residual impact

No adverse residual impact is expected provided the mitigation measures are implemented.

6.18 Impacts on Gender Inequality and Vulnerable Groups

Gender and vulnerability are cross-cutting themes that interact with various impacts of the Project, and thus are considered here in an aggregate manner.

The socio-economic impacts, benefits and opportunities of the Project are largely gender-neutral i.e., both men and women, regardless of their ethnical identity and vulnerability/ social status, will benefit equally from the gas pipeline construction and, most importantly, from its operations. There are 11 settlements along the gas pipeline, being located at the distance of 0.3 km to 2.8km from it. The men and, to a lesser extent, women, of the noted settlements may benefit from the employment opportunities during construction. However, such opportunities will be few and the significance of impacts is assessed as **minor** (see [Section 6.11](#)).

The Project implementation is not expected to adversely affect gender inequality and vulnerable groups of the population. Residents/households belonging to the general "vulnerable" categories will benefit commensurately with the non-vulnerable population. Since vulnerable groups typically include the population living in poverty, they may face less costs associated with gas heating compared to electrical heating. This is a beneficial impact; however, making predictions about any cost saving is complicated given the changing situation at the international gas and power markets.

The negative impacts related to the land acquisition or health and safety issues would also be gender- and vulnerability-neutral, and these are considered in the relevant section of this report. Furthermore, specific actions to ensure inclusion of men, women and vulnerable groups will be considered in the course of the Livelihood Restoration Plan preparation (see [Section 6.12](#)). These actions will allow the Project to positively contribute to reducing gender gaps related to land ownership and land-related decision-making and to support vulnerable groups.

6.19 Impact on Cultural Heritage

6.19.1 Construction Phase

Activities

The following activities will take place during the construction phase which would result in potential impacts on cultural heritage, including archaeological sites:

- Site preparatory works, clearing and grubbing, and removal of topsoil;
- Vehicle and machinery movement;
- Excavation of the trench and temporary stockpiling of the excavated material; and
- Use of access roads to/from the construction sites.

Aspects

Aspects associated with the above construction activities include:

- Land disturbance and compaction of soils by the movement of heavy vehicles;
- Surface transformation through clearing and grubbing of all vegetation;
- Mechanical generation of dust, through vehicle movement and transport of excavated soils;
- Vibration from construction vehicles and works; and
- Earth excavations and subsequent backfilling.

Impacts

These aspects would bring about changes in the condition of cultural heritage, namely

- damage to the known archaeological sites, and
- potential loss or damage to chance finds and/or undiscovered underground heritage assets.

As derives from the baseline analysis, intangible cultural heritage, historical buildings and complexes, and cultural landscapes do not represent sensitive receptors and are not expected to be (more than insignificantly) affected by the Project.

It should be noted that measures to ensure no disturbance to the practices of communities embodying traditional lifestyles are embedded in the preparation of the Traffic Management Plan (see [Section 6.14.1](#) for details) (that is, the Construction Contractor will plan the access roads and organise the construction activities so that to avoid impact on the cemeteries and churches and any disturbance to their local use; and NER will do the same for the operations stage).

Receptor sensitivity

With regards to **known archaeological sites**, seven archaeological sites have potential to extend into the pipeline's construction corridor/RoW. Of these, five sites – **Sulejmanec, Medovo Anishteare Koliba Bair, Srma, and Mashatli`k** – have moderate sensitivity judging by the perceived heritage value and scientific importance, and two sites – **Kula and Kanda Geoglyph** – are the closest to the proposed pipeline route and possess presumably rare characteristics, and thus are seen to be of **high sensitivity**.

Sensitivity of **undiscovered remains** (chance finds and/or unknown underground heritage assets) may vary from **low** to **high** depending on their value, condition, rarity and other features.

Impact magnitude

The magnitude of impacts on the **known archaeological sites** could be graded as **medium**, given that the potential impacts are largely about partial loss of these known heritage assets, are of localised nature, irreversible, and the probability of the impact is likely (yet to not deterministic).

The potential impacts on the **undiscovered archaeological sites/chance finds** are limited to the construction corridor and irreversible. Given that a potential, and therefore a likelihood, for chance finds exist in the Project footprint, the magnitude is seen as **medium** as well.

Impact significance

Significance of potential impacts to the **known archaeological sites**, taking a risk-based approach, is predicted to be **major for Kula and Kanda Geoglyph site and moderate for Sulejmanec, Medovo Anishteare Koliba Bair, Srma, and Mashatli`k**.

As the sensitivity of **undiscovered archaeological sites/chance finds** is an uncertain variable, the significance of the potential impact on such assets can vary from **minor to major**.

Management and mitigation

- Before the construction of the gas pipeline, engage a qualified Cultural Heritage Expert from an authorized institution to complete a survey of the planned pipeline route (as required in the Report No. 08-73/3 from 25th March 2021 by the National Conservation Centre of Cultural Heritage-Skopje, North Macedonia);
- Ensure that a qualified Cultural Heritage Expert from an authorized institution be present during the construction activities and that specific care be taken during the activities near the following sections of the pipeline:
 - a) the Kula archaeological site, which is located 200m from km 24+000.00 of the pipeline (per the to Report No. 08-73/3 from 25th March 2021 from the National Conservation Centre of Cultural Heritage-Skopje, North Macedonia); and
 - b) the Kanda Geoglyph archaeological site, which is located 300m from km 8+000.00 of the pipeline.

These surveys will identify if the archaeological sites do in fact extend into the pipeline's construction corridor and will propose the mitigation: e.g., pipeline re-routing or site excavations to be completed before the construction can proceed.

- Reduce the size of the construction corridor as much as possible;
- Limit vehicle movements and machinery activities to the cleared area within the construction corridor, and minimise the scale of earth works;
- Demarcate the known archaeological sites as needed, to avoid disturbance to assets (via vibration or dust pollution or accidental damage);
- Prior to construction works, develop a Chance Finds Procedure for the Project and train the Construction Contractor and its relevant workers in applying this Chance Finds Procedure (so that they can identify the chance finds, stop the works and notify the management).

Residual impact

No residual impact is expected provided the prevention/mitigation measures are implemented.

6.19.2 Operational Phase

Activities

During the operational phase there are far fewer activities that would pose a risk to cultural heritage, these can be:

- Excavations for repairing purposes; and
- Vehicle movement to different parts of the pipeline.

Aspects

- Land disturbance, earth excavations and subsequent backfilling, and compaction of soils by the movement of heavy vehicles;
- Mechanical generation of dust and vibration, through vehicle movement and transport of excavated soils.

Impacts

No impacts are expected if the activities take place within the 7m operations and maintenance corridor or the earlier disturbed construction corridor.

Receptor sensitivity

Same as for the construction stage.

Impact magnitude

The magnitude of impact on the **known archaeological sites** and **undiscovered archaeological sites/chance finds** during operations is graded as 'no change', given that this is highly unlikely (however whether the archaeological sites do in fact extend into the pipeline's construction corridor will be determined at the pre-construction staged and the due mitigation, pipeline re-routing or site excavation will be applied before operations), irreversible, and limited to small points along the gas pipeline. For larger repair works going outside the construction/maintenance strips, the magnitude of damage could be seen as **negligible**.

Impact significance

The significance of potential impacts is seen as no impact / **negligible** (for routine operations) to **moderate** (larger repair works going outside the earlier disturbed areas).

Management and mitigation

- Restrict repair work sites to the operations and maintenance corridor of 7 m centred on the pipeline axis;

- Limit vehicle movements and machinery activities to the access roads arranged during the construction, and minimise the scale of earth works;
- Comply with the demarcation of the known archaeological sites;
- Prior to the operations stage and then regularly, train repair/maintenance workers in applying the Chance Finds Procedure.
- In case larger gas pipeline reconstruction/repair activities connected with earth excavations are expected to go beyond the earlier disturbed areas (a 22 m construction corridor) at the chainage km 24+000.00 (Kula site) and km 8+000.00 (Kanda Geoglyph), engage a qualified Cultural Heritage Expert from an authorized institution to be present during these works.

Residual impact

No residual impact is expected provided the mitigation measures are implemented.

6.20 Risk Analysis and Plan of Measures for Emergency Scenarios and Accidents

An emergency is an unplanned event when an operation 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:

1. Natural disasters that bring about infrastructure damage or threaten the lives and safety of employees on site or third parties off-site;
2. Worker accidents that result in injury to or death of workers;
3. Equipment and/or infrastructure failure that leads to loss of containment of gas or other hazardous materials (during construction for example);
4. Fires and/or explosion; and others.

The gas pipeline is a system of steel pipes with a high operating pressure through which natural gas will be transported and this makes the pipeline system a potentially hazardous installation. At the outset, construction and operations would be regulated by the Rulebook on technical conditions and norms for safe transport of liquid and gaseous hydrocarbons by means of main oil and gas pipelines and international oil and gas pipelines (OG of SFRY No. 26/85, and OG of RM No. 18/97). These Rulebook requirements provide an overarching safe practice framework during the construction and the regular operation of the gas pipeline.

6.20.1 Risk Assessment and Measures in Case of Emergency Scenarios and Accidents During Construction

The possible emergency scenarios and accidents that can occur during the construction phase are following:

6.20.1.1 Natural Disasters

During construction, storms with strong winds, rain, snow, lightning, fog, earthquakes, extreme temperatures, fires, and so forth would all present potential health and/or safety risks to construction workers.

The project team would need to identify plausible natural disasters that could happen during the construction phase, identify the risks to worker health and safety brought about by such natural disasters, and develop and implement mitigation to prevent or at least reduce such risks. The mitigation may take the form of PPE but provision must also be made for an orderly evacuation of the site should a natural disaster threaten or occur. The orderly evacuation must be rehearsed multiple times (drills) to ensure that when the real need to evacuate manifests, that it can happen effectively and quickly enough to minimize risks of injury or worse for construction workers. Such drills should also include the simulation of injury to construction workers so that the safe medical evacuation of injured personnel is also provided for.

6.20.1.2 Accidents on Site

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. 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.

6.20.2 Upset Conditions During the Operation of the Pipeline

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 even in the absence of the machinery and vehicles associated with the construction phase. Again, there are two types of risk that need to be recognized and planned for on the operational pipeline namely natural disasters and accidents.

6.20.2.1 Natural Disasters

For natural disasters the completed and operational pipeline would be far more resilient to natural disasters than during the construction phase, with natural disaster risk management and mitigation being included in the design and construction of the pipeline. The consequence of failure of the pipeline due to natural disasters, even if less likely, would however, be far more severe due to the presence of the flammable gas under pressure within the pipeline. Safety engineering criteria to prevent failures due to natural risks posed by earthquakes, wind, flooding, landslides and fire must be incorporated in the design, which must include engineering and design criteria obliged by site-specific risks, including but not limited to seismic activity, slope stability, wind loading, and other dynamic loads.

The project team would need to identify plausible natural disasters that could happen during operations, identify the risks to worker health and safety and offsite third parties brought about by such natural disasters, and develop and implement mitigation to prevent or at least reduce such risks. Contingency plans must be developed to safely and effectively manage such risks, including ensuring that both operations staff and potentially affected third parties can be evacuated should that need arise. Such an evacuation must be rehearsed multiple times (drills) to ensure that when the real need to evacuate manifests, that it can happen effectively and quickly enough to minimize risks of injury or worse. Such drills should also include the simulation of injury so that the safe medical evacuation of injured personnel is also provided for.

6.20.2.2 Accidents

As with the response to natural disaster risk, the probability of accidents on the pipeline is greatly reduced but given the presence of pressurized natural gas in the operational pipeline, the consequences of an accident are potentially far more severe. The hazard characteristics are summarized in **Table 56**. When natural gas burns, the products of combustion include CO₂ (carbon dioxide), water, and intense heat. When the combustion is incomplete, traces of CO (carbon monoxide) are produced which is also an asphyxiant.

Matches, lighters, light switches, smoke alarms, and even the sparks generated by the starter or alternator of motor vehicles can ignite natural gas. Cell phones, pagers, and radios all have switches that, when activated, can generate sparks sufficient to ignite natural gas. Even static electricity arcs

from clothes, body, or other sources can create sparks of sufficient heat to ignite the gas. It is very important to maintain control of potential ignition sources.

Table 56. Hazard Characteristics of Natural Gas

Product	Appearance	Odor	Special Behavior	Hazards
Natural Gas	Combustible mixture of hydrocarbon gases that is odorless	No odor will be detected unless an odorant is added for shipping	Low density and lighter than air In an open area, it rises into the atmosphere and dissipates In an enclosed area, it collects first overhead	Extremely flammable and explosive Suffocation can occur if vapors displace the oxygen in an enclosed area

For liquid pipelines in the United States, the following constitute the relative risk factors for pipeline failure. It can be seen from the figure that equipment failure and corrosion failures are the two most significant forms of failure followed by incorrect operations. Equipment supplied for operations of the gas pipeline must accordingly be certified with apposite quality ratings to minimize the risk of failure. The following are typically implemented on gas pipelines to reduce the likelihood of accidents.

Control systems

Gas pipeline operators monitor the system and manage the gas flow through the pipeline using a Supervisory Control and Data Acquisition system (SCADA). A SCADA is a computer system developed to gather information such as flow rate through the pipeline, operational status, pressure, and temperature readings. The information allows pipeline operators to take action in response to what is happening along the pipeline and facilitating quicker reactions for normal operations and to equipment malfunctions and releases. As gas flows through the system, regulators control the flow from higher to lower pressures, opening when the pressure falls and closing when the pressure is too high. As an added safety feature, relief valves are installed on pipelines to vent gas if a line becomes over pressured and regulators malfunction.

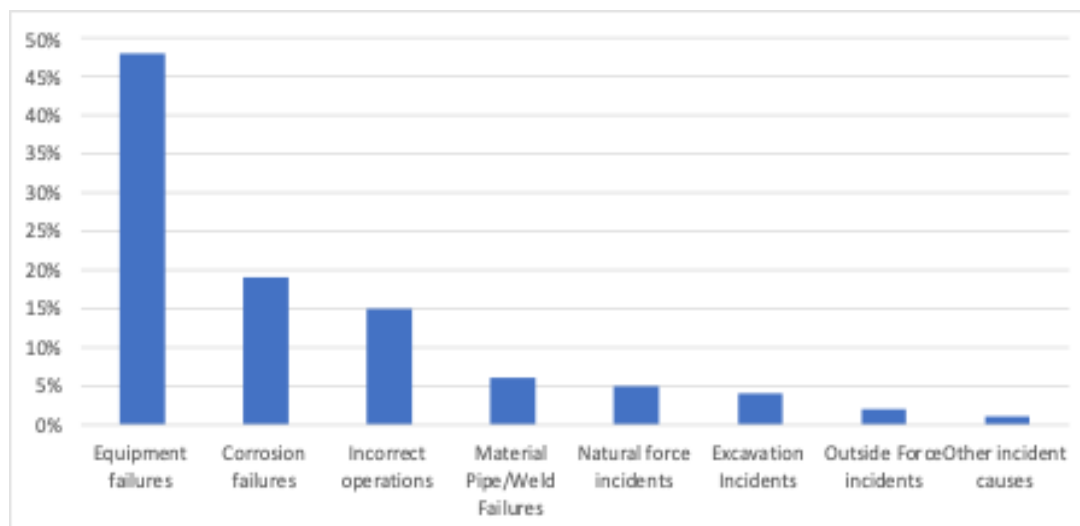


Figure 37. Causes of Pipeline Failures in the US dollars over a 5-year period from 2017-2022 as Relative Percentages¹⁵⁴

¹⁵⁴ Note that these are liquid pipelines not gas pipelines and so the figures should be used indicatively only.

Corrosion protection

Without proper corrosion protection every steel pipeline will eventually deteriorate to the point of failure. These are the two forms of corrosion protection that would be used on the pipeline.

- *Cathodic protection (CP)* is a system that uses direct electrical current to counteract the normal external corrosion that occurs on a metal pipeline from soil and moisture conditions.
- Pipeline coatings and linings are used to prevent corrosion by protecting the bare steel from coming in direct contact with materials that would cause corrosion.

Leak detection

Operation Corridor Patrols

Regular patrols of pipeline operation corridor can be used to check for indications of leaks and ensure that there are no construction activities taking place on or near the operation corridor that may compromise pipeline safety.

Leakage Surveys

Personnel walk or drive the route using specialized equipment to determine if any gas is leaking and to then quantify the size of the leak. Very small leaks are a normal part of most gas pipeline systems.

Odorization

Natural gas is odourless, so natural gas transmission pipelines can be odorized so leaking gas is readily detectable by a person with a normal sense of smell.

Other mitigation

The following must be implemented accordingly, during design, construction and ultimately operations:

- Locally regulated or internationally recognized building codes must be applied to ensure structures are designed and built-in accordance with good engineering practice, including fire prevention and response;
- Engineers responsible for designing and constructing facilities, must certify the applicability and appropriateness of the structural criteria employed;
- Codes must be followed, for:
 - Soils and foundations;
 - Site grading;
 - Structural design;
 - Accessibility and means of egress;
 - Fire-resistant construction; and
 - Flood-resistant construction.

A Hazards and Operability Study (HAZOPS) must be conducted to ensure that:

- Process conditions reduce the potential consequences of an accidental off-site release
- There is effective shut-down to reduce the amount of material escaping and release duration, from containment;
- Operations and control and inspection and maintenance are optimised; and
- Off-site impacts of releases are minimised through measures to contain explosions and fires, alert the public, provide for evacuation of surrounding areas, establish safety zones around a site, and ensure the provision of emergency medical services to the public.

6.20.3 Emergency Preparedness and Response Plan

6.20.3.1 Planning Coordination

Planning is a key element of effective emergency response

- Define plausible accident scenarios that could result in potential impacts on the environment either through the accident itself or through actions taken in response to an emergency scenario e.g., firefighting;
- Assess the environmental aspects of the above accident scenarios and the likely significance of those aspects resulting in impacts on the environment to ensure that suitable controls are in place;
- Define specific actions that can be taken, together with the personnel required to give effect to such actions and detail plans in response to the various emergency scenarios;
- Define and source equipment needed to manage and control emergency events and ensure personnel are trained in the use of that equipment;
- Establish a mechanism for immediate mobilization of a central control and coordination function (operations room function) in the event of an emergency, to coordinate information and summons the requisite emergency services;
- Detail how to notify:
 - Pipeline employees;
 - The general public; and
 - Emergency response agencies.
- Conduct training exercises, drills and tests to determine the readiness status of the emergency response team, highlighting areas for improvement in the Emergency Response Plan and enhance the performance of the emergency response team.

6.20.3.2 Emergency Preparedness and Response

The pipeline must have an Emergency Preparedness and Response Plan commensurate with the risks of the facility with the following elements:

- Administration (policy, purpose, distribution, definitions, and so forth);
- Organization of emergency areas (command centres, medical stations, and so forth);
- Roles and responsibilities;
- Communication systems;
- Emergency response procedures;
- Emergency resources;
- Training and updating;
- Checklists (role and action list and equipment checklist); and
- Business Continuity and Contingency.

Key components of the emergency plan

Key components of the Emergency Response Plan must include:

Worker notification

- Alarm (sound and/or visual) or other forms of communication must be established to alert workers to an emergency. Related measures include:
 - Testing warning systems at least annually (fire alarms monthly), and more frequently if required by local regulations, equipment, or other considerations;

- Establishing a back-up system for communications on-site with off-site resources, such as fire departments, if normal communication methods may be inoperable during an emergency.

Community Notification

If a local community could be at risk from a potential emergency arising from the pipeline, the company should implement communication measures to alert the community, such as:

- Audible alarms, such as fire bells or sirens
- Fan out telephone call lists
- Vehicle mounted speakers
- Communicating details of the nature of the emergency
- Communicating protection options (evacuation, quarantine)
- Advising on appropriate protection

Media and Agency Relations

Emergency information should be communicated to the media through:

- A trained, local spokesperson able to interact with relevant stakeholders, and offer guidance to the company for speaking to the media, government, and other agencies
- Written press releases with accurate information, appropriate level of detail for the emergency, and for which accuracy can be guaranteed

Finance and Emergency Funds

- A mechanism should be provided for funding emergency activities.

Fire Services

- The level of local firefighting capacity and whether equipment is available for use at the facility in the event of a major emergency or natural disaster must be ascertained.

If capacity is inadequate, additional capacity should be acquired that may include pumps, water supplies, trucks, and training for personnel.

Medical Services

- First aid attendants as well as medical equipment suitable for the personnel, type of operation, and the degree of treatment likely to be required prior to transportation to hospital, must be made available.

Availability of Resources

Appropriate measures for managing the availability of resources in case of an emergency include:

- Maintaining a list of external equipment, personnel, facilities, funding, expert knowledge, and materials that may be required to respond to emergencies. The list should include personnel with specialized expertise for spill clean-up, flood control, engineering, water treatment, environmental science, etc., or any of the functions required to adequately respond to the identified emergency;
- Providing personnel who can readily call up resources, as required;
- Tracking and managing the costs associated with emergency resources;
- Considering the quantity, response time, capability, limitations, and cost of these resources, for both site-specific emergencies, and community or regional emergencies; and
- Considering if external resources are unable to provide sufficient capacity during a regional emergency and whether additional resources may need to be maintained on-site.

Mutual Aid

Mutual aid agreements decrease administrative confusion and provide a clear basis for response by mutual aid providers. Mutual aid agreements should be maintained with other organizations to allow for sharing of personnel and specialized equipment.

Contact List

- The company should develop a list of contact information for all internal and external resources and personnel. The list should include the name, description, location, and contact details (telephone, email) for each of the resources, and be maintained annually.

Training and Updating

The emergency preparedness facilities and emergency response plans require maintenance, review, and updating to account for changes in equipment, personnel, and facilities. Training programs and practice exercises provide for testing systems to ensure an adequate level of emergency preparedness. Programs should:

- Identify training needs based on the roles and responsibilities, capabilities and requirements of personnel in an emergency;
- Develop a training plan to address needs, particularly for firefighting, spill response, and evacuation;
- Conduct annual training, at least, and perhaps more frequent training when the response includes specialized equipment, procedures, or hazards, or when otherwise mandated;
- Provide training exercises to allow personnel the opportunity to test emergency preparedness, including:
 - Desk top exercises with only a few personnel, where the contact lists are tested and the facilities and communication assessed
 - Response exercises, typically involving drills that allow for testing of equipment and logistics
 - Debrief upon completion of a training exercise to assess what worked well and what aspects require improvement
- Update the plan, as required, after each exercise. Elements of the plan subject to significant change (such as contact lists) should be replaced;
- Record training activities and the outcomes of the training Business Continuity and Contingency.

6.21 Transboundary Impacts

The minimum distance from the Project route (its beginning) to the national boundary is about 45 km. Due to local characters of the Aol's terrain and types of Project impacts, no impacts are expected to extend beyond the national boundaries.

7 CUMULATIVE IMPACT ASSESSMENT

7.1 Introduction

This section presents a cumulative impact assessment (CIA), i.e., E&S impact of the Project is considered in combination with potential impacts from other projects or activities that are currently carried out or will be implemented in the near future. The CIA takes into account those projects/activities for which there is sufficient publicly available information to identify their interaction with the Project in time and / or space and assess the possibility of cumulative impacts.

The CIA methodology is based on a step-by-step process, described in the IFC guidelines *Cumulative Impact Assessment and Management - Guidelines for the Private Sector in Emerging Markets* (2013)¹⁵⁵ and complies with the requirements of Council Directive 85/337/EEC *on the assessment of the effects of certain public and private projects on the environment* (1985, with amendments). In accordance with the IFC guidelines, the CIA is carried out in six steps:

- Step 1 – identification of valued environmental and social components (VECs), and spatial and temporal boundaries of the assessment;
- Step 2 – identification of other projects for inclusion in the assessment, as well as environmental drivers;
- Step 3 – gathering background information on the identified VECs (this information is presented in **Chapter 0** and is not repeated in the current section);
- Step 4 – assessment of the cumulative impact on the identified VECs;
- Step 5 – assessment of the significance of predicted cumulative impacts; and
- Step 6 – cumulative impact management.

The assessment of the potential cumulative impact is qualitative and based on the E&S Consultant's expert judgement using impact significance criteria.

7.2 Step 1 – Determining VESC, and Identifying Spatial and Temporal Boundaries of the Assessment

VESC are typically equated to E&S recipients that might be affected by the project being assessed. However, it makes sense to single out those VECs, the impact on which, after implementation of mitigation measures, may exceed the threshold of minor significance (per the current ESIA, these are impacts with a residual significance from minor through to moderate and no impacts of major residual significance). Based on the results of the ESIA, the VECs were identified for further analysis during the CIA as shown in **Table 57**. These were also supplemented by the conclusions of the SEA of the *Draft Strategy for Energy Development of the RNM until 2040* (the bluish bottom line in the table).

Table 57. Characteristics of VECs Identified for the Purpose of the CIA

VEC	Impact description	Residual Significance of Impact / Risk
Soil	Soils crossed by the pipeline support <i>inter alia</i> natural or critical habitat and agriculture. They will be extensively affected during the construction stage and less significantly during the operations.	Moderate negative

¹⁵⁵ https://www.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/sustainability-at-ifc/publications/publications_handbook_cumulativeimpactassessment.

VEC	Impact description	Residual Significance of Impact / Risk
Water	Construction activities, and to less extent operations, could result in contamination of runoff water which might reduce surface and/or ground water quality and further knock-on effects such as reducing aquatic habitat and aquatic fauna populations.	Moderate negative
Air quality	Construction activities would bring about changes in air quality that could in turn result in negative human health and/or human health effects and potentially have a negative impact on habitat. On a wider scale, as a result of the Project, improvement in air quality is expected as natural gas will replace coal and settlements will be gasified.	Moderate negative Major positive
Biodiversity	One IPA, one IBA, one Emerald site and one KBA will be crossed by the gas pipeline. There are no national protected areas, or areas proposed for protection in the Aol. <ul style="list-style-type: none"> IBA Ovche Pole can be affected by construction noise impacts. CH and PBF can be affected by the construction air, noise and vibration emissions. 	<ul style="list-style-type: none"> Moderate negative Moderate negative
Local / regional economy and labour market	Construction activities could result in new direct workplaces and increased wellbeing of workers; as well as in increased demand for some goods and services needed for the Project. The secondary effects include increased incomes of Project's suppliers and sub-contractors and new job openings at these businesses benefitting from the Project.	Moderate positive
Employee health and safety	Risks to the health and safety of workers during the construction and operation stages due to pollutant emissions, noise and vibration levels within the sites.	Minor to moderate negative
Health and safety of the local population	A number of impacts/risks might be expected: <ul style="list-style-type: none"> Risks of road accidents involving pedestrians and road users of local roads to be used by the Project vehicles. Physical discomfort related to noise and emissions from the construction sites and vehicle movements along the roads to the construction corridor; Psychological discomfort related to vibration and artificial lighting from the construction sites and vehicle movements along the roads to the construction corridor; Risk of falling to on-site trenches; Potential increase in incidence of communicable, virus and sexually transmitted diseases. 	From minor to moderate negative
State of local roads	Impact on the state of the local road network can be expected as a result of Project-induced construction traffic.	Moderate negative
From the national SEA: Population wellbeing and economic development	Better quality of life of citizens, improved sanitary and epidemiological situation, reduction of air pollutant emissions and climate change, and encouraged economic development	Slight to high positive (in the SEA grading)

Other typical E&S recipients could include cultural heritage, public infrastructure facilities (apart from roads), ecosystem services, including tourism and recreation, etc. However, these recipients are not considered as VESC and are not taken further into the CIA, since the residual significance of the Project impact on them is rated as low or negligible, and the implementation of other projects/activities included in the CIA should not lead to a significant cumulative negative impact.

For the purposes of the current assessment, the **time frame** for the CIA encompasses the Project construction (presumably, mid-2023 to mid-2025) and operations (some 30-40 years).

The spatial (geographical) boundaries of the CIA are accepted as defined in **Section 4.4** of the ESIA, including the Project's footprint (also called the Zone of Influence or construction corridor), and the Area of Influence where both direct and indirect impacts are expected to occur.

7.3 Step 2 – Identification of Other Activities (Projects) for the Inclusion in the CIA and Environmental Drivers

The proposed gas pipeline will cross various linear facilities, such as roads, railway, water and irrigation infrastructure (see **Section 3.5.1.6**). Routine operation of these infrastructure facilities is considered 'ongoing activities' that may lead to some cumulative impacts at the crossings with the pipeline.

Screening of ongoing or planned projects in the affected municipalities has identified several projects that could affect the above VECs. All of them are located in Sveti Nikole Municipality:

- A **proposed 17 MW solar power plant** (4 km away from the gas pipeline), which will be located in the village of Amzabegovo, Sveti Nikole Municipality¹⁵⁶, is expected to be fully operational by early 2023.
- The **36 MW Bogoslovec Wind Park**¹⁵⁷ (9 km away from the gas pipeline), approximately 1 km north-east of Bogoslovec village, Sveti Nikole Municipality, which is expected to be finished by 2023. A 4.5km overhead transmission line is part of the project. This project is funded by various lenders and structured according to the IFC requirements and national regulations.
- The **Mechkuevci Regional Landfill** (6 km away from the gas pipeline) next to the village of Mechkuevci, Sveti Nikole Municipality, and six transfer stations in Berovo, Makedonska Kamenica, Kochani, Shtip, Rankovce, and Kumanovo (Eastern and North-eastern Planning Region)¹⁵⁸. Construction works of the regional landfill are expected to start in 2022 and will last for about two years (the ESIA has been prepared according to the EU legislation). The project will be financed by the EU funds.

In addition, the baseline analysis was reviewed to identify any social and/or environmental **stress drivers or external factors** that may influence the condition of the VECs. In relation to the Project context, such stress factors could be i) the overall situation with hydrology, that is, the area where the Project is proposed to be located is prone to drought with rivers sometimes drying up during the summer; and ii) emigration from, and ageing of population, in small affected settlements. These drivers are considered in the next steps of the CIA.

7.4 Steps 4 and 5 – Characterization and Assessment of the Main Cumulative Impacts

The analysis of the above ongoing and planned activities and projects for potential contribution to the cumulative impact during the construction and operation of the Project facilities has resulted in the following considerations and assessments¹⁵⁹:

- **Overlaps or synergies with the existing roads:** Cumulative impacts may occur during the construction phase at the crossings of the Sveti Nikole-Veles gas pipeline section with the existing roads, especially Motorway A4 "Miladinovci – Shtip", Regional Road R1204 "Sveti Nikole – Kadrifakovo", Local Asphalted Road "Milino – Lozovo", Regional Road R1312 "Milino – Karatmanovo", Regional (Expressway) Road R1312

¹⁵⁶ <https://balkangreenenergynews.com/slovenias-gen-i-to-build-17-mw-solar-power-plant-in-north-macedonia/>

¹⁵⁷ <https://wpbogoslovec.com/environmental-and-social/> and <https://balkangreenenergynews.com/bogoslovec-first-private-wind-farm-in-north-macedonia-secures-loan-for-construction/>

¹⁵⁸ <https://meta.mk/en/tender-procedure-for-construction-of-regional-landfill-in-mechkuevci-in-north-macedonia-started/>

¹⁵⁹ Within the limits of existing and available data, the assessment of the significance of the predicted cumulative impacts is qualitative in nature.

“Veles – Kadrifakovo”, and Motorway A1 “Skopje – Gevegeja”. The key aspects related to the Project construction activities and the operation of the existing roads are air emissions, exhaust gases from traffic, noise and vibrations. The potentially affected VECs are air quality and secondary receptors (e.g., soil around the roads and on-site workers). The impact would be very short-term and localised, with an intensity that would vary from depending on the traffic flows and use of specific construction equipment / vehicles. As the HDD construction pads will be located at some distance from the existing roads to allow for a needed bending angle, the magnitude would be from negligible to low, implying the **significance of impact on air quality and secondary receptors as minor to moderate**.

- **Overlaps or synergies with the solar power plant:** The construction of this solar power plant is expected to be completed prior to the start of the Project construction works. Activities and aspects stemming from the Project construction and solar power plant operations running in parallel would not give rise to cumulative impacts. Thus, the combination of these activities is not considered further.
- **Overlaps or synergies with the Bogoslovec Wind Park:** The construction of this facility is nearing completion with the power line being constructed and foundations for the turbines ready for further installations. No overlaps are expected between the construction activities of this facility and the Project. During the wind park operation and the gas Project construction, cumulative impacts may relate to such VEC as biodiversity for both projects are within the Ovche Pole IBA and IPA. The wind farm project underwent a biodiversity impact assessment and had specific biodiversity management plans and conservation strategies developed in line with IFC requirements¹⁶⁰. Given that both, the gas pipeline Project and the wind farm project envision biodiversity protection actions that would result in achieving no net loss, **negligible to minor cumulative impact on biodiversity** would be expected.
- **Overlaps or synergies with the Mechkuevci Regional Landfill:** As the construction activities of the landfill and the Project are expected to run in parallel for some time, the cumulative impact may relate to the increased load on the road network. The extent of this increase and thus the significance of the impact on road network is expected to be **negligible to low** assuming that the larger paved roads will be used by construction transport of both projects, rather than the same earth roads/small local roads.
- **All projects** cumulatively would 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.

7.5 Step 6 – Cumulative Impacts Management

All identified ongoing projects should be designed and constructed in compliance with national regulation, their specific lender requirements and Good International Practice, thus reducing the potential for cumulative impacts in construction and operational phases. In addition, the following mitigation measure is to be implemented in relation to crossings with the existing roads:

- When developing the construction schedule for the HDD works at the crossings with the existing roads, take into account the traffic loads on them and adjust to the low traffic intensity as much as possible.

¹⁶⁰ https://wpbogoslovec.com/wp-content/uploads/2021/07/BWF_non-technical-summary_v4-Final-for-Disclosure.pdf

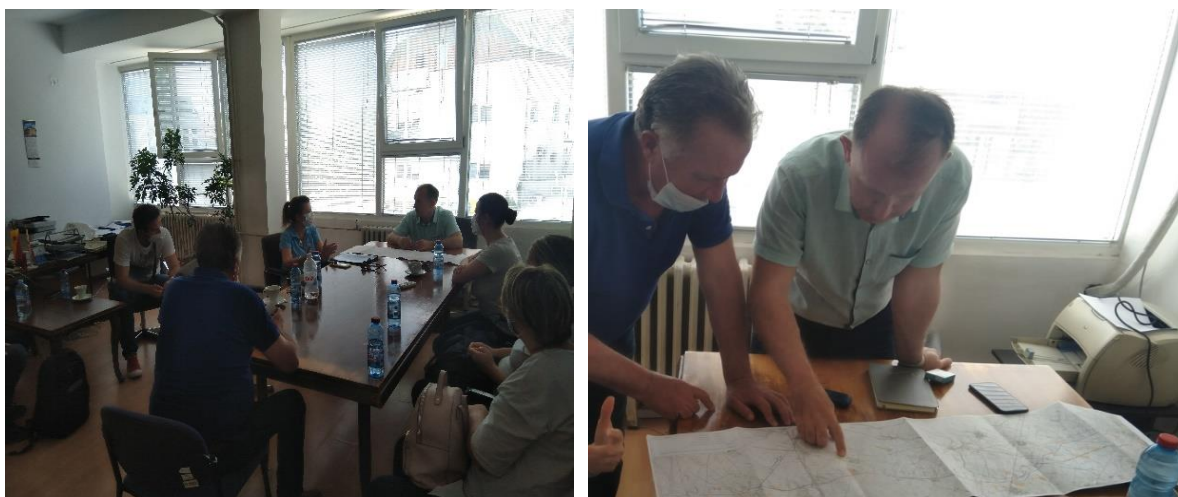
8 STAKEHOLDER ENGAGEMENT

8.1 Summary of Previous Project Stakeholder Engagement Activities

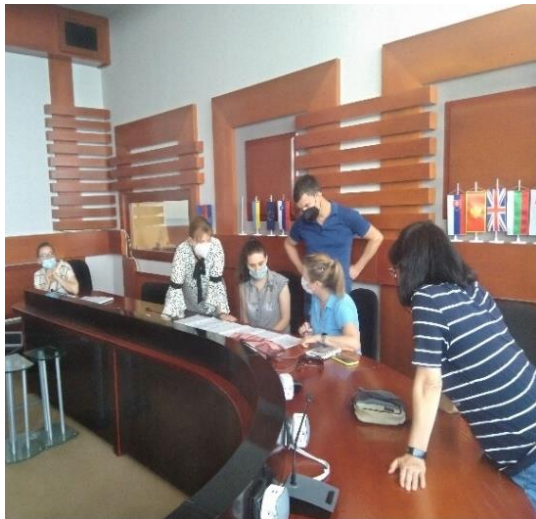
The public consultations on the planned construction of Sveti-Nikole – Veles gas pipeline were first held in 2012 as part of the EIA process for the larger Klechovce-Negotino gas pipeline scheme. In April 2012, the public consultation took place in Sveti Nikole Town. They covered such topics as project description, its environmental and social impacts, summary of the EIA results, mitigation, and monitoring measures. Participants of the meeting included municipal employees, representatives of the public enterprises, local schools, local/regional TV stations, local businesses and individual citizens. The questions raised by the participants were related to the pipeline route and its technical specifications. The implementation of this section of the pipeline was postponed.

The dedicated public consultations were held during the scoping stage of the draft ESIA for the Sveti Nikole-Veles Section. The public hearings and information disclosure were not legally required for this section during the development of the Environmental Impact Elaborate in late 2020-early 2021. However, NER initiated an ESIA process in line with the EBRD requirements, and thus held additional scoping consultations and meetings with stakeholders.

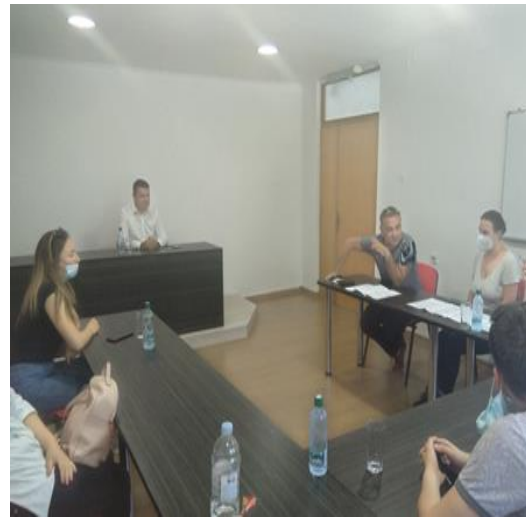
In November 2020, the online meeting (due to COVID-19 restrictions), was conducted for the officials from each of the three affected municipalities - Sveti Nikole, Lozovo, and Veles Municipalities. They were informed about the planned project design and activities, while the maps of the proposed gas pipeline route were sent to them in advance. The discussion concerned the development of the project related documentation and further cooperation during the project implementation.



Meeting with the mayor and municipal officials of Sveti Nikole municipality



Meeting with the Veles municipality



Meeting with the Lozovo municipality

Figure 38. Scoping Consultation Meetings at the Affected Municipalities

In June 2021, further meetings were conducted with the officials and mayors of the affected municipalities. The presentation covered the following topics: description of the selected route and its alternatives; location of the above ground structures; accessibility to the land plots during the construction phase; and crossings of public infrastructure by the pipeline. The participants raised questions about the selection of the pipeline route, the opportunities offered by the project and how it fits into the development strategy of the municipality, land expropriation, and hunting areas within the municipality of Veles. Some concerns were expressed about the possible traffic jams at A4 highway during the construction phase.

8.2 Stakeholder Identification

The identification and analysis of the stakeholders was performed to inform the SEP. The Project stakeholders are grouped into two major categories:

- *Internal stakeholders*, including the management and staff of the companies undertaking the Project – project personnel, the Construction Contractor, sub-contractors, and those benefiting from the Project (investors and shareholders); and
- *External stakeholders* - representing the groups or individuals that are not part of the organisations implementing the Project but are affected in some way by the decisions and actions of such organisations.

In order to ensure effective and meaningful engagement, the Project's external stakeholders have been clustered into the following groups in line with EBRD PR10:

- **Potentially affected parties** (those on whom the Project implementation may have a direct impact):
 - Population of the municipalities crossed by the Project, especially villages/settlements along the pipeline - Sveti Nikole, Lozovo, and Veles municipalities;
 - Private owners and users of the land plots impacted by land acquisition and/or access and land use restrictions in 11 settlements;
 - State owners of the affected land plots - State's forests, roads, communal and other enterprises and bodies, municipalities;
 - Small and medium enterprises owing the affected land and their employees;
 - Public utilities/ operators of the infrastructure that will be crossed by the pipelines; and

- Potentially vulnerable groups within the affected parties.
- **Other stakeholders** (those who are not affected by the Project but who may have an impact on or have expressed interest in the Project), such as:
 - National and Municipal Bodies/ Departments, Regulatory agencies, directorates and public institutions;
 - National and regional NGOs and civil society organisations;
 - National and regional media;
 - Businesses throughout the country; and
 - General population of North Macedonia.

The possible impacts and interests of the above groups are detailed in the Project's SEP.

8.3 Further Stakeholder Engagement Steps

Consultation and engagement activities will continue throughout the Project lifecycle. The next key engagement activities will revolve around the 120-day disclosure of the ESIA report and other Project documents (i.e., the SEP, LRF, NTS and ESAP¹⁶¹).

A Stakeholder Engagement Programme is designed as part of SEP to ensure effective engagement with all identified stakeholders, to create and maintain respectful relations between the Company and stakeholders, and to prevent possible conflicts. It provides a specific action plan, with responsibilities and an implementation timeframe arranged per the stages of the Project life. The list of the events/actions can be detailed and / or expanded based on future consultations.

8.4 Grievance Mechanism

In accordance with the EBRD requirements, a grievance mechanism should be established to review and resolve concerns and/or questions raised by stakeholders in relation to a project, in an efficient, timely, transparent, non-discriminatory / equitable and cost-effective manner (EBRD PR10 & 1).

NER, as a state-owned company, complies with the national regulations on addressing inquiries and grievances from natural or legal persons. It is committed to developing its grievance management practices further to align with the EBRD requirements. To this end, NER has set up the Project grievance mechanism for external stakeholders building on national regulations, communication / feedback channels used at NER; and supplementary actions to meet the EBRD requirements.

Table 58. 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
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

¹⁶¹ The SEP, LRF, NTS and ESAP cover not only the Sveti Nikole-Veles Section, but also other two sections that are considered by the EBRD for funding, namely: the North Macedonian Interconnector to Greece and the Gostival-Kicevo Section.

9 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP)

9.1 Overview

The purpose of the ESMP is to ensure that the mitigation and enhancement identified during the impact assessment process is effectively implemented and works to reduce the impacts in the manner assumed, during implementation of the project. For an ESMP to be effective it needs to be focused on two key elements:

- a) defining what must be achieved (actual performance in respect of key E&S indicators), and
- b) defining what must be done to achieve the performance specified under point a) above.

The current ESMP has been developed to accomplish the above key elements. Before presenting those two components it is useful to define what is meant by management within an ESMP. Probably the best recognized management philosophy is that of Plan, Do, Check and Act also known as the Demming cycle or PDCA. The PDCA approach is very simply one of:

- defining what needs to be achieved,
- defining what will be done to achieve what needs to be achieved,
- checking to see whether what was planned to be achieved is actually being achieved, and
- taking action where what is meant to be achieved is not being achieved.

9.2 The E&S Management Framework

9.2.1 Overview

The overarching E&S management approach is illustrated schematically in **Figure 39** and described in more detail in the following sections.

9.2.2 Policy

NER must develop an overarching *Environmental and Social Policy* for the Project. The purpose of the policy is to detail the Company's position in respect of various E&S risks and possible benefits and to commit to defined good practice requirements. A key part of the policy must be to commit to full compliance with EBRD policy obligations as part of the loan agreement.

9.2.3 EBRD requirements

The Project-specific EBRD requirements, as stemming from the ESIA, must be detailed in the ESMP, The ESAP details high level commitments by NER as part of the loan agreement.

9.2.4 Project impacts

Project impacts derive from the ESIA conducted on the Sveti Nikole-Veles pipeline. For each identified impact (singly or combined), objectives must be articulated as outcomes-based objectives.

9.2.5 Objectives

Objectives are started for each of the impact areas as an overall commitment to preventing or at least minimising the negative impacts and enhancing the benefits. Objectives must be stated as to what must be achieved by the project in respect of E&S elements as detailed in the box below.

The principle of outcomes-based objectives

ESIAs typically contain a raft of mitigation. While that mitigation is important, in itself it is no guarantee that the required outcomes will be achieved, but it is the outcomes that are most important. For example, if mitigation for dust is to spray water on gravel roads, the outcome sought is to prevent dust, not to spray water. There are many different ways that the same outcome of preventing dust could be achieved and the principle of adaptive management (despite being tautologous) implies being flexible in what gets done but being totally inflexible in pursuing what needs to be achieved. Engineers on a project should be given the flexibility to find optimum ways of achieving a stated outcome, not told what to do to achieve that outcome. If the project is measured on its actual E&S management performance then mitigation must be adapted until it works not just endlessly repeated regardless of what is being achieved.

9.2.6 Indicators

Whilst objectives detail overall intent, indicators must be defined that could be used to ascertain whether the objective is being met.

9.2.7 Targets

For each indicator, specific targets must be defined that serve to quantify, as well as possible, the intent of the objective. For example, objectives such as 'maximise' or 'minimise' can be expressed quantitatively to articulate exactly what those terms mean.

9.2.8 Management Plans

The purpose of the management plans is to express the mitigation that must be applied to be able to meet the targets. The management plans articulate what must be done to meet the performance targets and thereby achieving the objectives. Again, it must be recognised that these mitigation plans, can and should be adapted as the project unfolds with a view to consistently meeting the performance targets. The plans can be modified as necessary but the performance targets must remain steadfast. The mitigation defined in this ESIA is viewed as the minimum requirement for the management plans and is listed in **Table 59**.

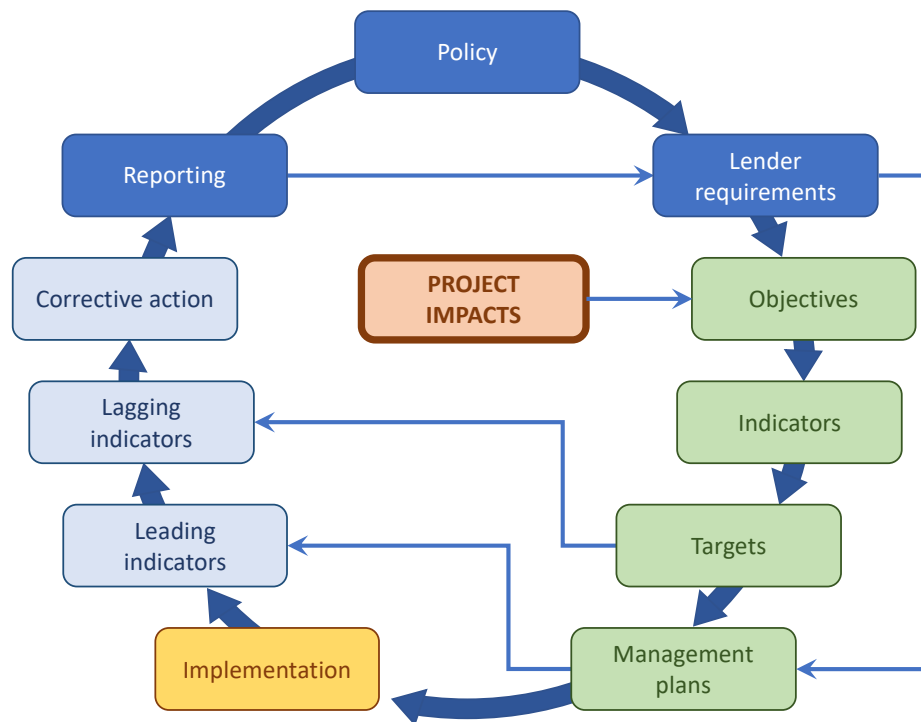


Figure 39. Schematic Presentation of the E&S Management Approach Advocated for the Pipeline Project

9.2.9 Implementation

Implementation of the management plans is always the most challenging part of the ESMP. For this reason, the management plans must detail what, who, where and when of the mitigation.

9.2.10 Monitoring of Leading Indicators

Environmental and social performance monitoring is always historical because it reflects what has happened. If a performance target is missed then the objective has not been met at least for the period of time for which the monitoring took place. For that reason, performance data is viewed as 'lagging'. Lagging indicators reflect what has been achieved (or not) and as such are reactive – put differently, lagging indicators reflect the question 'did we do things right?' For effective E&S management, leading indicators must also be defined, as a proactive approach to ensuring that the targets are met. The question asked by leading indicators, is 'did we do the right things?' Simply put, leading indicators simply reflect whether or not mitigation was in fact implemented as detailed in the management plans.

9.2.11 Monitoring of Lagging Indicators

Lagging indicators derive directly from the indicators and targets set relative to the objectives. Lagging indicators are typically E&S quality variables such as dust concentrations, noise, water quality concentrations and so forth.

9.2.12 Corrective Action

If a performance target is not met, two questions can be answered in reviewing why, namely was the mitigation inadequate (lagging) or was the mitigation simply not implemented (leading)? As a function of either or both possibilities, corrective action must be defined and implemented.

9.2.13 Reporting

The final requirement is to formalise the E&S management into reports that can be submitted to the EBRD as required.

Table 59. Summary of the Mitigation Defined in this ESIA by Project Phases and The Organization Responsible for Implementation of The Mitigation



Impacts / Risk	Project Phase	Mitigation	Responsibility
Environmental and Social Impact Assessment Report: Sveti Nikola-Veles Gas Pipeline, Regional Gasification Project - Ref No 57-004 Soils	Construction	Develop and implement a Soil Rehabilitation Plan that includes <i>inter alia</i>:	Construction contractor
		<ul style="list-style-type: none"> Record available depth of topsoil / fertile soil (depending on land use) – use to plan depth of strip, soil protection risk mitigation and monitoring of soil replacement and rehabilitation. 	
		<ul style="list-style-type: none"> Stripping in sensitive areas needs to be adapted – if wetlands or rivers are being crossed – narrow the stripped areas by creating wider servitude for larger laydown areas outside of the sensitive areas. 	
		<ul style="list-style-type: none"> Use bogmats in wet areas – they take away the need for tricky rehabilitation by avoiding stripping and spreading weight of plant to reduce compaction. 	
		<ul style="list-style-type: none"> Only strip across the work areas of the servitude – no need to strip the area under the stockpile itself. 	
		<ul style="list-style-type: none"> Make provision for drainage in and out of the project footprint and erosion protection at toe of slope 	
		<ul style="list-style-type: none"> Strip fertile soil over the trench or other excavations that need to be reinstated, stockpile separately adjacent to trench, making provision for battering back of trench sides, plan drainage and erosion protection 	
		<ul style="list-style-type: none"> Avoid mixing of subsoils or imported material with the in situ or stockpiled top and fertile soils especially getting stones into agricultural soils. 	
		<ul style="list-style-type: none"> Avoid compaction where possible and apply mitigation to restore soil structure and function 	
		<ul style="list-style-type: none"> During excavation check (record as evidence) characteristics of the soil profile and ID areas with impervious layers (rock, compact clays etc) these layers need to be reinstated to ensure that their function in the landscape is not impacted on the long term. 	
		<ul style="list-style-type: none"> Remove imported material / debris from the soil before landscaping and shaping. 	
		<ul style="list-style-type: none"> Ensure decompaction of lower layers before topsoil is replaced. 	
		<ul style="list-style-type: none"> Limit access to rehabilitated areas 	
		<ul style="list-style-type: none"> Apply soil amelioration where laboratory testing indicates a reduction in soil quality. 	
		<ul style="list-style-type: none"> Only cover soil stockpiles if there is a significant risk of soil losses and in the right season. 	
		<ul style="list-style-type: none"> Careful management of weeds can help bind soils but these need to be cut short regularly to avoid seeding. 	
		<ul style="list-style-type: none"> Apply additional erosion protection measures on steep slopes. 	

Surface and Groundwater	Construction	Develop and implement a Construction Hazardous Materials and Spill Prevention and Countermeasures Management Plan that includes <i>inter alia</i>:	Construction contractor
		<ul style="list-style-type: none"> Ensure that all hazardous materials are correctly stored, transferred, transported and used following good international practise; 	
		<ul style="list-style-type: none"> Refuelling must be done in a manner that minimises the risk of spills such as cut-off switches, use of drip trays, overfilling protection and so forth; 	
		<ul style="list-style-type: none"> No manual syphoning or decanting of fuel products. Fuel products may only be transferred using a pump to pump the fuel from one container to another; 	
		<ul style="list-style-type: none"> If there is a spill, it must be immediately stopped and countermeasures implemented to clean up the spill as quickly and as effectively as possible; 	
		<ul style="list-style-type: none"> All water courses are to be crossed using HDD only. No excavations of natural of watercourses will be allowed on the project 	
		<ul style="list-style-type: none"> Water used for pressure testing must not contain any residual chemicals that would render the water contaminated. If water used for pressure testing is contaminated it must be disposed in a system that can be used to treat the water before it is discharged to a surface water environment. 	
		Identify materials that may not be used on the project including substances banned by the Montreal protocol and subsequent conventions, persistent organic pollutants and so forth and include this list in the environmental specification.	
		Determine quality and characteristics of ground and surface water that will be affected by trench excavation or river crossings to provide a baseline against which future changes can be assessed.	
		Determine water quality and flow targets appropriate to the sensitivity of the receiving water environment so that the effects of construction can be monitored, and corrective action implemented timeously.	
		Treat all pumped groundwater to remove sediment either through a settling pond, or filtration.	
		Manage surface drainage during construction in such a way as to prevent scouring of backfill and topsoil and/or sedimentation of runoff water.	
	Operations	Develop and implement an Operations Hazardous Materials and Spill Prevention and Countermeasures Management Plan that includes <i>inter alia</i>:	NER/Operations team
		<ul style="list-style-type: none"> Refuelling must be done in a manner that minimises the risk of spills such as cut of switches, use of drip trays, overfilling protection and so forth; 	

		<ul style="list-style-type: none"> If there is a spill, it must be immediately stopped and countermeasures implemented to clean up the spill as quickly and as effectively as possible; 	
Air quality	Construction	Develop and implement a Construction Atmospheric Emissions Management Plan that includes <i>inter alia</i>:	Construction contractor
		<ul style="list-style-type: none"> Do not allow vehicles and machinery to idle. If vehicles and machinery are not being used then they must be switched off; 	
		<ul style="list-style-type: none"> Operating machinery must be under load so as to operate at higher revs and to have more complete combustion of fuel; 	
		<ul style="list-style-type: none"> Any vehicle or machinery emitting smoke must be tuned for better performance; 	
		<ul style="list-style-type: none"> Water can be used for dust suppression but chemical palliatives provide better dust control and use less water; 	
		<ul style="list-style-type: none"> Dust generating activities must be suspended during high wind speeds. 	
		<ul style="list-style-type: none"> Establish vegetation growth on temporary stockpiles of at least topsoil to minimise wind-blown dust; 	
		<ul style="list-style-type: none"> Limit vehicle speeds on unpaved roads 	
		<ul style="list-style-type: none"> Vehicles transporting soil must be covered with tarpaulins. 	
	Operations	Develop and implement an Operations Atmospheric Emissions Management Plan that includes <i>inter alia</i>:	NER/Operations team
		<ul style="list-style-type: none"> Develop and implement a preventative maintenance regime to reduce the risk of fugitive emissions and to prevent catastrophic failure of any elements of the pipeline infrastructure. 	
Waste	Construction	Develop and implement a Construction Waste Management Plan that includes <i>inter alia</i>:	Construction contractor
		<ul style="list-style-type: none"> Performance targets for waste generation by the contractors. Performance against targets to be reported monthly. 	
		<ul style="list-style-type: none"> All waste streams are to be categorised in terms of quantity, hazard, generation frequency and recyclability and disposal options define and implemented; 	
		<ul style="list-style-type: none"> Each hazardous waste type must have an MSDS that is always available to accompany the waste; 	
		<ul style="list-style-type: none"> Opportunities for source reduction, as well as reuse and recycling must be promoted and maximised; 	
		<ul style="list-style-type: none"> Hazardous wastes must be segregated from non-hazardous wastes; and 	
		<ul style="list-style-type: none"> A project waste register for materials removed from the construction site must be maintained, indicating type, quantity, date, and so forth. 	
		<ul style="list-style-type: none"> Waste must be properly segregated into different types, so that opportunities for re-use and recycling are not compromised 	

		<ul style="list-style-type: none"> • Transportation of waste must be conducted to prevent or minimize spills, releases, and exposures to employees and the public. • All waste containers must be secured and labelled with the contents, properly loaded on transport vehicles and accompanied by a shipping paper (i.e., manifest) that describes the load; and • Upon delivery of the waste consignment at the final waste disposal facility, the facility operator must sign the Transfer Note confirming the safe disposal of the waste. • Construction Contractor's handling, treating and disposing of hazardous waste must be reputable and legitimate enterprises, licensed by the relevant regulatory agencies and follow good international industry practice for waste handling and disposal ensuring compliance with applicable local and international regulations. • For each construction area provision must be made for intermediate storage of wastes generated in that area; and • Suitable spill clean-up materials are kept available on or close to the designated storage area, to deal with any accidental spillages/leakages. <p>Oblige contractors to adopt the waste management hierarchy in managing construction waste. Records must be provided of the safe final disposal of all types of waste.</p> <p>The collection and recycling or safe disposal of used welding rods must be included in the waste management plan.</p>	
Noise	Construction	<p>Develop and implement a Construction Noise Management Plan that includes <i>inter alia</i>:</p> <ul style="list-style-type: none"> • Noise prevention must be applied where predicted or measured noise impacts from the construction area could exceed the applicable noise level guideline at the most sensitive point of reception; • Noise control measures must be applied at source; • Noise reduction options include: • Limiting the hours of operation for specific operations (e.g transport); and • Use speed limiting to control noise from vehicles; • Maintaining a mechanism to record and respond to complaints. • Ensure routine preventative maintenance of vehicles and machinery to reduce noise; • Conduct routine inspections on vehicles and machinery so that excess noise can be corrected timeously. 	Construction contractor
Biodiversity	Construction	The pipeline alignment must be revisited to see whether it is not possible to avoid habitat destruction in the CH and PBF areas;	NER

		The formal protection status of Emerald Sites directly affected by the pipeline footprint must be determined, the protection requirements ascertained and applied to the project, even if that means rerouting the pipeline.	
		If the pipeline cannot be realigned:	
		• The CH loss must be offset in a manner that results in net gain of CH.	
		• The Natural habitat loss must be offset in a manner that results in no net loss.	
		Set a maximum allowable length of open trench ahead of the pipelaying and backfilling and rehabilitation and strictly enforce that requirement. This will serve to minimise the risk of animals falling into the trench.	
		Develop and implement a construction biodiversity management plan that includes <i>inter alia</i>:	
		• All river crossings must be affected using HDD, but HDD will not necessarily be required for anthropogenic water structures such as irrigation canals;	
		• All mitigation previously defined for the control of dust, other atmospheric emissions, noise, wastewater and waste must be fully implemented;	
		• Poaching must be strictly outlawed amongst construction workers with punitive consequences.	
		• Vehicle speeds must be limited in the construction areas and strictly enforced.	
Local and National Economies	Construction	• Open trenches must be barricaded to prevent animals falling into the trenches.	Construction contractor
		• Understand bird reproduction and ensure that construction activities do not impact on breeding/nesting seasons.	
Local Labour Market / Employment	Construction	• Any invasive plant species identified in the construction corridor must be removed immediately and care taken not to further propagate the seeds.	Construction contractor
		Oblige the Construction Contractor to develop (during the design development) and implement (during the construction phase) a Procurement Plan aligned with national legislation and EBRD PR1; such Plans will aim at maximizing local procurement subject to service/product requirements.	
		Develop (prior to construction) and implement a Recruitment Policy for the Project in line with national legislation and EBRD PR1/PR2 and the Company's Human Resource Policy;	
		Oblige the Construction Contractor to develop a Construction Phase Recruitment Procedure , have it approved by the Company at least a month before the construction, and implement it. The Recruitment Procedure will <i>inter alia</i> :	
		• Specify the qualifications and skill levels for the construction staff;	NER
		• Prioritise the employment of people living in the three Project-affected municipalities and in particular of residents of settlements along the pipeline route, subject to their qualification;	
			NER, Construction Contractor to implement

		<ul style="list-style-type: none"> Contain training provisions for the potential local workforce; 	
		<ul style="list-style-type: none"> Establish a female employment target at 12-15% for the construction workforce. 	
		<ul style="list-style-type: none"> Require that construction workers would be provided with an employment reference/ confirmation letter and a skills/training log, to enhance their subsequent employment prospects 	
	Operations	Establish a female employment target at 50% for NER's direct employees.	NER
		if the need for non-skilled and semi-skilled workers emerges at the operation stage, prioritise the employment of the residents of the three Project-affected municipalities and in particular of residents of settlements along the pipeline route, subject to their qualification;	NER
		Provide workers with an employment reference/ confirmation letter and a skills/training log, to enhance their subsequent employment prospects	NER
Land, Assets and Land-Based Livelihoods	Pre-construction	Prepare a Livelihood Restoration Plan (LRP) for the Sveti Nikole – Veles Section based on principles and requirements stipulated in the LRF for North Macedonia – Regional Gasification Project, agree the LRP with the EBRD, and implement it.	NER
	Construction	Make announcements on the start and end dates of trenching and road crossing works within a certain pipeline section two weeks before the planned start of the works; such announcements are part of the Stakeholder Engagement Programme within the Stakeholder Engagement Plan for North Macedonia – Regional Gasification Project (2022).	NER
	Operations	Address the operations-related economic displacement impacts in the Livelihood Restoration Plan (LRP) for the Sveti Nikole – Veles Section to be prepared prior to the construction stage.	NER
Public Utilities, Services and Infrastructure	Construction	Oblige the Construction Contractor to:	NER
		<ul style="list-style-type: none"> Include medical emergency to the Emergency Response Plan. 	Construction contractor
		<ul style="list-style-type: none"> Provide notice in advance to local hospitals about the number of workforce and duration of work. 	
		Oblige the Construction Contractor to develop and implement the Waste Management Plan;	
		Carry out a Road Safety Audit (RSA) to assess the physical condition of roads and bridge crossings and their safety, including the assessment of the risk of traffic accidents and road pavement/bridge collapse;	
		Oblige the Construction Contractor to develop and implement the optimal Construction Traffic Scheme using RSA findings and Construction Traffic Management Plan. As part of its preparation:	
		Assess the conditions of the existing unpaved tracks to determine if their reinforcement is needed to bear the weight of the Project's heavy vehicles, and undertake this enhancement as needed.	
		Where unpaved roads will be used, undertake a pre-construction survey of the public and private buildings within 10m from these roads to document their conditions.	

		Consult and document the consultations with the representatives of the affected municipalities and settlements about which road they would prefer the construction traffic to use.	
		Coordinate any track/road reinforcement or rehabilitation activities with the due municipal and roads authorities, local users, and other stakeholders as needed.	
		Ensure alternative access roads for the users or, if not, possible, confine the road blockage to a minimum duration.	
		As per the ESMP and SEP, provide information to the local residents about the start of construction traffic movement at least two weeks before the construction commences.	
Community Health, Safety and Security	Construction	Oblige the Construction Contractor to develop (during the pre-construction phase) and implement (during construction and operations) and the Construction Atmospheric Emissions Management Plan and Construction Noise Management Plan to control emissions, noise from project sources	NER
		Oblige the Construction Contractor to develop and agree with the Company (during the pre-construction phase) and implement (during construction) a Construction Site Operating Procedure. The Procedure to include, <i>inter alia</i> : a ban on night-time construction activities and vehicle traffic	NER
		Carry out road safety audit (RSA) which should inform development of an optimal Construction Traffic Scheme taking into account the location of sensitive receptors including residential areas and social facilities; provide bypass roads to avoid where possible, impacts on local residents (see details in Section 8.7.3.3);	Construction contractor
		Oblige the Construction Contractor to develop (during the pre-construction phase) and implement (during operational phase) develop and a Construction Traffic Management Plan (see details in Section 8.7.3.3). The Plan should promote the selection and use of roads in a manner that minimises risks to community safety by giving preference to the roads bypassing human settlements. Where keeping the Project traffic away from human settlements is not possible, the safest route options should be identified that use wider roads and lie away from schools, preschool facilities, polyclinics and hospitals. The Plan should be agreed with the municipal and/or national safety services and local authorities.	
		Oblige the Construction Contractor to:	
		<ul style="list-style-type: none"> Maximize the use of the local workforce; 	
		<ul style="list-style-type: none"> Establish or implement an existing worker Code of Conduct; 	
		<ul style="list-style-type: none"> Conduct health awareness training for workers including sexually transmitted diseases and HIV/AIDS at induction and then periodically throughout their employment; 	
		<ul style="list-style-type: none"> Monitor the implementation of workers' health specification, including among contractors 	
Employee Health and Safety	Construction	Develop and implement a Construction Occupational Health and Safety Management Plan that includes <i>inter alia</i>:	Construction contractor

	<ul style="list-style-type: none"> • Preparation of emergency response plans specifically applicable to construction and operations of the pipeline (especially those parts of the route that may be geographically isolated) and including the provision and maintenance of necessary emergency response and rescue equipment;
	<ul style="list-style-type: none"> • Sufficient number of first aid trained employees to respond to emergencies;
	<ul style="list-style-type: none"> • Implementation of specific personnel training on worksite health and safety management including a communication program with a clear message about corporate management's commitment to health and safety. The communication program should also include regular meetings such as daily "toolbox" talks prior to initiation of work shifts;
	<ul style="list-style-type: none"> • Integration of behavioural considerations into health and safety management, including on- the-job behavioural observation processes;
	<ul style="list-style-type: none"> • Illumination systems should be adequate and safe for the planned working conditions.
	<ul style="list-style-type: none"> • Signage in hazardous areas, installations, materials, safety measures, emergency exits, and other such areas should be in accordance with international standards
	<ul style="list-style-type: none"> • To the extent that alternative technologies, work plans or procedures cannot eliminate or sufficiently reduce a hazard or exposure, workers and visitors must be provided with the necessary personal protective equipment (PPE) and provide instruction and monitoring in their appropriate maintenance and use. Applicable PPE include, at a minimum, safety helmets and footwear, in addition to ear, eye, and hand protection.
	<ul style="list-style-type: none"> • Control operations by having a permit to work system for performance of high hazardous tasks;
	<ul style="list-style-type: none"> • Schedule periodic inspection and maintenance of working area and equipment;
	<ul style="list-style-type: none"> • Control availability of the first aid kits, fire extinguishers, PPEs throughout the construction area in sufficient numbers and properly maintained;
	<ul style="list-style-type: none"> • Require good housekeeping at all times across the construction area;
	<ul style="list-style-type: none"> • Prevent unauthorised access to construction areas
	<ul style="list-style-type: none"> • Define maximum speed at the construction site, assign dedicated parking areas for employee vehicles;
	<ul style="list-style-type: none"> • Prevent workers from entering the trench unless absolutely necessary and where it is necessary, ensure that the trench sides are shored appropriately to prevent trench collapse.
	Reduce occupational health risks by:
	<ul style="list-style-type: none"> • Ensuring equipment is maintained to manufacturers standards and that noise baffles are fitted.
	<ul style="list-style-type: none"> • Reducing exposure times for people working near noisy machinery;

		<ul style="list-style-type: none">• Providing workers with appropriate hearing protection.		
		<ul style="list-style-type: none">• Require pre-placement medical examinations of workers;		
		<ul style="list-style-type: none">• Implement a drugs and alcohol policy;		
		<ul style="list-style-type: none">• Provide preventive treatment to site workers and families, e.g., immunisation; health monitoring.		
	Operations	Develop and implement an Operational Occupational Health and Safety Management Plan that includes <i>inter alia</i>:	NER/Operations team	
		<ul style="list-style-type: none">• Introduce and enforce OHS instructions on performance of maintenance and inspection works on safe driving;		
		<ul style="list-style-type: none">• Conduct OHS training for all workers involved in the maintenance/inspection activities;		
		<ul style="list-style-type: none">• Define minimum qualification requirements for the performance of works;		
		<ul style="list-style-type: none">• Control operations by having a permit to work system for performance of high hazardous tasks;		
		<ul style="list-style-type: none">• Ensure pre-placement medical examinations of workers		
Tourism, Recreation and Hunting		Construction	As part of the Livelihood Restoration Plan's socio-economic survey for the pipeline, determine if hunting activities are part of the livelihood sources of the land-take-affected households, assess the related impacts and develop the commensurate livelihood restoration measures, if necessary.	NER
			In consultations with the municipal authorities and village representatives, prior to the construction stage, plan the access roads and organize the construction/operation activities so that to ensure access (direct or alternative) to hunting and recreation areas.	
Cultural Heritage		Construction	Before the construction of the gas pipeline, engage a qualified Cultural Heritage Expert from an authorized institution to complete a survey of the planned pipeline route (as required in the Report No. 08-73/3 from 25th March 2021 by the National Conservation Centre of Cultural Heritage-Skopje, North Macedonia);	NER
			Ensure that a qualified Cultural Heritage Expert from an authorized institution be present during the construction activities and that specific care be taken during the activities near:	
	a) the Kula archaeological site, which is located 200m from km 24+000.00 of the pipeline (per the to Report No. 08-73/3 from 25th March 2021 from the National Conservation Centre of Cultural Heritage-Skopje, North Macedonia); and			
	b) the Kanda Geoglyph archaeological site, which is located 300m from km 8+000.00 of the pipeline.			
	These surveys will identify if the archaeological sites do in fact extend into the pipeline's construction corridor and will propose the mitigation: e.g., pipeline re-routing or site excavations to be completed before the construction can proceed.			
	Reduce the size of the construction corridor as much as possible;		Construction contractor	

		<p>Limit vehicle movements and machinery activities to the cleared area within the construction corridor, and minimise the scale of earth works;</p> <p>Demarcate the known archaeological sites as needed, to avoid disturbance to assets (via vibration or dust pollution or accidental damage);</p> <p>Prior to construction works, develop a Chance Finds Procedure for the Project and train the Construction Contractor and its relevant workers in applying this Chance Finds Procedure (so that they can identify the chance finds, stop the works and notify management).</p>	
	Operations	<p>Restrict repair work sites to the operations and maintenance corridor of 7 m centred on the pipeline axis;</p> <p>Limit vehicle movements and machinery activities to the access roads arranged during the construction, and minimise the scale of earth works;</p> <p>Comply with the demarcation of the known archaeological sites;</p> <p>Prior to the operations stage and then regularly, train repair/maintenance workers in applying the Chance Finds Procedure.</p> <p>In case larger gas pipeline reconstruction/repair activities connected with earth excavations are expected to go beyond the earlier disturbed areas (a 22 m construction corridor) at the chainage km 24+000.00 (Kula site) and km 8+000.00 (Kanda Geoglyph), engage a qualified Cultural Heritage Expert from an authorized institution to be present during these works.</p>	NER/Operations team
Emergency conditions - natural disasters	Construction	Develop and implement a Construction Emergency Response Plan that includes <i>inter alia</i>:	Construction contractor
		<ul style="list-style-type: none"> Identify plausible natural disasters that could happen during the construction phase, identify the risks to worker health and safety brought about by such natural disasters, and develop and implement mitigation to prevent or at least reduce such risks.] 	
		<ul style="list-style-type: none"> Mitigation may take the form of PPE but provision must also be made for an orderly evacuation of the site should a natural disaster threaten or occur. 	
		<ul style="list-style-type: none"> The orderly evacuation must be rehearsed multiple times (drills) to ensure that when the real need to evacuate manifests, that it can happen effectively and quickly enough to minimize risks of injury or worse for construction workers. 	
		<ul style="list-style-type: none"> Such drills should also include the simulation of injury to construction workers so that the safe medical evacuation of injured personnel is also provided for. 	
	Construction	<p>Locally regulated or internationally recognized building codes must be applied to ensure structures are designed and built in accordance with good engineering practice, including fire prevention and response.</p> <p>Engineers responsible for designing and constructing facilities, must certify the applicability and appropriateness of the structural criteria employed.</p> <p>Codes must be followed, for:</p>	Construction contractor

	Operations	<ul style="list-style-type: none"> • Soils and foundations 	
		<ul style="list-style-type: none"> • Site grading 	
		<ul style="list-style-type: none"> • Structural design 	
		<ul style="list-style-type: none"> • Accessibility and means of egress 	
		<ul style="list-style-type: none"> • Fire-resistant construction 	
		<ul style="list-style-type: none"> • Flood-resistant construction 	
		A Hazards and Operability Study (HAZOPS) must be conducted to ensure that:	NER/Operations team
		<ul style="list-style-type: none"> • Process conditions reduce the potential consequences of an accidental off-site release 	
		<ul style="list-style-type: none"> • There is effective shut-down to reduce the amount of material escaping and release duration, from containment; 	
		<ul style="list-style-type: none"> • Operations and control and inspection and maintenance are optimised specifically through the use of intelligent pigs that can be used to assess possible pipeline integrity risks along the pipeline; 	
Emergency conditions - Accidents	Construction	Establish a dedicated health and safety management function on the project, that:	Construction contractor
		<ul style="list-style-type: none"> • Conducts safety risk assessments on all construction activities; 	
		<ul style="list-style-type: none"> • Identifies and ranks safety risks; 	
		<ul style="list-style-type: none"> • Develops mitigation to prevent or at least minimize all such risks to tolerable levels; 	
		<ul style="list-style-type: none"> • Ensures site wide implementation of all safety mitigation; 	
		<ul style="list-style-type: none"> • Ensures daily surveillance of potentially risky activities and ensures that activities are stopped where safety risks are present; 	
	Operations	<ul style="list-style-type: none"> • Continually reviews performance and seeks improvements that are implemented as needed; 	NER/Operations team
		During construction place a continuous marker (ribbon) in the trench above the pipeline but buried by the backfill to serve as a warning should there be a form of digging that would potentially damage the pipeline.	
		Pipeline will include the installation of a SCADA system.	
		Define plausible accident scenarios that could result in potential impacts on the environment either through the accident itself or through actions taken in response to an emergency scenario e.g., firefighting;	
		Assess the environmental aspects of the above accident scenarios and the likely significance of those aspects resulting in impacts on the environment to ensure that suitable controls are in place;	

		<p>Define specific actions that can be taken, together with the personnel required to give effect to such actions and detail plans in response to the various emergency scenarios;</p> <p>Define and source equipment needed to manage and control emergency events and ensure personnel are trained in the use of that equipment;</p> <p>Establish a mechanism for immediate mobilization of a central control and coordination function (operations room function) in the event of an emergency, to coordinate information and summons the requisite emergency services;</p> <p>Detail how to notify:</p> <ul style="list-style-type: none"> • Pipeline employees; • The general public; and • Emergency response agencies. <p>Conduct training exercises, drills and tests to determine the readiness status of the emergency response team, highlighting areas for improvement in the Emergency Response Plan and enhance the performance of the emergency response team.</p>	
Cumulative impacts	Construction	When developing the construction schedule for the HDD works at the crossings with the existing roads, take into account the traffic loads on them and match the works with low traffic intensity as much as possible.	Construction contractor

9.3 Checking and Corrective Action

9.3.1 E&S Monitoring Requirements

Data from the E&S baseline studies undertaken prior to the construction and commissioning of the pipeline project are to be considered as the reference data for aspects such as air quality, surface water quality, ambient noise levels, biodiversity and social receptors. The required monitoring is summarised in **Table 60**.

Table 60. Summary Pipeline Project Monitoring Requirements

Parameter	Frequency
Ambient PM ₁₀ concentrations	Campaign measurements
Dust fallout	Continuous, resolved monthly
Inventory of hazardous materials on site and quantities	Amended monthly
No and size of spills of hazardous materials	Per event
No of spills and area rehabilitated	Per event
Soil quality compared to baseline	Campaign
Fire occurrence and scale	Per event
Monetary costs of fire damage	Per event
Grievances related to fire	Per event
Noise – in dB(A) at offsite receptors	Monthly
Grievances related to fire	Per event
Total suspended solids in stormwater	Monthly
Visible signs of erosion	Weekly
Hydrocarbons concentrations in stormwater	Per rainfall event exceeding 10 mm
Waste recycled	Monthly
Waste accounts showing quantities of waste per waste class generated per month	Monthly
Waste accounts showing quantities of waste per waste class disposed per month together with the disposal mechanism	Monthly
Area rehabilitated versus disturbed	Monthly
Natural habitat destroyed versus offset natural habitat	Monthly
Critical habitat destroyed versus critical habitat regained	Monthly
Near misses	Weekly
First aid cases	Per event
Disabling injury	Per event
Lost time injuries	Per event
Lost time injury frequency rate	Monthly
Fatalities	Per event
Grievances	Per event
Off-site accidents	Per event
Third party injuries	Per event
Grievances	Per event
Emergencies	Per event
Industrial action	Per event

Parameter	Frequency
Number of formal grievances lodged	Summarised Monthly
Productivity	Monthly
No of stakeholder engagements	Monthly
Public protests or disruption	Per event

9.3.2 Data Quality

Project monitoring programmes must apply approved methods for quantitative and qualitative data collection. Monitoring should be conducted by or under the supervision of trained E&S specialists and analysis should be conducted by entities permitted or certified for these purposes. All data are to be tabulated and stored electronically for a minimum period of five years.

9.3.3 Inspections

Regular and systematic visual inspection provides an important source of information on E&S management performance. Most notably inspection serves to assess activities and the degree to which these reflect the project's E&S management requirements. At the same time, some potential impacts are difficult to monitor quantitatively, such as soil erosion and waste management. For this reason, inspections are a key component of checking and corrective action and indeed of the ESMP as a whole. Inspections will be scheduled in such a way that all activities across the project are inspected consistently and regularly but should happen at least every fortnight across the working front, and possibly more frequently where specific non-compliances are identified.

9.4 Audits

Audits are systemised and formalised methods of assessing the degree to which the requirements of the ESMP have been implemented. Audits are thus used to ensure that procedures, monitoring, reporting and other management functions are operating as they are intended to as components of the overall management philosophy. Audits must be scheduled regularly to ensure that the components of the ESMP that allow it to work as a system, are being regularly checked for effectiveness. Audits must be conducted at least once every three months.

9.4.1 Implementation

As part of the overall checking and corrective action regime it is important to maintain an index of the implementation of required management actions. In order to do so it is necessary to track the various activities that must be implemented as well as their implementation status. The implementation status can be derived from audits and inspections and the submission of progress reports that detail the specific implementation status of given actions.

9.4.2 Corrective Action

9.4.2.1 Identifying corrective actions

The management component of the ESMP derives from evaluating all the information that becomes available on a weekly/monthly/quarterly and annual basis. It is important to note that ESMP is based on two types of indicators, namely leading and lagging indicators. Leading indicators are proactive and serve to highlight whether the project has adequate mechanisms in place to address key social and environmental risks as identified in the ESIA. Lagging indicators provide information on historical incidents and allow the project to appraise the efficacy of the corrective actions implemented and the performance of the management system as a whole (typically assessing performance against targets). The project can use this information to develop an understanding of why a target was missed. Information availability is thus critical to the success of the ESMP and a key implementation discipline is to ensure that reporting is timely, effective, and accurate.

Where a non-conformance is identified it is necessary to evaluate the reason for the non-conformance and to define the necessary corrective action. It is important to recognise that corrective action can take many different forms but it is fundamentally about changing a component of the overall management approach. For example, it may be that implementation has been ineffectual, or the defined management actions have been fully implemented but they are simply not working. Whatever the cause, the cause must be identified and action taken to rectify the cause. Whatever corrective action is defined, it must be recorded and formalised and implementation of the corrective action tracked. In this manner a record of corrective action can be established that serves as a reference for future corrective action. Where corrective action is seen to result in the desired effect, the ESMP must be updated accordingly to reflect that corrective action and ensure that is adopted as practise into the future.

9.4.2.2 Incident register

The project will maintain an incident register that serves to provide a central record of all incidents on the project. An incident is defined as any event that results in the requirements of this ESMP being contravened, whether that be flouting the mitigation prescribed or performance not meeting defined targets. The incident register will be divided into Environmental and Social Incidents and Occupational Health and Safety Incidents and the full circumstances of the incident are to be described and recorded. There will be a one-to-one correlation between performance and the incident register so that if there is a non-conformance evident in the performance monitoring, then the incident that resulted in that non- conformance will be available in the incident register.

9.4.2.3 Close out procedures

Every incident in the incident register is to be resolved or 'closed out' over time. Such a closing out is to be described in the incident register, together with what was done to notify the complainant (in the event that there was a complaint), whether the authorities were notified (in the event that the seriousness of the incident warranted such reporting) and what has been implemented on the project to ensure that there is not a repeat of the incident. The close-out is to be signed off by the project manager, reflecting accountability for the resolution of the incident.

9.4.2.4 Documenting corrective actions

All corrective actions are to be documented as part of the record keeping of the project and this ESMP is to be updated with such corrective actions to ensure that at all times the ESMP correctly reflects the management practices being used by the project.

ANNEXES

Annex 1. ENVIRONMENTAL QUALITY STANDARDS OF THE RNM

Water quality

Based on the purpose of the water use and the degree of the water purity, the Decree on classification of the waters (OG of RM No. 18/1999), divides the surface waters including watercourses, lakes and accumulations into five classes (see the table below).

Classes of Water Quality According to the Macedonian Regulations

Class	Purpose / Use of Water
I	This is very clean, oligotrophic water, which in its natural state, with possible disinfecting, can be used for drinking and production and processing of food product and is suitable for mating and cultivation of noble types of fish – salmonids. The buffering capacity of the water is very good. It is constantly saturated with oxygen, with low content of nutrients and bacteria, contains very slight, occasional anthropogenic pollution with organic matters / but not with inorganic matters.
II	This is a very clean, mesotrophic water, which in its natural state can be used for bathing and recreation, water sports, production of other types of fish / cyprinids /, or which can be used – after usual methods of purification / coagulation, filtration, disinfection etc./ –for drinking and production and processing of food products. The buffering capacity and oxygen saturation, present throughout the year, are good. The loadings may lead to slightly increased primary productivity.
III	That is moderately eutrophic water, which in its natural state can be used for irrigation, and after usual purification methods (conditioning) for industries, which do not need drinking water quality. Buffering capacity of the water is low, but it maintains the pH value / acidity at a level still suitable for most fish. Occasionally oxygen deficit occurs in the hypolimnion. The level of primary production is considerable, and some changes in community structure, including fish species can be observed. The load of harmful substances is evident as well as microbial pollution. The concentration of the harmful substances varies from natural levels to levels of chronic toxicity for aquatic life.
IV	This is strongly eutrophic, polluted water, which in its natural state can be used for other purposes only after certain processing. The buffering capacity is exceeded, which leads to higher levels of acidity that affects the development of the offspring. In the epilimnion there is oxygen saturation, and in hypolimnion there is oxygen deficit. Algal blooms are common. Increased decomposition of organic matter at the same time with the stratification of the water can cause anaerobic conditions and fish death. Mass occurrences of more tolerant species, fish population and benthic organisms can be affected. Microbiologic pollution does not allow the water to be used for recreation. Harmful substances emitted or released from the sediment / deposits can affect the quality of the aquatic life. The concentration of harmful substances can vary from level of chronic to acute toxicity to aquatic life.
V	This is strongly polluted, hypertrophic water, which in its natural state can be used for other purposes. The water has no buffer capacity and its acidity / pH value is harmful for many fish species. Large problems occur with the oxygen regime, namely saturation in hypolimnion absence of oxygen, leading to anaerobic conditions in hypolimnion. Decomposers dominate over producers. Fish and benthic species are constantly not present. Concentration of harmful substances exceeds acute toxicity levels for aquatic life.

In accordance with the Decree on categorization of the watercourses, lakes, accumulations and ground water (OG of RM No. 18/99 и 71/99), these water features are grouped in five categories. Each category from I to V corresponds with the classes of the water quality, from I to V.

Air quality

Limit values for air pollutants in Macedonia are established by the Decree on limit values and types of polluting substance in the ambient air (OG of RM No. 50/2005) based on the EU legislation and recommendations made by the World Health Organization (WHO). Legally binding limit values for Macedonia to achieve have already been set for SO₂, NO₂, PM₁₀, CO, lead, benzene (C₆H₆). For some pollutants, (e.g., NO), there is a long-term (annual mean) standard and a short-term standard.

In the case of NO₂, the short-term standard is for a 1-hour averaging period, whereas for PM₁₀ it is for a 24-hour averaging period. These periods reflect the varying impacts on health of differing exposures to pollutants (e.g., temporary exposure on the pavement adjacent to a busy road, compared with the exposure of residential properties adjacent to a road). Limit values of polluting substances for protection of human health are given in two tables below.

Air Quality Limit Values for Protection of Eco-systems and Vegetation

Pollutant	Protection	Average Period	Limit Value
SO ₂	Ecosystems	Year – winter period	20 µg/m ³
NO + NO ₂	Vegetation	Year	30 µg/m ³

Air Quality Limit Values for Protection of Human Health

Pollutant	Averaging period	Limit value	Permissible number of annual exceeding events
SO ₂	1 hour	350 µg/m ³	24
	24 hours	125 µg/m ³	3
NO ₂	1 hour	200 µg/m ³	18
	1 year	40 µg/m ³	0
PM ₁₀	24 hours	50 µg/m ³	35
	1 year	40 µg/m ³	0
CO	Maximum daily 8-hour average value	10 mg/m ³	0
Lead	1 year	0,5 µg/m ³	0
C ₆ H ₆	1 year	5 µg/m ³	0

Ambient noise

The law on the Protection against Environmental Noise (OG of RM No. 79/2007) defines the polluting noise in the environment as noise caused by undesired or harmful outdoor sound generated by human activities, posed by the close vicinity and causing nuisance and annoyance, including the noise emitted by transportation means on the road, railway and air traffic and coming from sites of industrial activities. A source of noise is a construction, plant, piece of equipment, installation, device, means or apparatus, the operation/activity or use of which causes permanent or temporary noise, noisy activity carried out by humans and animals, as well as other activities spreading and/or generating sound in the surroundings.

Nuisance is the annoyance caused by sound emission which is frequent and/or durable generated at given time and place and which prevents or makes impact on normal human activity and work, concentration, rest and sleeping. The annoyance by noise is the degree of nuisance of the population by the noise determined by means of field surveys or inspections. A noise indicator is a physical scale for describing environmental noise, which is related to harmful effect. Indicators are defined in the Ordinance for use of noise indicators, additional noise indicators, manner for noise measurement and methods for assessment of the environmental noise indicators (OG of RM No. 107/2008). There are four basic noise indicators:

- L_D – noise indicator during the day (period from 07,00 h to 19,00 h)
- L_E – noise indicator during the evening (period from 19,00 h to 23,00 h)
- L_N – noise indicator during the night (period from 23,00 h to 07,00 h)
- L_{DEN} – noise through day-evening-night as an average noise level.

This ordinance also defines the methods for calculation of industrial noise (various ISO methods), as well as methods for calculation of noise from different types of traffic.

Limit values for the basic environmental noise indicators are determined in the Ordinance on environmental noise level limit values (OG of RM No. 147/2008). In accordance with the level of protection against noise, the limit values for the basic noise indicators should not be higher than shown in the below table.

Ambient Noise Limit Values

Area, defined in relation to the degree of protection from noise	Noise level [dBA]		
	LD	LE	LN
Area with first degree	50	50	40
Area with second degree	55	55	45
Area with third degree	60	60	55
Area with fourth degree	70	70	60

The areas in regard to their degree of protection against noise are determined in the Ordinance for locations of the measuring stations and measuring spots (OG of RM No. 120/2008):

- Area with first degree of protection from noise is touristic and recreational area, an area in immediate vicinity to health-care institutions and core areas in natural protected areas.
- Area with second degree of protection from noise is an area which primary purpose is accommodation - residential area, area around educational buildings and buildings for social care and health care, area around playgrounds and public parks and public green areas.
- Area with third degree of protection from noise is business - trade area, area with public buildings for administrative, trade, service and similar purposes and an agricultural area.
- Area with fourth degree of protection from noise is an area without residential buildings, an area for industrial and other production activities, transport activities, storage and other service activities and communal activities which produce significant noise.

Cases as well as the conditions when it is considered that the peace of the citizens is disturbed by noise are defined in the Governmental decision No. 19-6920/1 (OG of RM No. 01/2009).

Annex 2. LOCATION OF THE PIPELINE ROUTE SECTIONS



Location of the pipeline route, km 0+000.00 – km 7+000.00



Location of the pipeline route, km 7+000.00 – km 15+500.00



Location of the pipeline route, km 15+000.00 – km 21+000.00



Location of the pipeline route, km 21+500.00 – km 27+674.23

Annex 3. BIODIVERSITY IMPACT ASSESSMENT REPORT

(provided as a separate volume)

Annex 4. CULTURAL HERITAGE: DATA SOURCES AND FIELDWORK

Data sources

Published data

- Archaeological Map of the Republic of Macedonia, 2002, Macedonian Academy of Sciences and Arts - MANU;
- Churches and Monasteries in Macedonia, Trimax, 2012;
- Climate changes and cultural heritage - Institute for Heritage Management – IHM, Michael Schmitt and Britta Rudolf, 2013;
- Mikulcic, G., Gradiste /Knezje, Pajonski grad Bilazora, Arheoloski Pregled, 1986, Ljubljana, 1987, 111-164;
- Mikulcic, I., Ubikacija na Bilazora, Godisen Zbornik na Filozofski Fakultet 28, Skopje, 1976, 149-164;
- Nikolić, D., Debertolis, P., Savolainen, H., Marjanović, G., Earl, N., Ristevski, N., Archaeoacoustic analysis of the ancient site of Kanda (Macedonia), Study of the peculiar EM phenomena and audio frequency vibrations, 4th Advanced Research in Scientific Areas, 2015, 169-177;
- E. Petrova, Paionian Tribes and Paionian Kingdom in II-I millennia BC, Macedonia Acta Archaeologica, 12, Skopje, 1991.
- Tourist Guide of Macedonia, Trimax, 2015;

Unpublished data

- Spatial Plan of the Republic of Macedonia, Ministry for Environment and Spatial Planning, 2011.

Technical Reports

- Infrastructural and Detailed Design for construction of main gas pipeline, section Sveti Nikole-Veles, a Technical Report for main gas pipeline, section St. Nikole - Veles (km 0 + 000,00 - km 27 + 674,23), National Energy Resources Skopje, Prostor DOO consulting (2022);
- Environmental Elaborate for the Sveti Nikole-Veles Section, Civil Engineering Institute "Macedonia J.S.C Skopje;
- National Registry of material and spiritual heritage- Ministry of Culture of the Republic of Macedonia.

Field surveys

In order to analyse the proposed route of the gas pipeline and its relationship with the registered and non-registered archaeological sites and buildings, several field surveys were conducted by the cultural heritage experts of Civil Engineering Institute "Macedonia" J.S.C Skopje:

- 10.02. 2021 Initial overview of the route and detecting possible critical points; Consideration of interrelations between cultural heritage and settlements;
- 21.05 2021 Tour to all registered sites and buildings along and near the gas pipeline; visiting all places along the route; taking photos from the route to the sites and from the sites to the route pipeline in order to determine the visual impact the pipeline will have;
- 23.06 2021 Verification tour of all registered sites and buildings along and near the gas pipeline; visiting all places along the route; taking photos from the route to the sites and from the sites to the route pipeline in order to determine the visual impact

the pipeline will have; verification of all the registered and recorded archaeological sites along the route according to the archaeological map of the Republic of Macedonia (archaeological survey along the planned route), and discussions and conversations with the local population.

- 19.08.2021 Verification of the registered and recorded archaeological sites along the route according to the archaeological map of the Republic of Macedonia (archaeological survey along the planned route), discussions and conversations with the local population.
- 20.09.2021 Verification of the registered and recorded archaeological sites along the route according to the archaeological map of the Republic of Macedonia (archaeological survey along the planned route), and discussions and conversations with the local population.