



Biodiversity Impact Assessment Report
for the
project for construction of gas pipeline,
section Sveti Nikole- Veles

November 2021

Contents

1. INTRODUCTION.....	6
1.1 Report Structure	9
1.2 Scope & Objectives	10
1.3 Key Issues from Scoping	11
2. SUMMARY OF NATURE PROTECTION LEGAL FRAMEWORK	12
2.1 International and National Commitments.....	12
2.1.1 National legislation	12
2.2 EBRD Performance Requirements (PRs).....	15
3. BASELINE ASSESSMENT METHODOLOGY & APPROACH	16
3.1 Baseline Data Collection	16
3.2 Baseline Data Sources.....	17
3.3 Baseline Assessment Criteria and Impact Assessment approaches.....	18
3.3.1 Categorisation of Flora.....	18
3.3.2 Categorisation of Fauna.....	19
3.3.3 Identification of Priority Biodiversity Features	19
3.3.4 Baseline impact assessment approach	20
3.4 Assumptions and Limitations.....	21
3.6 Habitat and Species Baseline Identification.....	21
4. BASELINE CONDITIONS	22
4.1 Baseline Summary	22
4.1.1 Overview of Findings	22
4.2 Designated Sites	24
4.2.1 Protected areas and proposed protected areas under Macedonian legislation	27
4.2.2 Proposed ecological corridors of the national ecological network.....	27
4.2.3 Natural areas covered under the protection regime of European Union	29
4.2.4 Other areas of natural interest without national protection coverage (IBAs, IPAs, PBAs, KBAs)	30
4.2.5 Key Biodiversity Area	33
5. BIODIVERSITY- DESCRIPTION OF HABITATS AND SPECIES	34
5.1 Habitats within the Aol.....	34
5.1.1 Natural habitats	35
5.1.2 Anthropogenic habitats	45
5.1.3 Habitat Sensitivity Assessment	51
5.2 Ecosystem Services	55
5.3 Conservation Significance of Species.....	56

5.3.1 Valorisation of Flora Species.....	56
5.3.2 Valorization of Fauna Species	59
5.4 Priority Biodiversity Features and Critical habitat	61
5.4.1 PBF / Notable Mammals	62
5.4.2 PBF / Notable Birds	63
5.4.3 PBF / Notable Amphibians	65
5.4.5 PBF / Notable Reptiles	67
5.4.6 Summary of PBF of species.....	75
5.4.7 Summary of PBF and Critical Habitats	78
6. DESCRIPTION & ANALYSIS OF PROJECT ALTERNATIVES.....	81
6.1 Description of Alternatives (Alignments, Design Features)	81
6.2 Avoidance of direct impact upon significant biodiversity features	84
7. IMPACT ASSESSMENT	86
7.1 Approach and Methodology.....	86
7.1.1 Summary	86
7.1.2 Detailed Approach.....	86
7.1.3 Summary of Impact Assessment Results	88
7.1.4 Impacts to Designated Sites.....	90
7.1.5 Impacts to Habitats.....	90
7.1.6 Impacts on Species.....	91
7.1.7 Cumulative impacts	91
7.1.8 Anticipated threats	92
8.PROPOSED AVOIDANCE, MITIGATION, RESTORATION AND OFFSETTING	92
8.1 General Avoidance Overview	92
8.2 General Mitigation Overview	93
8.2.1 Pre-works surveys.....	93
8.2.3 Bespoke Habitat Mitigation	94
8.2.4 Bespoke Species Mitigation	95
8.3 Construction Controls.....	98
8.3.1 Prohibition of access to Nezirlik Ardi (near km 21+500).....	98
8.3.2 Plan to avoid disturbing pseudo-steppe habitat EUNIS Code E1.3, N2000 code 6220* at Kanda Geoglyf (near km 8+000)	98
8.3.3 River Protection Measures for all Stream Crossings.....	99
8.3.4 Protection Measures at IBA	99
8.5 Operation.....	100
8.6 Rehabilitation and Restoration Measures	100

8.6.1	Rehabilitation at River Crossings, especially River Svetinikolska Crossing.....	100
8.6.2	Rehabilitation at Other Areas	101
8.7	Plan to control invasive species.....	101
9.	MONITORING.....	101
10.	ANNEXES.....	106

Acronyms

Aoi- Area of Interest

BA - Biodiversity Assessment

BS- block station

EIA -Environmental Impact Assessment

ESAP-Environmental and Social Action Plan

Zoi - Zone of Influence

PR -Performance Requirement

NNL -No Net Loss

CH critical habitat

PBF Priority Biodiversity Features

SPA - Special Protected Areas

IPA – Important Plant Areas

IBA – Important Bird Areas

PA – Prime Butterfly Areas

EBRD- European Bank for reconstruction and development

E&SDD- Environmental and Social Due-Diligence

NER - National Energy Resources

MOEPP- Ministry of Environment and Physical Planning

Preface

The European Bank for Reconstruction and Development (the “EBRD” or the “Bank”) is considering providing finance to National Energy Resources (“NER”, “Borrower” or the “Company”), the North Macedonian state-owned company responsible for the country’s gas transmission network, to finance the construction of strategic section of the country’s gas transmission network - section Sveti Nikole – Veles (the “Project”). As this Project involves the funding of isolated sections of the pipeline, which are a greenfield facility, the EBRD has preliminarily assigned it a Category A, and has commissioned an Environmental and Social (E&S) Assessment of the Project. While gas operations are often not the biggest threat to biodiversity in an area, they can have a wide range of negative impacts on ecosystems¹. For that reason, as part of this E&S Assessment (also referred to as the E&S Due-Diligence (ESDD), a Biodiversity Assessment has been requested.

The objectives of the Biodiversity Assessment are to ensure the adequate protection of the natural resources in the Project Area, through detail identifying, mapping and describing of the natural habitats affected. These data are not fully present in Elaborate for environmental protection prepared according to National Law², so this Biodiversity Assessment is actually updating of that biodiversity baseline in the Elaborate. This BA was performed by biologist Martina Blinkova Donchevska (engaged by CEIM) with assistance by biologist Marko Aceski.

¹ Integrating Biodiversity Conservation into Oil & Gas Development. EBI

² Law on Environment (O.G. of RM Nos. 53/05, 81/05, 24/07, 159/08, 83/09, 123/12, 93/13, 187/13, 42/14, 44/15, 129/15, 192/15, 39/16 and 99/18).

1. INTRODUCTION

This Biodiversity Assessment (**BA**) Report discusses the implication of the proposed gas pipeline project, section Sveti Nikole – Veles, for the biodiversity sensitivities of the Ovche Pole.

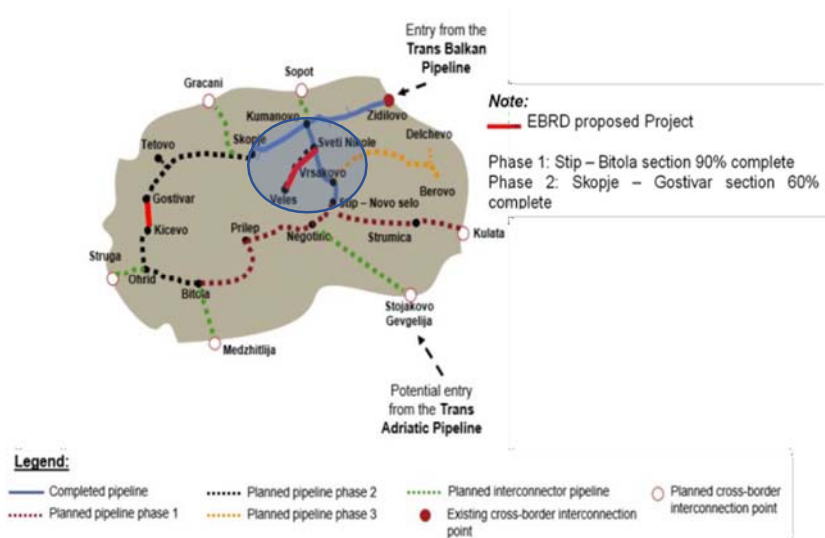


Figure 1. Gas Pipeline Section included in EBRD Assignment (source: Environmental and Social Assessment Report, RINA/Point pro 2020)

The route of the gas pipeline starts east of town of Sveti Nikole, and ends south of town of Veles (fig.1).

The following structures will be designed:

- Main gas pipeline DN 200, \varnothing 8" with length of 27.67 km;
- Initial cleaning station Sveti Nikole at the beginning of the gas pipeline (km 0)
- Receiving cleaning station Veles at the end of the gas pipeline (km 27.5)
- From the gas pipeline, connections are predicted towards Sveti Nikole – DN 80 with length of 387m; (km 6.39)
- The linear block station DN200 is predicted at km 27,5 (BS Veles);
Block station DN80 is predicted at the connection to Sveti Nikole;
- Cathodic protection system;
- Main metering-regulatory stations
 1. GMRS Veles (25 000 – m³/h)
 2. GMRS Sv. Nikole (8 000 – m³/h)

The Main gas pipeline is DN 200, \varnothing 8" with length of 27.67 km and the block stations, without the structures such as GMRS and the cleaning stations. The boundary elements of the plan and the profile are clearly and precisely defined by their sizes:

- working belt for welding pipes 6.00m
- space for excavation of a construction trench 4.00m

- storage space for the excavated material 4.00m
- space for pipers and long-distance transport 5.00m
- delay of humus from wide excavation 3.00m
- total wide excavation or planum 22.00m
- minimum transverse slope 2%
- minimum longitudinal slope 0.0%
- max. transverse slope 6% (8%)
- max. longitudinal slope 100%

One river (Svetinikolska) will be crossed.

According to Designer, the access roads that will be used to reach the route itself during the construction of the pipeline are the existing (dirt, compacted or asphalted) roads. Then, as the main access road along the entire length of the pipeline, the working belt itself will be used, because when determining the width of the working belt, it is considered that the mechanization as well as the off-road vehicles can move smoothly.

River Svetinikolska crossing

The technology of construction of crossings under rivers and canals is prescribed by the Contractor with the approval of the Supervisory Authority. There are two technologies of river crossings.

- First technology is when it comes to smaller rivers where there is not much water flowing. It is performed by installing tubular culverts through which the water is collected and bridged over the trench itself, while classical digging of the trench is enabled. When the trench is completed, the pipe culverts are dismantled and the water flow returns to normal.
- Second way is when it comes to larger riverbeds and rivers where there is a large flow of water. In that case, a deviation is made on the riverbed itself, during which embankments are made before and after the working belt and the river is redirected to the deviation so that the gas pipeline can be placed under the riverbed itself. When the installation is completed, the dams are gradually removed and the river returns to the original riverbed.

Project location

Most of route will cross areas of relatively low natural habitats and at some sections pipeline parallels an existing road to minimise environmental impacts. The proposed corridor is mainly in agricultural use, mostly ephemeral crops (like vegetables and cereals), perennial plants (such as orchards and vineyards) and pasture land.



Figure 2. Area of Interest and Project Zone of Influence (Zol photo from another project)

As it is shown on fig.2 the area between town Veles and town Sveti Nikole (or norther part of Ovche Pole plain) is Area of Interest (**Aol**) and the temporal construction zone³ is a direct Zone of Influence (**Zol**). As such it outlines both the baseline status of the habitats and species within the Aol (and specifically seeks to evaluate the sensitivity of those resources) and the potential project impacts on them.

Overview of gas pipeline construction activities

Construction activities, including opening and closing of trenches, deposition of materials and pipelaying, and movement of vehicles will be undertaken within a 22m wide Right of Way (RoW). Within this area the soil will be cleared of all vegetation and the topsoil and subsoil will be removed and stored separately, before replacement and revegetation once the pipeline has been laid. In this belt of 22 m 'or less should be placed the access road and working belt for the working construction mechanizations such as excavators, bulldozers, loaders, pipe layers, etc. In addition, it is necessary to provide access to heavy transport motor vehicles for local transport and placement of steel pipes. In inaccessible terrains this transport can be organized with tractors and other similar mechanization enabled for smooth movement on rough dirt roads. The above-mentioned working-manipulative belt of 22m should also accommodate the trench for laying the pipes, as well as space for storage of the excavated earth or other material, or supplied sandy material for initial fine burying of the pipes from the main gas pipeline.

Arable land will be affected temporarily during construction, and some orchards and vineyards will be affected in the longer term as they cannot be re-planted directly on top of the pipeline for safety reasons. The construction itself will be broken down into a series of separate tasks utilizing as shown in fig.3:

³ 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 right-of-way is determined based on the diameter of the pipe, in this case it is 22m

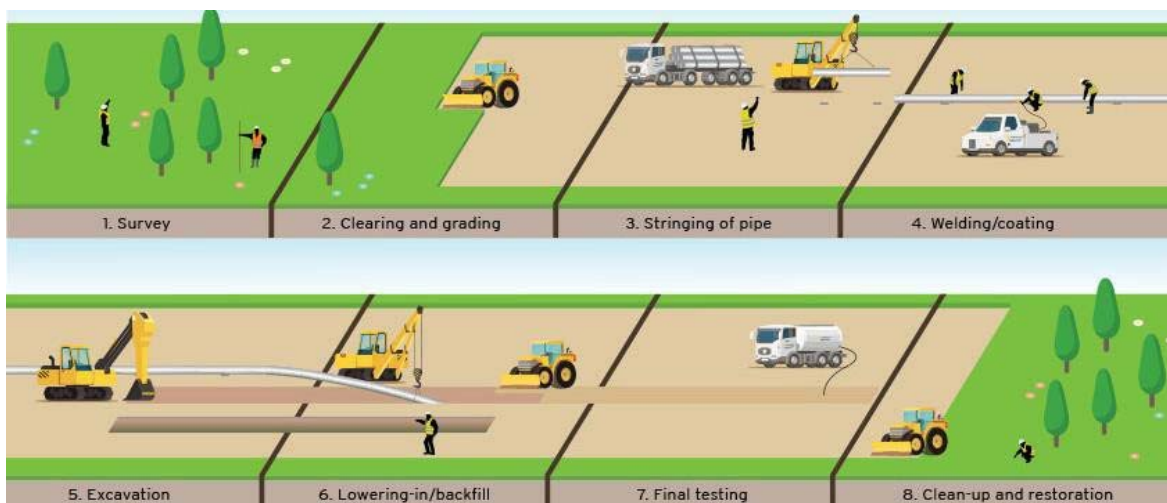


Figure 3. Gas pipeline project phases

A range of impacts are expected, although many of these will be short-term only as the activities move along the RoW. Such impacts may include nuisance effects such as general disturbance, noise and traffic impacts or temporary pollutant emissions such as emission to air or water or creation of wastes. Associated risks will be carefully managed to avoid harm to human, biological or other environmental receptors.

The construction of the gas pipeline will result in a range of temporary impacts associated with the clearance (and later restoration) of the RoW, digging (and later filling) of the trench and laying of the pipe. These are fully explained in the Elaborate and ESIA, but will generally last for a short period. Impacts associated with operation of the pipeline will be even less, and will generally be limited to noise and air emissions from the above ground installations and impacts associated with temporary maintenance works.

For each species/habitat, an assessment was made. A discussion on the occurrence of impact categories resulting from the construction/operation phases was made for each of them. Internationally recognised criteria are used to ensure that any impacts with the potential to be significant are clearly highlighted and that their appropriate mitigation is clearly addressed in line with the mitigation hierarchy of avoidance, mitigation and offset (in that order). Project Area is a 500m wide corridor along the gas pipeline route (250m either side of the proposed pipeline). This was done due to the openness of the area as a whole bearing in mind that it is a plain.

1.1 Report Structure

This BA is in accordance with EBRD's Performance Requirement 6 (**PR6**) and Good International Practice (**GIP**). Also, it refers to recommendations and ESAP⁴ made by RINA/ Point Pro team for next steps in the EBRD PR6 Compliance (September, 2020) and relies on the facts mentioned in Scoping study - environmental report for future extension (August, 2020) performed by team of national biodiversity specialists. The results presented in this Report are based on:

- Reviewing the Project design - discussion with the designers;
- Literature review;
- Conducting a visit to the site;

⁴ Doc. No. P0020349-1-H4 Rev. 0 – October 2020

- Relevant stakeholder consultations; and
- Applying expert judgment with input.

Special emphasis is given to:

- Biodiversity features that could qualify the area as Priority or Critical habitat;
- Biodiversity features that are likely to be of particular stakeholder concern.

Biodiversity screening is aligned with the EU Environmental Impact Assessment (**EIA**) directives. Additional useful guidance on screening that was used is Energy and Biodiversity Initiative framework and CBD Voluntary Guidance on Impact Assessment. The reporting within this document follows the following structure:

1. Identifies key issues from scoping;
2. Details the baseline data collection methodology;
3. Summarises the baseline conditions;
4. Assesses the impacts from the Project;
5. Details Avoidance, mitigation and restoration measures;
6. Details offsetting strategy required to ensure compliance with PR6.

The following Annexes are associated with this report:

Annex 1. Designated Areas Maps

- Annex 1.1 Protected areas Map;
- Annex 1.2 Designated Emerald site;
- Annex 1.3 Designated Natura 2000;

Annex 2. Habitat Maps;

Annex 3. List of species.

1.2 Scope & Objectives

The purpose of this BA is to identify whether any ecosystems, habitats and/or species could be affected, which may trigger '*critical habitat*' or which might be considered '*priority biodiversity features*' in a national or EU context. If such features are identified, measures to minimize the Project effects on them would be identified, in accordance with the mitigation hierarchy, and EBRD's Performance Requirement 6. This BA refers to update Guidance Note 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources (January 1, 2020). Special emphasize is given to Project related impact, within the context of an area that is appropriate to the receptors in question. It is the output from the Biodiversity Assessment and as such, includes:

- Biodiversity baseline including species lists and habitat maps (please see Annexes);
- Mitigation measures which complement those already identified in the Elaborate for Environmental Protection to minimize impacts on important or sensitive biodiversity; and

- Identification of potential offset measures for any residual impacts expected to remain despite mitigation and which should be further investigated to ensure No Net Loss (NNL) of these features.

1.3 Key Issues from Scoping

Key issues identified during the scoping stage are highlighted in Table 1.

Table 1. Key issues identified during the scoping stage of the study

Source of Impact	Receptors (core)	Impact	Key receptor sensitivities/Potential effects
Impacts from Construction			
Vehicle mobilization, including transport of people and equipment within the working area	Terrestrial habitats; Commuting animals; Wintering and breeding birds	Possible disturbance of fauna due to noise, potential direct mortality due to road traffic accidents and degradation of habitats due to compaction dust and vegetation destruction or the ingress of non-native invasive species.	Currently the receptors are habituated to locations with little background noise or traffic (very near is regional road) therefore the additional vehicle traffic has the potential to have some effect. Less likely to have a significant effect on less mobile species such as amphibians and reptiles.
Production of waste and indirect pressure of workers' presence.	Terrestrial and riparian habitats; Breeding birds; Wintering birds; Small and large mammals; Reptiles; Amphibians.	Possible disturbance of fauna, particularly while breeding, degradation of habitats, direct and indirect pollution of habitats, potential for direct mortality through illegal hunting and fishing. Potential for impacts from consuming food and waste brought into the area for the project and other impacts from interactions between humans and wildlife.	Currently the receptors are habituated to locations with some level of human interaction (mostly during agricultural activities). Additional numbers people and their associated waste has the potential to have a significant effect.
Pipeline working corridor vegetation clearance	Terrestrial and riparian habitats; Breeding birds; Wintering birds; Mammals (small and large) (breeding and sheltering); Reptiles (breeding and hibernating).	Loss of vegetation, fragmentation, degradation of habitats and conversion, disturbance, potential direct mortality	The clearance of vegetation will remove habitat but more significantly increase fragmentation of existing ecological corridor, that could lead to disturbance of faunal species.
Pipeline construction activities including top soil removal, pipeline soldering and water crossing construction	Terrestrial and riparian habitats; Breeding birds; Wintering birds; mammals; Reptiles; Amphibians; Aquatic invertebrates; Plants.	Noise disturbance in the mid-term which may lead to habitat fragmentation. Indirect and direct pollution due to sedimentation of water courses and construction consumables and waste.	While many faunal receptors have the potential to be disturbed by ongoing construction activities it is likely that many will become habituated and/or use other areas temporary. The aquatic species are less likely to be affected by general terrestrial construction disturbance but may be affected by pollution and sedimentation during river crossings
Unlikely			

events, such as landslides, fires, collapse of trenches.	All	There is potential for effects on all receptors due to unforeseen events	The area is somewhat degraded through agricultural practices, intensive agriculture with using of fertilizers and pesticides. Some event could affect all biodiversity features.
Other projects	All	There is a potential for other projects to have a cumulative effect when assessed in combination with the pipeline Project	Increased disturbance or the need for wider infrastructure improvements to facilitate accesses etc.
Operational⁵			
Operational Issues: Rights of Ways Maintenance requiring the clearance of vegetation for access to the pipeline	Terrestrial habitats. Commuting mammals including bats; Wintering and breeding birds; Reptiles.	Introduction of non- native invasive species. Permanent fragmentation effects	Maintenance has the potential to prevent the establishment of restored habitats and/or in introduce non-native invasive species. Also, disturbance of breeding animals and potential for direct mortality if they have occupied the area in the interim.

2. SUMMARY OF NATURE PROTECTION LEGAL FRAMEWORK

2.1 International and National Commitments

2.1.1 National legislation

The Macedonian environmental legal framework is defined by the *Law on Environment* (O.G. of RM Nos. 53/05, 81/05, 24/07, 159/08, 83/09, 123/12, 93/13, 187/13, 42/14, 44/15, 129/15, 192/15, 39/16 and 99/18). This Law transposes the requirements of various EU requirements, including those of Directive 2003/35/EC; Council Directive 96/61/EC; Directive 2001/42/EC; and Council Directive 82/501/EEC. The provisions for assessment of the effects of certain public and private projects on the environment (i.e. the EIA Directive) are transposed in Chapter XI.

More specifically, the legal basis for nature protection is contained within the National Constitution, the *Law on Nature Protection* (O.G. RM Nos. 67/04, 14/06, 84/07, 93/13, 187/13, 42/14, 146/15, 39/16 and 63/16). The Law on Nature Protection sets out principles of protection, restrictions regarding use of nature and natural resources, impact assessment, planning, compensation measures, protection of biodiversity, protection of internationally important species, wildlife conservation, genetic diversity, habitats and ecosystems, ecological networks, minimum environmental releases to the environment, restrictions for construction activities in riparian habitats and littoral areas, restriction of fishing in certain conditions, protected areas, management plans for protected areas, rangers, landscape diversity, organization of nature protection including management of protected areas, financing inspection and supervision, penalties and final and transitional provisions. The law transposes the following Directives: Council Directive 92/43/EEC, Council Directive 79/409/EEC, Council Regulation (EC) No 338/97 etc.

However, the full transposition of the Habitats Directive (92/43/EEC) and the Wild Birds Directive (79/409/EEC) is pending. Obligations arising from Article 6 of the Habitats Directive on the

⁵ Main metering-regulatory stations are proposed to be located within agricultural fields or with minimal ecological value. Potential impacts from these stations were screened out and are not assessed within this document as significant impacts resulting from the compressor station installation were considered unlikely. Detailed technical specifications for the compressor groups had not been finalised by the time of drafting, however, given new compressors will be used, emissions are expected to be low and well within legal limits.

assessment of projects significantly affecting Natura 2000 sites are yet to be fully implemented in the national legislation.

The Law on Nature Protection provides a good framework for developing a network of protected areas in line with the IUCN categorization. In Article 53 it stipulates the establishment of a coherent ecological network. The obligation to establish a national ecological network (as part of the Pan-European Ecological Network - PEEN) derives from the fact that Macedonia is a signatory party of the Pan - European Biological and Landscape Diversity Strategy (PEBLDS, 1996).

Preparation of the national Red List provides scientific information and analysis of the state, trend and level of threat to species, in order to turn the attention of the public, and especially decision makers (at national and global levels) towards endangered species in order to design appropriate strategies/ programmes and undertake actions for biological diversity conservation. It has been elaborated in accordance with the criteria for evaluation developed by IUCN, whereas species are categorized into 7 categories relative to the extent of their being under threat: Extinct Species (EX), species Extinct in Wild (EW), Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Near Threatened (NT), Least Concern (LC) species, and additionally the category of Data Deficient species (DD). These criteria have been accepted in the Law on Nature Protection (Article 34).

Threatened wild species i.e. those that are categorized as critically endangered, endangered or vulnerable may be proclaimed as strictly protected or protected wild species according to the Article 35 of the Law on Nature Protection and thus acquiring the status of Natural Heritage. The Lists of Strictly Protected Wild Species were adopted in 2011 (OJ 139/2011) without prior categorization of species based on their threat status. The lists of threatened and protected wild species of plants, fungi and animals and their parts were adopted in 2012 (Official Gazette of the Republic of Macedonia no. 15/12) including:

- all species listed in the annexes of the CITES (List 1);
- species listed in the annexes of the EU Regulation for protection of wild flora and fauna through regulation of trade (338/97/EC) (List 2);
- List 3 comprises the National List of Plant, Fungi and Animal Species whose trade is regulated with licensing procedure (D4 or CITES).

To promote the system of protected areas, the Republic of North Macedonia initiated the development of the EMERALD network comprising of areas of special interest for conservation (ASCI) in line with the Berne Convention on the Conservation of European Wildlife and Natural Habitat, more specifically, its Resolutions No.4 (1996) and 6 (1998). Of the total number of 187 endangered habitats requiring special conservation measures listed in Resolution No. 4 (1996), 32 have been found in North Macedonia. Of the total number of 927 species requiring special habitat conservation measures according to the Resolution No. 6 (1998), 167 are present in North Macedonia. Within the period 2002-2008, 35 sites were identified, described and submitted to the Secretariat of the Bern Convention.

For the sake of compatibility between the Emerald Network and Natura 2000, Emerald sites are categorized into three different types:

- Type A (Areas important for the protection of birds, which are in accordance with the Special Protection Areas (SPAs) of Natura 2000);

- Type B (Areas important for other species and/or habitats, which are in accordance with the Special Areas for Conservation (SACs) of Natura 2000);
- Type C: Areas important for birds, other species and/or habitats.

The development of the Emerald Network is considered an important preparatory activity for the establishment of the Natura 2000 network and thus compliance with the Habitats Directive (92/43/EEC) and the Wild Birds Directive (79/409/EEC).

The Law on Nature Protection establishes a system of protected areas. According to the Law on Nature Protection, there are six categories of protected areas in the RNM: Strict Natural Reserve, National Park, Monument of Nature, Nature Park, Protected Landscape, and Multi-purpose Area. Categorization of protected areas has been done in accordance with the International Union for Conservation of Nature (IUCN).

North Macedonia is subject to a range of international commitments and obligations regarding ecology and nature conservation. Several international environmental treaties and conventions related to biodiversity are relevant to the Project, including those listed below, but not limited to:

- EU Habitats Directive (92/43/EEC);
- EU Birds Directive (2009/147/EC);
- EIA Directive (85/337/EEC);
- Convention on Biological Diversity (CBD);
- Berne Convention on the Conservation of European Wildlife and Natural Habitat;
- Bonn Convention: Conservation of Migratory Species of Wild Animals;
- Convention on the International Trade in Endangered Species of Wild Flora and Fauna (CITES); and
- European Landscape Convention.

Public Opinion and Stakeholder Concerns

Impact assessments are legally enforceable instruments, providing a concrete means for strengthened mainstreaming of biodiversity in development plans and investments. The procedure typically includes obligatory public disclosure of documents and involvement of stakeholders that promotes transparency and public participation in decision making. In order to assess the pros and cons of a proposed project for construction of gas pipeline in an integrated manner, Elaborate for environmental protection has been prepared in 2021 and approved by MoEPP (arch.no.UP1-11/4-691/2021 from 11.06.2021). The Elaborate followed the Macedonian requirements for screening and scoping, which included issuing a Letter of Intent, to which MoEPP may comment and raise specific issues to be addressed. The Elaborate give a brief description of the location and environmental impacts, also appropriate mitigation measures are provided. No public consultation is required.

It must be stressed that the results of the baseline surveys were shared with stakeholders, to obtain feedback and identify the extent and nature of any further work that might be required.

Relevant stakeholders⁶ were consulted, in order to gain more information about the project area significance. Also, local people were consulted because local knowledge can reveal important information relevant to understanding the biodiversity values within the project area of influence.

2.2 EBRD Performance Requirements (PRs)

This BA refers to update Guidance Note 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources (January 1, 2020). PR6 on Biodiversity Conservation and Sustainable Management of Living Natural Resources specifically recognises that the conservation of biodiversity and the sustainable management of living natural resources fundamental to environmental and social sustainability. The PR has the core requirements to:

- ↳ Protect and conserve biodiversity using a precautionary approach;
- ↳ Adopt the mitigation hierarchy approach, with the aim of achieving no net loss of biodiversity, and where appropriate, a net gain of biodiversity; and
- ↳ Promote Good International Practice in the sustainable management and use of living natural resources.

PR6 also refers to those areas that hold the highest tier of irreplaceable (existing in few places) as critical habitat (**CH**) and those with vulnerable (at high risk of being lost) biodiversity features as Priority Biodiversity Features (**PBF**). The criteria used to define these explicitly includes ecological functions that are vital for maintaining the viability of CH features.

EBRD supports a precautionary approach to the conservation and sustainable use of biodiversity through the implementation of applicable international laws and conventions and relevant EU Directives. Guidelines addressing this approach which this Project must meet the requirements of are provided in EBRD's Performance Requirement 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources (updated 2020). In the context of PR 6, three key directives are considered: the EU Habitats, Birds and EIA Directives.

Non-binding Good Practice Guidance

In addition to the above, the following guidance was used in development of mitigation measures:

- Good Practices for the Collection of Biodiversity Baseline Data Prepared for: Multilateral Financing Institutions Biodiversity Working Group & Cross Sector Biodiversity Initiative Prepared by: Ted Gullison, PhD Jared Hardner, MFS Stuart Anstee Mike Meyer, PhD July 2015
- Guidance Note: EBRD Performance Requirement 6 Biodiversity Conservation and Sustainable Management of Living Natural Resources
- Biodiversity Capacity Building Programme: Promoting Good International Practices- EBRD Workshop materials and presentation
- Monitoring methodology and protocols for 20 habitats, 20 species and 20 birds; Twinning Project MK 13 IPA EN 02 17; project Strengthening the capacities for effective implementation of the acquis in the field of nature protection
- EIA Guidelines for Transboundary Natural Gas Pipelines

⁶ Scientists, NGOs that are locally active on the issues of biodiversity, Farmers etc.

- MANAGEMENT of Natura 2000 habitats Pseudo-steppe with grasses and annuals (Thero-Brachypodietea) 6220*
- Interpretation Manual of European Union Habitats, version EUR 28

3. BASELINE ASSESSMENT METHODOLOGY & APPROACH

3.1 Baseline Data Collection

The baseline conditions described here were generated through a combination of desk studies and rapid biodiversity survey (it was iterative process). A summary of the key approaches used is provided in the table 2 below.

Table 2. 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 National Ministry of Environment and physical planning (MoEPP) and plotted on the project GIS. Maps, photos were also obtained from a combination of publicly available sources and by taking photographs in digital format by field surveyors.
Field Surveys – habitats and species	<p>Information gathered from previous ecological studies in the AOI has given some clue of the expected habitat types. This information was confirmed in the field.</p> <p>A one-day drive (9 July 2020) of the area was made, by ecologists. The purpose of this was to: update the 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 survey would be needed (in particular to confirm presence of CH/PBF).</p> <p>Follow-up survey visits (27 July and 10 October 2020 for terrestrial and 13 May 2021 for river crossing point) were made to survey the areas specifically identified as either:</p> <ul style="list-style-type: none"> • Containing CH/PBF; or • Being exposed to particular risks or impacts from the Project. <p>These field surveys extended across the Project and for a distance of up to c.500m from the Project centerline. These areas included:</p> <ul style="list-style-type: none"> • Hill pastures with sparse shrubs in the area near the town of Veles) - habitat 6210: (*important orchid sites) listed in Annex I. • Pseudo-steppe with grasses and annuals of the Thero-Brachypodietea, (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 <ul style="list-style-type: none"> • The area surrounding the location Nezirlik Ardi, a small fragment of reed belt • Svetinikolska river crossing section. <p>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), and the importance and supporting role of identified habitats for these species. The timing of surveys was appropriate for the purpose of characterizing the habitat types present. Species recorded during the two surveys of the site and review of literature as well as Scooping study are presented in Annex.</p>

Desk studies – habitats	<p>The field-based assessment was followed by desk assessment. Habitats in the Project area are divided into two main categories according to their origin: natural and anthropogenic habitats. The division within these categories followed criteria such as presence of various plant communities, distribution, degradation level, but the main criterion was the division proposed by EUNIS Habitat Classification (European Commission, DG Environment). The significance of individual habitats was evaluated in line with the following:</p> <ul style="list-style-type: none"> □ Annex I of Council Directive 92/43/EEC of 21 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 habitats were mapped using aerial photographs, the information gathered from the site visits and photographs taken during the survey.</p> <p>Habitat maps cover the trajectory of ~28km length of the pipeline and 250m either side of the pipeline corridor (to produce a 500m wide study corridor) which is subsequently termed the Study Area. 13 types of habitats were classified and mapped. In reality, the boundaries between habitats (as landscapes) are diffuse, so that they often cross into each other and defining a clear boundary between them is practically impossible, but it is 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 recordings) and in part by overlapping the boundaries of some CLC classes (Corine Land Cover).</p> <p>It must be noted that most of the route passes through arable land, which means that anthropogenic habitats (fields and acres) dominate the site. Spawns with natural vegetation are mainly represented by remnants of hornbeam forests, xerothermophilous shrubs and grass vegetation, but also riparian belt. A description of the habitats, and the typical species found within them was made using available literature, past survey work conducted in the area and information gathered during the Rapid Baseline Survey. The goal was to evaluate the biodiversity along the corridor and recognize any sites of special importance concerning biodiversity and natural heritage, including natural and potential critical habitat as per PR6. This process also included expansion of habitat mapping to each habitat's EAAA, in order to provide the appropriate context for assessment of these habitats as well as associated fauna.</p>
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3.2 Baseline Data Sources

The following data sources were used for defining biodiversity-related terms in the compilation of this Report:

- The Biodiversity A-Z (<https://biodiversitya-z.org/content/key-biodiversity-areas-kba>)
- Data on protected and important areas, and red data book species from IBAT (<https://www.ibatforbusiness.org/>);
- IUCN Red list of birds, mammals, amphibians, reptiles (<https://www.iucn.org/>);
- IUCN National red list (<http://redlist.moepp.gov.mk/pocetna/>)
- Natura 2000 designation information (<http://natura2000.gov.mk/en/>).

Also, these documents were used:

- Study on the Status of Biological Diversity of Republic of Macedonia (MoEPP, 2003);
- Physical Plan of the Republic of Macedonia 2002-2020 (MoEPP, 1999-2004);

- Development of Emerald Network in the Republic of Macedonia (MoEPP, 2002-2004);
- Project: Development of the National Ecological Network in the Republic of Macedonia (MAK-NEN) (MES, ECNC & MoEPP, 2008-2011);
- Flora and Vegetation of Macedonian Steppe (Carni et al. 2010);
- Important Plant Areas in the Republic of Macedonia (UNDP/GEF & MES, 2011);
- Project: Development of a Representative Protected Areas' Network in the Republic of Macedonia, (UNDP/GEF & MES, 2010);
- Project: Strengthening the Ecological, Institutional and Financial Sustainability of Macedonia's National Protected Areas System (UNDP/GEF & MES, 2011);
- Biodiversity Strategy and Action Plan of Republic of Macedonia (NBSAP); MoEPP & MES, 2014,
- "Nature Conservation Programme in North Macedonia" (<http://www.bregalnica-ncp.mk/documents/?lang=en>),

Consulted EIA studies, Biodiversity assessments, ecological baseline reports, monitoring reports:

- Pipeline project, north macedonia scoping study - environmental report for future extension, Karadelev et al., 2020
- ECOLOGICAL BASELINE SURVEY & BIODIVERSITY MANAGEMENT PLAN" Preparation of project studies (FSs, EIAs, CBAs), design and tender documentation for establishing an integrated and financially self-sustainable waste management system in the east and northeast regions. EuropeAid/136070/IH/SER/MK, 2017
- Biodiversity assessment report according to EBRD PR6 for Express road A3, section Shtip (Tri Cheshmi)- Kochani. CEIM, 2016
- Seasonal monitoring reports from Investigation of vulnerable groups - fauna (birds and bats) along corridor 400 kV transmission line TS Shtip – Macedonian-Serbian border. CEIM, 2019
- BRUA EIA (USI 2016) and Appropriate Assessment (USI 2016)⁷;
- EIA for interconnective gas pipeline from North Macedonia – Greece. Tehnolab, 2020
- EIA for construction of gas pipeline from Klechovce-Negotno. Tehnolab, 2014
- Ecological Data Gap Analysis and Ecological Sensitivity Map Development for the Bregalnica River Watershed - Integral report
- Biodiversity of the Bregalnica River Watershed
- Landscape diversity in Bregalnica watershed
- Report on the status of protected areas in Bregalnica watershed
- Ecological Sensitivity Map of Bregalnica watershed etc.

3.3 Baseline Assessment Criteria and Impact Assessment approaches

The methodology for categorizing habitats and describing and determining the conservation significance of plant and animal species is described below.

3.3.1 Categorisation of Flora

Floristic diversity and conservation importance were assessed according to the various conventions and directives, which are ratified by Republic of North Macedonia:

- IUCN Global Red List of Threatened Plants (2020);

⁷ Also, the assessment and mitigation approach are based on this Study

- IUCN National Red List of Threatened Plants (2020);
- List of Strictly Protected and Protected Wild Species (MOEPP 2011);
- Habitat Directive Annex IIb, Annex IVb;
- Endemic/ rare species;
- CORINE list; and
- IPA – Important Plant Areas.

Data for these were obtained from the available botanical literature. Results from the *Study on the Status of Biological Diversity of Republic of Macedonia* and the *Biodiversity Strategy and Action Plan of Republic of Macedonia* were used during the evaluation of data.

3.3.2 Categorisation of Fauna

Animal diversity was evaluated according to several international conventions and directives which are ratified by Republic of North Macedonia, including:

- IUCN Global Red List;
- IUCN European Red List;
- National Red List of Threatened Herpetofauna;
- Habitats Directive Annex II, Annex IV and Annex V (Annex IIb & Annex IVb);
- CORINE European list;
- Bonn Convention – Convention of Migratory Species of Wild Animals;
- Bern Convention – Conservation of European Wildlife and Natural Habitats;
- Birds of Conservation Concern (Red/Amber List);
- EU Directive 79/407/ECC on the Conservation of Wild Birds;
- SPEC – Species of European Conservation Concern⁸;
- List of Strictly Protected and Protected Wild Species (MOEPP 2011);
- Law on Hunting of RM;
- Law on Nature Protection of RM;
- ETS – European Threat Status; and
- CITES Convention - Convention on International Trade in Endangered Species.

3.3.3 Identification of Priority Biodiversity Features

Key to this assessment is the identification of *priority biodiversity features*, as defined in EBRD PR 6. The following criteria were used to identify the key biodiversity features (habitats and species).

For Habitats:

⁸ SPEC 1 European species of global conservation concern; SPEC 2 Unfavourable conservation status in Europe, concentrated in Europe; SPEC 3 Unfavourable conservation status in Europe, not concentrated in Europe; Non-SPEC Favourable conservation status in Europe, concentrated in Europe; Non-SPEC Favourable conservation status in Europe, not concentrated in Europe

- EU Habitat Directive – Annex I and Annex I Priority Habitats;
- Bern Convention – Resolution No. 4 (1996); and
- Any core and suitable habitats for species that meet the criteria below.

For Species:

- Listed in EU Birds Directive Annex I and II;
- Birds of Conservation Concern (Red/Amber list);
- Bern Convention on Migratory Species (Appendices 1 and 2, AEWA, ASCOBANS, EUROBATS, Resolution No. 6);
- IUCN Global Red Lists (Vulnerable or above and Data Deficient);
- IUCN European/ National Red Lists; and
- EU Habitats Directive Annexes II, IV and V.

3.3.4 Baseline impact assessment approach

The BA identifies and assesses the impacts of the proposed Project on the biodiversity features, taking particular account the degree to which priority biodiversity features are likely to be affected. The assessment has determined what measures should be implemented to prevent and mitigate adverse impacts and identify improvements. Impacts on critical habitats should be avoided, and where it is impossible to avoid them, measures should be taken strictly to reduce the project effects, and also to establish a net gain of biodiversity, e.g. through compensation measures or offsetting. Impacts on priority biodiversity effects are also to be avoided. Where this is not possible, measures should be taken to gain No Net Loss of biodiversity as a result of the Project.

The measures recommended are described in Section 7, aims to bring the Project into compliance with the Performance Requirements of EBRD, where issues of non-compliance have been identified during the Assignment.

A simple characterisation of residual significance as: Not significant, low, medium, and high have been used, please see summary table 3 below.

Table 3. Significance Criteria Applied for the Biodiversity Assessment

Significance Criteria	Description
High	The potential effects are adverse, measurable and sustained and could result in strong concern among stakeholders or result in substantive changes to the biodiversity baseline. They are usually of long-term duration and not easily managed. The effects are likely to be important at a regional or national level because they are likely to result in regulatory objectives being exceeded and/or breaches in legislation and/or good international practice. Adverse impacts of a high significant nature must be mitigated and the effects monitored.
Medium	The potential effects are adverse, distinguishable and result in awareness or concern among stakeholders or materially affect the well-being of biodiversity resources. They are usually of a short to medium term duration and are amenable to management if they occur over the longer term. These effects may result in regulatory objectives being exceeded and/or breach in legislation and/or good international practice. Adverse impacts of a medium significance usually must be mitigated and in relevant circumstances the effects monitored.
Minor	Low-level adverse effects are distinguishable. These are usually of a short-term nature and are geographically limited. They result in small changes in biodiversity/environmental conditions. Even if they are sustained and have a widespread effect, they are not considered disruptive to baseline biodiversity/environmental conditions. These effects may be raised as local issues but are unlikely to be important in the decision-making process for the Project and its approval.

Not Significant	There will be no discernible change in sensitive biodiversity/environmental conditions. The effect is likely to have negligible or neutral influence, irrespective of other effects.
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3.4 Assumptions and Limitations

This assessment was based on field surveys and information already available. The information available in the literature was verified and updated by the rapid field survey. Secondary data was used from previous Intrusive surveys and quantitative measurements on birds and bats - taken few months before this Project starts, by the same company CEIM (letter to EBRD was send in August 2020). In 2019 for the transmission line project in Ovche Pole, a one-year monitoring of the vulnerable taxonomic groups of the fauna (birds and bats) and their migratory routes was performed. The first 6 monitoring points (for bird and bat) from that survey are in the initial part of the pipeline corridor and provide coverage of the pipeline corridor area, so those results are considered in this assessment. The assessment study on birds and bats was done as proposed under the ESAP's activity No. 6, which is in line with the EBRD Performance Requirement 6 (Biodiversity Conservation and Sustainable Management of Living Natural Resources).

Given the scope of the assessment, predominant limitations are that:

- No vegetation map is available in North Macedonia;
- There has been limited public consultation undertaken during the route selection process and Covid-19 has restricted consultation following the design fix. A remote disclosure process which considers Covid-19 safeguards and best practice was applied;
- Regional and national Red books and Red lists, with data on the Macedonian flora and fauna have not yet been prepared (for all groups). As a result, the assignment of sensitivity of habitat types and species along the Project alignment has been made based on the most relevant international conventions (such as the Berne Convention, IUCN Red List, Habitats Directive, Birds Directive etc.);
- No information about North Macedonia on proposed on-line data resources
- Species data available were compiled from a number of sources which were differentiated within that dataset, including:
 - species inferred to be present from known habitat associations;
 - existing dataset information held on a personal database.

Despite these limitations, the evaluation and impact assessment within this document is considered robust, as precautionary principles have been applied and where possible, further data sources were consulted.

3.6 Habitat and Species Baseline Identification

To determine the potential value of habitats present, all habitats present within the AoI were first identified and mapped using Google Earth. Those likely to be adversely affected by the Project route identified and assessed was then undertaken based on the following:

- The uniqueness and vulnerability of the habitat;
- The importance of the habitat to endangered or critically endangered species;
- The importance of the habitat to endemic or geographically restricted species, or species qualifying as restricted-range under Birdlife or IUCN criteria.

At the same time, a list of species that had the potential to be present within the AoI and which could be impacted by the works was identified. This list of species was then prioritized to those

which had the potential to be impacted by the Project works by identifying the potential presence of species within the corridor based on the presence of supporting habitats and detailed assessment of species distribution from data sources (please see chapter 3.2) scoping.

4. BASELINE CONDITIONS

4.1 Baseline Summary

4.1.1 Overview of Findings

Supporting information for the area available through peer-reviewed papers and scientific grey literature was used to validate results and screen for additional biodiversity features that may be present. Following information is gathered:

- According to the Macedonian Spatial Plan, no protected area or area proposed for protection is present in project area
- The project area isn't situated within potential Natura 2000 site
- No UNESCO Natural World Heritage Sites, Alliance for Zero Extinction (AZE) sites, ecosystems evaluated using the International Union for the Conservation of Nature (IUCN) Red List of Threatened Ecosystems or ecosystems recognized by the scientific community as being associated with key evolutionary processes, was identified
- The project area is located within Key Biodiversity Area, according to IBAT data base
- The project area is located within proposed IBA, IPA and Emerald site
- The project area is crossing steppe ecological corridors Karatmanovo-Ivankovci
- Some of the species and habitats are a priority for conservation (listed by the EU Habitats Directive and Birds Directive, Bern Convention, IUCN Red List of Threatened Species)

The project area (Ovche pole) is open and hilly terrain with the elevation ranging between 150 and 400m. Agricultural landscapes dominate in the Aol, mainly span in the area of broad plains and floodplains along the Valley of Svetinikolska River. At the begging of the route dominate lowland rolling agricultural landscape with wind hedges (Ovche Pole lowland rolling landscape with wind hedges). Within the frame of Ovche Pole lowland rolling landscape, the visual effect of the landscape is strongly featured by the field protective zones. These areas cover a large area in Ovche Pole area and this allows for a special unit with specific landscape characteristics can be set aside - Ovche Pole lowland rolling landscape with wind hedges. In the middle of the route dominate lowland rolling agricultural landscape (Ovche Pole lowland rolling landscape) is characterized by lowland wavy-hilly terrain with very gentle slopes, found at low altitude. The end of the corridor is hilly area with patches of oak horbean highly degradeted fores.

Within the pipeline corridor the habitats are mostly anthropogenic although some areas of natural habitats are present as a fragment including degraded oak forests, grasslands, riparian and as well as water course. For much of the route, and almost all of the lowland areas, the 500m 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 temporarily impacted during construction and operation.

Other remaining habitats only account for small part of the land affected by the works and include areas of hill pastures, grasslands, riparian belt, reed belt, water courses and some intermitten

streams. The project also crosses 1 natural water courses- river Svetinikolska, and 4 irrigation manmade channels. A description of habitats, their status and value within the Study Area is also presented in chapter 4.1.



Figure 4. Decline in farmland biodiversity due to intensification of land use Source: ECA.

According to European Environment Agency (EEA)⁹ agricultural intensification remains one of the main causes of biodiversity loss and ecosystem degradation in Europe. 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 highly reduced work force (please see Fig.4). This has led to a decline in the abundance and diversity of natural vegetation and, as a result, flora and fauna.¹⁰

A small fragment of reed belt (locality of Nezirlik Ardi) is found ~220 meters away from the planned alignment (please see chapter 5 *Alternative analyses*). This is not a typical biotope, but it is important for animals, especially amphibians. This type of reed belts usually represents fragments of the swampy plant community Scirpo-Phragmitetum W. Koch 1926.

The first part of the corridor is part of Important Plant Area (IPA) Ovche pole - Bogoslovec, designated for the presence of steppe-like vegetation. Field survey showed that this type of vegetation (and habitat) in good condition could only be found southern from the route at 8+000 km at the archeological monument-Geoglyph Kanda, surrounded by arable land. This habitat¹¹ which is of priority significance, is about 150m away from the PZI, and on higher elevation, so no direct impacts during construction or operational phase are expected.

Fragments of natural forest as a remnant of well-developed oak-hornbeam forests, could be found at the end of the corridor near town of Veles (in a very degraded form). This habitat is mixed with hill pastures 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. Despite the fact that it does not have a priority status, it is still of particular significance as a habitat where a myriad of orchid species occurs. Stands of this habitat were chiefly recorded in the vicinity of Veles (during the Scoping study performed by biology experts in 2020) but they do not have substantial coverage and they are in a stage of scrubs overgrowth.

⁹ EEA: "The European environment – state and outlook 2020", 2019

¹⁰ IPBES: "Regional assessment report on biodiversity and ecosystem services for Europe and Central Asia", 2018.

¹¹ 6220*: pseudo-steppe with grasses and annuals of the Thero-Brachypodietea

Riparian habitats are found along the watercourses (92A0), represented by willow poplar trees occurring in small belts along river Svetinikolska, but not in its original (unmodified) shape.

These type of the natural habitats (grasslands with steppe-like vegetation and riparian belts) are the equivalent of EU Annex I Habitats. All of these habitat types have been under intense anthropogenic pressure for centuries, due to the need for arable farmland. They are in different stages of degradation.

This report outlines the key designated sites, habitats and species (in this order) which have the potential to be impacted by the Project. The following table 4 summarizes the key sensitive receptors identified within the Project AoI or within the Zol of the Project.

Table 4. Summary of baseline findings

Receptor	Presence within the Area of Influence
Designated sites	One identified IPA, one identified IBA, one identified EMERALD site, one identified KBA will be potentially affected by the Project. Of the identified sites, all of them are crossed by gas pipeline. No national protected areas, or areas proposed for protection in the AoI / Zol.
Habitats	A total of 13 habitats were identified within the Sveti Nikole - Veles route corridor and were assessed for their value, where possible. In addition, habitats were assessed for the potential to be impacted by the proposed construction works. Of these, specific mitigation was deemed necessary for some habitats, with impacts to all other habitats considered fully mitigated through standard Good Industry Practice Mitigation
Species	Approximately 140 species (most of the bird species) are known for the region as notable potential receptors which could be impacted by the proposed works. 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 are considered to be fully mitigated through standard Good Industry Practice mitigation.

4.2 Designated Sites

Table 5 give a list all identified designated sites in the AoI. All of them are internationally (identified and proposed) designated sites like Emerald, IPA, IBA etc. According to the National biodiversity strategy and action plan (for the period 2018 – 2023) protection of these areas on national level is insufficient.

Table 5. 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 PZI (m)	
MK 019	Ovche Pole - proposed Important Bird area	1-27	Supports number of bird species as follows: <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 resorting to poisonous baits, then usage of pesticides in agriculture and intensive hunting. According to Veleviski 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	On line
/	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 thanks 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 the 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, and <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 of 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 Thero-Brachypodietea 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	Not Crossed by gas pipeline	~5km	At distance

	European level.		
<i>Ovche pole - Proposed KBA</i>	<p>KBA Ovche Pole (51622 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 km²) <i>Hedysarum macedonicum</i> Born, <i>Salvia jurisicii</i> Kosanin.</p> <p>Plant species that trigger the Irreplaceability criterion - Restricted range species (range <5,000km²) (Threshold -5% of the global population or one of the 5 best sites in MK) <i>Anchusa macedonica</i> Degen & Dorfl. <i>Galium rhodopeum</i> Velen.</p>	<i>Crossed by the gas pipeline</i>	<i>On-line</i>

4.2.1 Protected areas and proposed protected areas under Macedonian legislation

According to the Law on Nature Protection 67/2004, there are six categories of protected areas in the Republic of Macedonia: Strict Natural Reserve, National Park, Monument of Nature, Nature Park, Protected Landscape, and Multi-purpose Area. Categorization of protected areas has been done in accordance with the International Union for Conservation of Nature (IUCN). There are no protected areas in the wider Project area (see fig.5), which have been proposed for protection under the 2010 UNDP/GEF project *Development of a Representative Protected Areas' Network in the Republic of Macedonia* ¹².

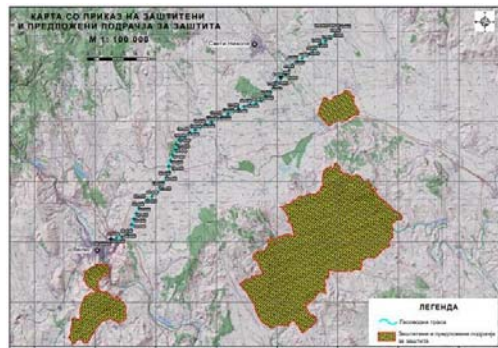


Figure 5. Protected areas along route of the proposed pipeline

At distance of approximately 10-20 km there are 4 areas that are protected in RNM and 5 that are proposed for protection in the national system of protected areas (Table 6). The pipeline is located at a certain distance from protected areas, as follows:

Table 6. Protected areas in vicinity of gas pipeline (source: Spatial Plan of the Republic of Macedonia, 2004)

AREA	MUNICIPALITY	CATEGORY	LEVEL OF PROTECTION	AREA (HA)	DISTANCE FROM GAS PIPELINE (KM)
KARASLARI	Veles	Monument of nature	protected	148	5
TAOR GORGE	Veles	Monument of nature	protected	3769,5	6.8
GORGE OF THE RIVER	Veles	Monument of nature	protected	285.45	7.1
TOPOLKA					
PESTI	Veles	Monument of nature	protected	/	4.5
ZMIJARNIK	Lozovo	Monument of nature	proposed	/	6.4
MANGOVICA	Sv.Nikole	Natural park	proposed	3.271	7.6
DABJE	Sv.Nikole	Monument of nature	protected	/	10.3
OVCE POLE	Sv.Nikole	Natural park	proposed	/	3.56
NEMANJICA	Sv.Nikole	Natural park	proposed	599	4.5
GUZUMLISKA RIVER	Sv.Nikole	Natural park	proposed	145	3.5

4.2.2 Proposed ecological corridors of the national ecological network

Ecological (bio) corridors connect different parts of a habitat, allowing movement of animals and/or plants between them. This movement can be a significant survival factor for many species in

¹² <https://www.protectedplanet.net/country/MK>

relation to the changes brought about by changes in land use, development and climate change. One function of bio-corridors is to preserve vital ecological processes and relations by sustaining the connection between habitats and the species populations. Bio-corridors provide daily, periodical and/or seasonal movements and migrations of different animal species, as well as facilitating the propagation of plants. One bio-corridor Ivankovci- Karatmanovo (fig.6) has been identified in the gas pipeline corridor, by the Macedonian Ecological Society¹³.



Figure 6. Location of Bio-Corridor along route of the proposed pipeline (Sources: Project: Development of the National Ecological Network in the Republic of Macedonia (MAK-NEN))

The steppe corridor Karatmanovo-Ivankovci is important for maintaining communication between the key steppe areas Dolna Bregalnica and Gradištanska Mountain. This bio corridor is especially important for the normal life cycle of:

- Amphibians-migrations during the reproductive period (green toad, river frog)
- Gray wolf - in search of food
- Equestrian special roe deer - movement and seasonal grazing
- Small mammals - periodic and seasonal movements

The map indicate that the proposed route crosses this bio-corridor between km 26+000 and 26+500. The degree to which this corridor currently functions is unclear, as there is a strip of anthropogenic habitat – arable land. Additionally, along the line of the corridor, there is an agricultural area of over kilometers in width along the corridor direction, before the terrain changes back to grassland. These, together with the narrow severance effect caused by the existing regional road R1312 Veles- Sveti Nikole (on the north side), suggest that the corridor has been significantly disrupted at this point, and its function in allowing the safe passage of animals and the propagation of plants is therefore questionable.

¹³ Project on Development of the National Ecological Network in the Republic of Macedonia (MAK-NEN), in realization of Macedonian Ecological Society and European Centre for Nature Conservation (ECNC) in collaboration with MoEPP, 2008 - 2011

This corridor is important for migration of steppe species like *Podarcis tauricus*, *Eryx jaculus* and *Apodemus flavicollis*, *Spalax leucodon*, *Lepus europeus*, *Talpa europaea*, and others.

4.2.3 Natural areas covered under the protection regime of European Union

In order to promote a European wide system of protected areas, the Republic of North Macedonia in 2002 initiated the development of the EMERALD network. The route of proposed pipeline passes through one Proposed Emerald Area: code MK0000035 Ovche Pole. This area is proposed based on the presence of the vulnerable bird species (IBA Ovche pole (Code MK019), (surface area 41,366 ha) .

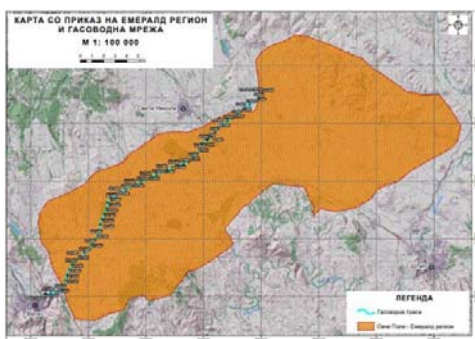


Figure 7. Proposed Emerald site Ovche Pole and the proposed gas pipeline corridor

95 % of Ovche pole Emerald Site occupies the pipeline route (fig.6). The site was designated as Type C4, areas important for birds, other species and/or habitats. **These sites are still not officially approved by the Council of Europe, and Macedonian legislation has not yet incorporated the obligations arising from of Article 6.4 of Habitats Directive 92/43 /EC regarding the assessment of plans and projects significantly affecting Natura 2000 sites. Nor do similar requirements exist for Emerald network sites or ecological corridors.**

Natura 2000

The main motive for the development of the Emerald Network was to contribute to the environmental Natura 2000 network in non-EU countries, using as similar as possible methodological approach. Being so, Ovche pole (south part of the route of the proposed pipeline) is identified as a future Natura 2000 site throughout the IPA project "Strengthening the capacities for implementation of Natura 2000 in Republic of Macedonia (EuropeAid/136609/IH/SER/MK)".

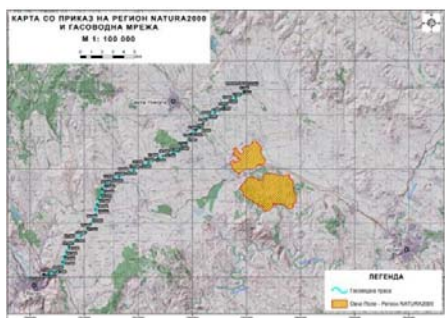


Figure 8 .Natura 2000 Ovche Pole and the proposed gas pipeline corridor

As part of the project of the Ministry of Environment and Physical Planning "Strengthening the capacity for implementation of NATURA 2000" on the territory of RNM were identified and proposed 8 potential NATURA 2000 areas. One of these areas is the proposed NATURA 2000 areas "Ovche Pole" which is located away from the gas corridor ~ 5km (fig.8).

4.2.4 Other areas of natural interest without national protection coverage (IBAs, IPAs, PBAs, KBAs)

In accordance with the international criteria in Project area and its closer environment, it has been identified as a significant ornithological locality "Ovche Pole" and a significant area for plants "Ovche Pole - Bogoslovec".

4.2.4.1 Important Plant Areas

The designation of Important Plant Areas (IPAs) is an initiative of Plantlife International for the identification of areas important for the diversity of wild plants based on the presence of endangered plant species, endangered habitats and species richness. It can be seen that one IPA site is located close to the Project area:

- IPA 42 Ovche pole – Bogoslovec: an area of dry grasslands on paleogene sediments - steppes and habitats with halophytic vegetation.

This IPA site was selected based on the importance of the habitats (namely Criterion C – Important habitats – from Annex I of the Habitat Directive or from the Bern Convention), and endangered plant species with restricted range of distribution (satisfying Criterion A). As shown on fig.9 the gas pipeline passes through it.

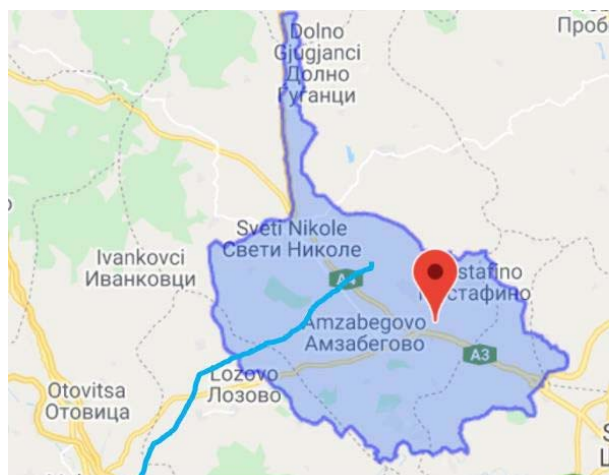


Figure 9. IPA Ovche Pole-Bogoslovec (source: <http://www.plantlifeipa.org/site/factsheet/map>)

Threatened species are listed in table 7. Due to intensive agriculture in the project area, no sensitive plant species were found in Aol or Pzl.

Table 7. IPA Ovche Pole-Bogoslovec factsheet (source: <http://www.plantlifeipa.org/site/factsheet>)

Threatened Species					
Species Name	IPA Assess.	Species Assess.	Abundance	Data quality	Criteria
Anchusa macedonica Degen & Dorfl.	2005	2004	unknown	unknown	
Galium rhodopeum Velen.	2005	2004	unknown	unknown	
Hedysarum macedonicum Bornm.	2005	2004	unknown	unknown	
Salvia jurisicii Kosanin	2005	2004	unknown	unknown	

4.2.4.2 Important Bird Areas and Natura 2000

¹⁴The Member States of the European Union, the protection of birds implements based on the provisions of the Directive on the protection of wild birds (2009/147/ EC). This Directive, in its original form since 1979 is the first document of the European Commission intended to preserve nature. Among other things, it stipulates habitats and species of wild fauna and flora (92/43 EEC) provides proclamation of special areas (SPA - Special Protected Areas) to protect some bird species.

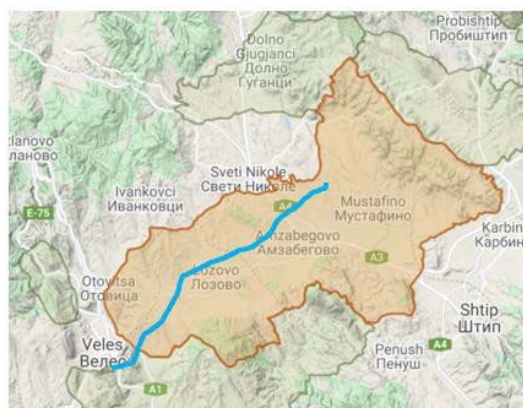


Figure 10. IBA Sveti Nikole-Veles

Another document of the European Union Directive on the protection of habitats and species of wild fauna and flora (92/43 EEC) provides proclamation of special areas of conservation (SAC - Special Areas for Conservation). Together, these two types of designated areas, cost the European ecological network Natura 2000.

Based on internationally established criteria, international organization BirdLife International (<http://www.birdlife.org/>) identifies the important areas for Birds (IBA - Important Bird Areas) of World, European and regional level. Very often in the European Union important bird areas (or their most important business) are directly included in the Natura 2000 network as SPA. The inclusion of important areas for Birds in the Natura 2000 network is an obligation that N. Macedonia must meet in accession to the European Union. Gas pipeline corridor is situated within the internationally designated IBA site – MK019 Ovche Pole (fig.10). In addition, Birdlife Ovche pole factsheet is given.

¹⁴ Project "Wings over the Balkans: Preparation of Western Balkan countries to implement the Directive on wild birds European Union"- Macedonian Ecological Society

Table 8. IPA Mk019 Ovce Pole (source Birdlife)

Ovche Pole **This is an IBA in danger!**

MK019

IBA Criteria

Year of most recent IBA criteria assessment: 2008

Populations of IBA trigger species

Species	Current IUCN Red List Category	Season	Year(s) of estimate	Population estimate	IBA Criteria Triggered
Eastern Imperial Eagle <i>Aquila heliaca</i>	VU	resident	2007	12-15 breeding pairs	A1, B2
European Roller <i>Coracias garrulus</i>	LC	breeding	2006	10-30 breeding pairs	A1, B2
Lesser Kestrel <i>Falco naumanni</i>	LC	breeding	2003	200-250 breeding pairs	A1, B2
Lesser Grey Shrike <i>Lanius minor</i>	LC	breeding	2006	30-100 breeding pairs	B2

IBA Monitoring

Most recent IBA monitoring assessment

Year of assessment	Threat score (pressure)	Condition score (state)	Action score (response)
2013	very high	very unfavourable	low
Was the whole site covered?	Yes	State assessed by	Population
Accuracy of information	unknown		

Threats to the site (pressure)

Threat Level 1	Threat Level 2	Timing	Scope	Severity	Result
Agricultural expansion and intensification	annual & perennial non-timber crops - agro-industry farming	happening now	some of area/population (10-49%)	moderate to rapid deterioration	high
Biological resource use	hunting & collecting terrestrial animals - persecution/control	happening now	majority/most of area/population (50-90%)	very rapid to severe deterioration	very high
Energy production and mining	renewable energy	likely in short term (within 4 years)	some of area/population (10-49%)	slow but significant deterioration	medium
Residential and commercial development	commercial and industrial development	happening now	some of area/population (10-49%)	very rapid to severe deterioration	high
Transportation and service corridors	utility & service lines	happening now	some of area/population (10-49%)	very rapid to severe deterioration	high

Condition of key/trigger populations (state)

Scientific	Common	TargetPop	ActualPop	Units	Remaining	Result
<i>Falco naumanni</i>	Lesser Kestrel	120	10	breeding pairs	9	very unfavourable

Conservation actions taken at site (response)

Conservation Designation	Management Planning	Conservation Action	Result
Little/no site covered (<10%)	No management planning has taken place	Substantive conservation measures are being implemented but these are not comprehensive and are limited by resources and capacity	low

Habitats

IUCN Habitat	Habitat detail	Extent (% of site)
Artificial - terrestrial	Arable land, Other urban and industrial areas, Perennial crops, orchards and groves	-
Forest	Broadleaved deciduous woodland, Native coniferous woodland	-

Because its important as a breeding area for birds, the IBA is considered a 'priority biodiversity feature'. In this case, the IBA is particularly important during the breeding season, and measures have been proposed so not to disturb the nesting season.

Site surveys along the proposed route of the pipeline are done and no nest are found. This part is mostly arable land where people are using a lot of pesticides which have potentially harmful effects of on the environment. Stakeholder consultations confirmed that no *Aquila helica* nests are present in PZI, and 5 locations near in the Ovche pole plain were mapped.

4.2.5 Key Biodiversity Area

Key Biodiversity Areas (**KBAs**) are sites that contribute significantly to the global persistence of biodiversity. KBAs (fig.11) have been identified for birds by the BirdLife International Partnership, for Critically Endangered or Endangered species restricted to single sites through the Alliance for Zero Extinction, and for other mammals, reptiles, amphibians, fish, plants and invertebrates through the Critical Ecosystem Partnership Fund (CEPF) hotspot profiling process. The data presented below are drawn from the World Database of Key Biodiversity Areas, which is managed by BirdLife International on behalf of the KBA Partnership.

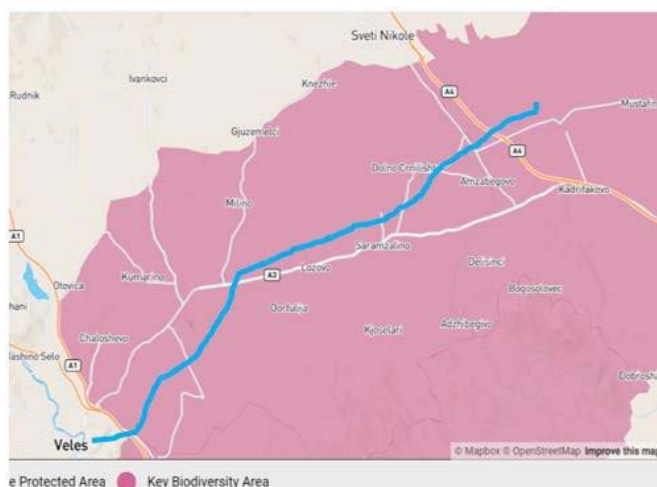


Figure 11.KBA Ovche pole source: https://ibat-alliance.org/country_profiles/MKD

They represent the most important sites for biodiversity conservation worldwide, and are identified nationally using a Global Standard from the International Union for the Conservation of Nature (IUCN). According to research paper¹⁵ for identifying KBA in NM, Ovche pole is KBAs triggered for both plants and birds: combines one IPAs with one IBA into a single KBA (please see table 9). This is not legally protected area in North Macedonia.

Table 9.KBA Ovche Pole information

KBAs (* sites holding narrow endemic species)	Bird species that trigger the Vulnera- bility criterion	Bird species that trigger the Irreplaceability criterion (d - maintaining 1% of global population)	Plant species that trigger the Irreplaceability criterion - Highly restricted-range species (range <500 km ²)	Plant species that trigger the Irreplaceability criterion - Restri- cted range species (range <5,000km ²) (Threshold - 5% of the global popula- tion or one of the 5 best sites in MK)	Plant species that trigger the Irreplaceability criterion - Species with large but clumped populations (Threshold - 5 % of the global population or one of the 5 best sites in MK)
KBA Ovche Pole (51622 ha) = IPA Ovche Pole- Bogoslovec which overlaps with IBA Ovche Pole (and partially to IBA Preod- Gjugjance, that does not meet KBA criteria)	<i>Neophron percnopterus</i> (EN) (6 ind.) <i>Aquila heliaca</i> (12–15 pairs) (VU)		<i>Hedysarum macedonicum</i> Bornm. <i>Salvia jurisicii</i> Kosanin	<i>Anchusa macedonica</i> Degen & Dorfl. <i>Galium rhodopeum</i> Velen.	

¹⁵ Melovski, Lj., M. Veleviski, V. Matevski, V. Avukatov & A. Sarov (2012). Using important plant areas and important bird areas to identify Key Biodiversity Areas in the Republic of Macedonia. Journal of Threatened Taxa 4(8): 2766–2778.

5. BIODIVERSITY- DESCRIPTION OF HABITATS AND SPECIES

5.1 Habitats within the Aol

PR6 considers habitats as “a terrestrial, freshwater or marine geographical unit or airway that supports assemblages of living organisms and their interactions with the non-living environment.” Within the Aol a total of 13 types were identified along the gas pipeline route corridor (table 10). Habitats listed within Annex 1 of the EU Habitats Directive are present within the Aol. Given the description of the habitats within the Study Area, many of the species found along the route are widespread and common. Approximately 90% of the area within the Aol is arable land (fields and acres, vineyards, orchards) while ~ 10% are natural habitats. The whole area is ~1323ha.

Table 10. Types of habitats along the pipeline corridor

Habitat type				EUNIS code	N2000 code	Area (ha) within Aol (250m either side of pipeline)	Area (%) within Aol (250m 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 (Festuco-Brometalia)			E1.21	6210	18.5	1.4
6	Rivers narrower than 5 meters			C2.2	3260	/	
7	Temporal watercourses			C2.5	3290	/	
8	Fields and acres			I1.3	/	1200	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

This Section presents the results of the habitat mapping, field observations and literature review conducted in June - December 2020, on the habitats and species composition of the proposed gas pipeline corridor. It contains a description of the habitats, characterization of their distribution and significance. Determination of the baseline has been undertaken in accordance with EBRD PR 6 as well as relevant documents referenced in Chapter 3.2. As noted, the focus of the study was a 500 m wide corridor, i.e. 250 m from both sides of the axis of the pipeline. This corridor was considered appropriate for a rapid survey, and is sufficiently wide to encompass most impacts arising during the construction works and operational needs. A belt with a width of 22 meters will be permanently destroyed with the construction of the pipeline. According to their origin, the habitats in the project area 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. The habitat descriptions follow a consistent pattern, as follows:

- Description of plant association, dominant and most common plant species and any distinctive fungi species;
- Fauna of the habitat, represented by vertebrates (amphibians, reptiles, birds and mammals) and selected groups of invertebrates (dragonflies, ground beetles, grasshoppers and daily butterflies);
- Certain invertebrate groups; and
- The habitat description is completed by providing the distribution range in the pipeline corridor.

Species of conservation significance, which may be described as 'priority biodiversity features', are discussed separately in Section 5.4.

5.1.1 Natural habitats

Within the gas pipeline corridor, several types of natural habitats have been recorded, all under strong anthropogenic influence and most often - degraded.

Degraded xerothermophilic oak forest- pubescent oak-hornbeam forests EUNIS G1. 7

Main characteristics- This habitat is a remnant of well-developed oak-hornbeam forests. There is a lower percentage of deciduous species (*Carpinus orientalis*, *Quercus pubescens*, *Fraxinus ornus* and others), due to their overexploitation, which has changed the physiognomy of the community. The degraded natural belts presented in this biotope are invasively inhabited by *Paliurus spina christi*, *Pyrus amygdaliformis*, *Prunus spinosa*, etc. The dominant plant community representing this habitat is *Paliuretum submediterraneum* (Riz, prov.) with the dominant species *Paliurus spina - christi*, but in parts *Juniperus oxycedrus* also predominates (fig.12). The grass floor consists of: *Minuartia glomerata*, *Euphorbia myrsinites*, *Ajuga laxmanii*, *Knautia orientalis*, *Tunica illyrica*, *Althea sp.* and others. **Distribution in the area of the gas pipeline corridor:** This habitat is common in North Macedonia. In the project area it is present in the hilly area between km 27+000 and km 27+500, (please see Habitat maps).

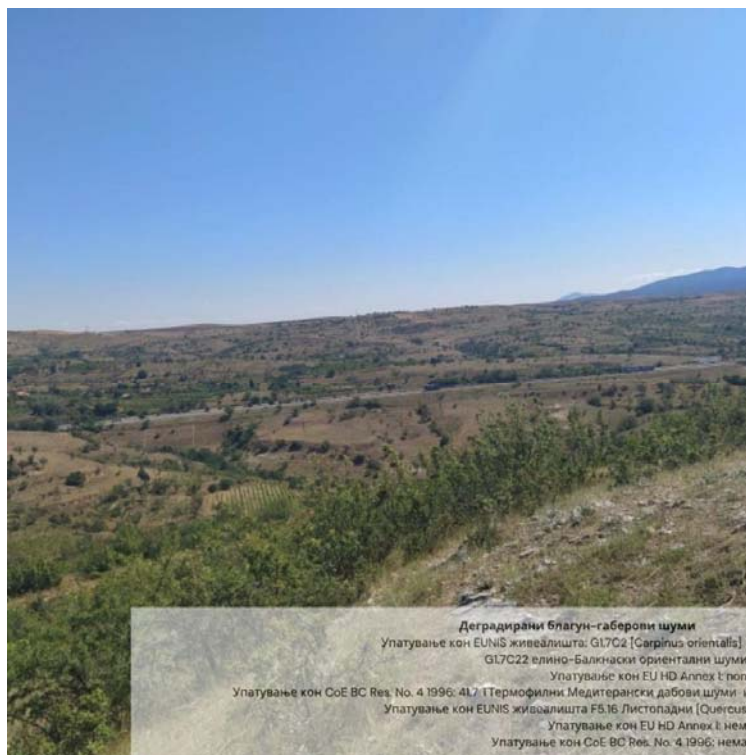


Figure 12. Degraded oak hornbeam forests near the end of the route

Fungi - represented primarily with terricolous fungi as: *Amanita caesregion*, *Leccinum griseum*, *B. aereus*, *Boletus aestivalis*, *Boletus fechtneri* and others. Lignicolous species that can be observed on *Quercus pubescens* are: *Daedalea quercina*, *Dichomitus campestris*, *Exidia truncata*, *Hapalopilus nidulans*, *Peniophora quercina*, *Radulomyces molaris*, *Stereum hirsutum*, *Vuilleminia comedens* *Hyphodontia crustosa*, *Phellinus punctatus*, *Steccherinum ochraceum* and others.

Mammals- The most common mammal species in this habitat are: the hedgehog (*Erinaceus concolor*) and the g nther's vole (*Microtus guentheri*). The presence of *Apodemus sylvaticus*, *Mus macedonicus*, *Lepus europeus*, *Canis lupus*, *Vulpes vulpes*, *Meles meles*, *Sus scrofa*, *Capreolus capreolus* is also expected because these species live in many diverse habitats. Several species of bats hunt and feed in this type of habitat, especially in the edge of forests like: *Myotis myotis*.

Birds -The number of birds that nests are large and is due to the presence of species such as: *Hippolais pallida*, *Sylvia sp.*, *Lanius collurio*, *Lanius minor*, *Lanius senator*, *Passer hispaniolensis* and some species of the genus *Emberiza sp.*

Reptiles - wall lizard (*Lacerta erhardii riveti*), green lizard (*Lacerta viridis*), Balkan green lizard (*Lacerta trilineata*), coluber snakes *Elaphe longissima* and *Coluber najadum* and others.

Amphibians- fire salamander (*Salamandra salamandra*), common toad (*Bufo bufo*), green toad (*Bufo viridis*), European tree frog (*Hyla arborea*), etc.

Butterfly- diversity is characterized by the presence of typical species for habitats with dry, bushy vegetation such as: *Thymelicus sylvestris*, *Phengaris arion*, *Melitaea phoebe*, *Arethusana arethusana*, *Iphiclides podalirius*, *Papilio machaon*, *Aporia crataegi*, *Carcharodus alceae*,

Gonepteryx rhamni, *Limenitis reducta*, *Nymphalis antiopa*, *N. polychloros*, *Brintesia circe*, *Erebia medusa*, *Argynnis niobe*, *Aglais io*, *Plebeius agestis*, *Vanessa cardui*, *V. atalanta*, *Melanargia larissa*, *Coenonympha pamphilus*, *Leptidea sinapis*, *Colias crocea*, *Satyrium acacia*, *Hamearris lucina* etc.

Orthoptera- the most common of which are: *Tylopsis lilifolia*, *Ancistrura nigrovittata*, *Poecilimon thoracicus*, *Polysarcus denticauda*, *Tettigonia viridissima*, *Decticus albifrons*, *Platycleis affinis*, *Odontopodisma decipiens*, *Omocestus rufipes*, *Chorthippus bornhalmi*, *Euchorthippus declivus* and others.

RIPARIAN HABITATS

Riparian belts with willows and poplars EUNIS G1.1

Main characteristics- This habitat type is represented by a narrow belt of willow and poplar trees, usually distributed along watercourses. It belongs to two associations: *Platanion orientalis* I. et V. Kárpáti 1961 and *Salicion albae* Soó (30) 1940. The most characteristic species of trees are *Salix alba* (fig. 13), or mixed communities of *Salix alba* and *Salix fragilis*.



Figure 13. Riparian belt

Tree species such as: *Populus nigra*, *Salix triandra*, *Sambucus nigra*, *Viburnum opulus*, *Cornus sanguinea*, *Amorpha fruticosa* and others can be found in small groups or individually. Poplars (*Populus nigra*, *Populus tremula* and *Populus alba*) are dominant in some belts, forming a typical poplar community. The following species are most characteristic in the grass floor: *Poa trivialis*, *Poa palustris*, *Carex vulpina*, *Polygonum lapatifolium*, *Polygonum hidropiper*, *Rumex sanguineum*, *Veronica anagalis-aquatica*, *Scirpus lacustris* and others. In the area of the planned

gas pipeline corridor, there are riparian forests dominated by poplars. They are found at the place where the planned corridor intersects with Svetinikolska river (chainage km 6+162,00). Well-preserved forests of this type are very rare, as people have converted the land into agricultural land.

Fungi -Lignicolous fungi, parasites and saprobes of *Salix alba*, *Populus tremula* and *Alnus glutinosa* are present in this habitat. The species *Laetiporus sulphureus*, *Phellinus igniarius* and *Panus tigrinus* are characteristic of willows. Among the parasitic fungi are important: *Phellinus igniarius* (of *Salix alba*), *Phellinus tremulae* (of *Pupulus*), *Ganoderma applanatum*, *Polyporus squamosus* and *Pleurotus cornucopiae*. Among the saprobes are *Funalia trogii*, *Ganoderma adspersum*, *G. resinaceum*, *Pleurotus ostreatus*, *Trametes ochracea*, etc.

Mammals - presented by: *Apodemus sylvaticus*, *Mustela nivalis*, *Sus scrofa*, *Sciurus vulgaris*, *Talpa europea* and *Vulpes vulpes*.

Birds - characteristic species for this habitat are Cetti's warbler (*Cettia cetti*) and Eurasian penduline tit (*Remiz pendulinus*). Many other species use willows for protection and reproduction, the most common being the nightingale (*Luscinia megarhynchos*), the European robin (*Erithacus rubecula*), the Eurasian blackcap (*Sylvia atricapilla*) and others. Bats *Nyctalus noctula* and *Pipistrellus nathusii* prefer this type of habitat due to the presence of prey and drinking water.

Reptiles - the most common species are the snakes *Natrix natrix* and *N. tessellata*, and *Elaphe quatuorlineata* and *Vipera ammodytes* also could be found. Of the other reptiles, tortoises (*Eurotestudo hermanni*, *Testudo graeca*) and lizards (*Lacerta erhardii riveti*, *L. viridis*, *L. trilineata*, *Anguis fragilis*) are more common.

Amphibians - more common species are *Rana dalmatina*, *Triturus carnifex*, *Salamandra salamandra*, *Lissotriton vulgaris*, *Hyla arborea*, *Bombina variegata*, *Bufo bufo*, *Pseudepidalea viridis* and *Pelophylax ridibundus*.

Butterflies-The most common species is *Lycaena tityrus*, and the following are also found: *Apatura ilia*, *Polygonia c-album*, *Maniola jurtina*, *Pieris mannii*, *Pararge aegeria*, *Leptidea sinapis*, *Limenitis reducta*, *Erebia ligea*, *Vanessa cardui*, *V. atalanta*, *Aglais urticae*, *Aglais io*, *Anthocharis cardamines*, *Colias crocea*, *Gonepteryx rhamni*, *Argynnis adippe*, *A. paphia*, *Melanargia larissa*, *Pyronia tithonus*, *Nymphalis antiopa*, *N. polychloros*, *Polyommatus icarus*, *Satyrus spini*.

Beetles - are significantly represented and the following are the dominant species: *Carabus granulatus*, *Chlaenius nitidulus*, *Stenolophus mixtus*, *Agonum sexpunctatum*.

Dragonflies -The most characteristic of the dragonflies are *Calopteryx virgo*, *Calopteryx splendens*, *Libellula depressa* and *Sympetrum sanguineum*.

OPEN AREAS – Grasslands

Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) EUNIS E1.3

Main characteristics-

Dry to semi-dry calcareous grasslands of the *Festuco-Brometalia*. This habitat is formed on the one hand by steppic or subcontinental grasslands (*Festucetalia valesiaca*) and, on the other, by the grasslands

of more oceanic and sub-Mediterranean regions (*Brometalia erecti*); in the latter case, a distinction is made between primary *Xerobromion* grasslands and secondary (semi-natural) *Mesobromion* grasslands with *Bromus erectus*; the latter are characterised by their rich orchid flora. Abandonment results in thermophile brushwood with an intermediate stage of thermophile fringe vegetation (*Trifolio-Geranietea*). This type of grassy areas is formed by the devastation of larger areas with natural vegetation. It is represented by areas covered with grass vegetation surrounded by *Quercus coccifera*, which is of varying degrees of degradation (fig.14).

Distribution in the area of the gas pipeline corridor- These habitats are generally distributed in hilly areas near Veles (please see habitat maps).



Figure 14 Hilly pastures in Ovche Pole

Fungi - The composition of fungi in this habitat is characterized by the dominance of grass species such as: *Agaricus campestris*, *Astraeus hygrometricus*, *Bovista plumbea*, *Calvatia excipuliformis*, *Hygrocybe conica*, *Marasmius oreades* and others. Occasionally certain mycorrhizal species of the genera *Amanita*, *Cortinarius*, *Lactarius*, *Russula* can be found.

Mammals in this type of habitat are: *Talpa europea*, *Microtus guentheri*, *Apodemus sylvaticus*, *Mus macedonicus*, *Lepus europeus*, *Canis lupus*, *Vulpes vulpes*, and *Martes foina*. This habitat serves as a place for hunting and feeding of many species of bats, such as: *Myotis myotis*.

Birds - Since this habitat occupies a very small area, there are not many characteristic bird species. The number of resident birds is low (*Perdix perdix*, *Melanocorypha calandra*, *Galerida cristata*, *Carduelis cannabina* and *Miliaria calandra*). 11 species of bird's nest in the area: *Coturnix coturnix*, *Burhinus oedicnemus*, *Calandrella brachydactyla*, *Alauda arvensis*, *Anthus campestris*, etc. Birds from the surrounding habitats use this habitat for hunting and food. Some predators, such as hawks and kestrels, are also found.

Reptiles- This habitat is characterized by a wealth of reptiles, some of which are *Testudo hermanni*, *Testudo graeca*, *Lacerta erhardii*, *Podarcis muralis*, *Podarcis taurica*, *Lacerta viridis*, *Lacerta trilineata*, *Emys orbicularis*, *Dolichophis caspius*, *M. insignitus*, *Platyceps najadum*, *Elaphe quatuorlineata* and *Vipera ammodytes*.

Amphibians- Only two species of **amphibians** are common, but several other species of neighboring habitats can probably be found, which come here in search of food. The most common species is the green toad (*Bufotes viridis*).

Butterflies- Hill pastures are a particularly suitable habitat for day butterflies: *Polyommatus icarus*, *Lycaena phleas*, *L. tityrus*, *L. vigaureae*, *L. thersamon*, *Plebeius sephirus*, *Aporia crategi*, *Callophrys rubi*, *Argynnis niobe*, *Melitaea athalia*, *M. phoebe*, *Boloria euphrosyne*, *Cyaniris semiargus*, *Hesperia comma*, *Euchloe ausonia*, *Pontia edusa*, *Pieris mannii*, *P. napi*, *P. rapae*, *Aglais urticae*, *Pseudophilotes vicrama*, *Papilio machaon*, *Iphiclides podalirius*, *Zerynthia cerisy*, *Colias crocea*, *Gonepteryx rhamni*, *Lasiommata megera*, *Arethusana arethusa*, *Pyrgus malvae*, *P. serratulae*, *Limenitis reducta*, *Melanargia larissa*, *Coenonympha pamphilus*, *Plebeius agestis*, *Vanessa cardui*, *Euphydryas aurinia*, *Hesperia comma* etc.

Beetles - The fauna of the beetles in the hilly pastures is particularly specific and is characterized by a high degree of species diversity and differs significantly from that in the forest habitats. Most species are carnivores or omnivores, but some species are mostly herbivores (e.g. *Dixus obscurus*, *Acinopus picipes*). All species are characteristic of open type habitats and rarely enters the forest. All species are widespread in the Mediterranean and Europe.

Dragonflies- Several species of dragonflies can be seen on the hill pastures in the region, the most common of which is *Onychogomphus forcipatus*.

Orthoptera- The following types of orthoptera can often be seen countered in the area: *Saga natoliae*, *Oedipoda germanica*, *Tylopsis lilifolia*, *Ancistrura nigrovittata*, *Polysarcus denticauda*, *Tettigonia viridissima*, *Decticus albifrons*, *Decticus verrucivorus*, *Platycleis affinis*, *Bucephaloptera bucephala*, *Oecanthus pellucens*, *Gryllus campestris*, *Dociostaurus brevicollis*, *Omocestus rufipes*, *Chorthippus bornhalmi*, *Acrida ungarica*, etc.

Pseudo-steppe with grasses and annuals of the Thero-Brachypodietea EUNIS 1.21

Main characteristics - Meso- and thermo-Mediterranean xerophile, mostly open, short-grass annual grasslands rich in therophytes; therophyte communities of oligotrophic soils on base-rich, often calcareous substrates. Perennial communities - Thero-Brachypodietea, Thero-Brachypodietalia: Thero-Brachypodion. Poetea bulbosae: Astragalo-Poion bulbosae (basiphile), Trifolio-Periballion (silicolous). Steppe-like vegetation is developed on Paleogene and Neogene marshes, with presence of steppe-like species like: *Astragalus parnassi*, *Hedysarum macedonicum*, *Morina persica*, *Onobrychis hypargyrea*. The most common is ass. *Astragalo-Morinetum* which usually develops on eroded slopes.

Distribution in the area of the gas pipeline corridor - In the area, this habitat is represented in fragments (fig.15) or mixed with pastures at 8+000 km on archeological monument Geoglyph (please see Habitat Map).

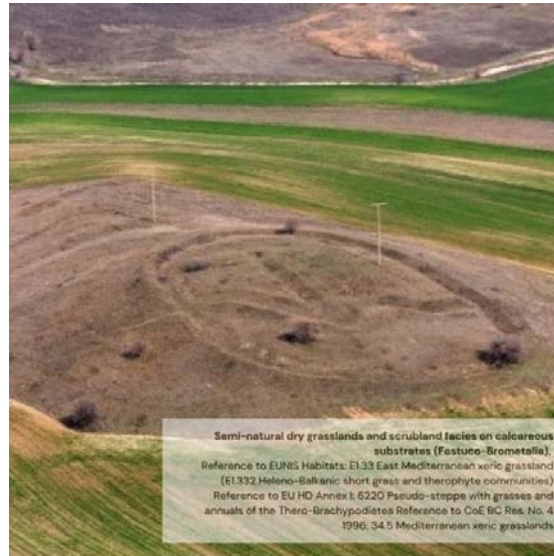


Figure 15. Dry grasslands

Mammals –Levant vole (*Microtus guentheri*), yellow-necked mouse (*Apodemus flavicollis*), European mole (*Talpa europaea*), brown hare (*Lepus europeus*).

Birds –As this habitat is with only small surface, there are not many characteristical bird species. Commonest is Crested Lark (*Galerida cristata*) but many other species are coming from the neighbouring habitats for foraging. Some raptor species, such as Buzzards and Kestrels, should be also mentioned.

Reptiles– This habitat is very rich with species and with some very important ones. Common are some lizards and many snake species ((*Dolichophis caspius*, *Elaphe quatuorlineata* etc.). Another reptile species that could be *Testudo graeca*, *Testudo hermanni*, *Platycephalus naja*.

Amphibians - there are only two species regularly found in this habitat, but several others probably can be found coming from neighbouring habitats. Commonest is the Green Toad (*Bufo viridis*).

AQUATIC HABITATS

Due to the extremely dry years and the negligence of the human factor (ruthless cutting of field-protective belts, forests and failure to provide the biological minimum on the river Mavrovica) today all watercourses in Ovche Pole are dried up throughout the year. Only in Svetinikolska River there is water during the summer. There are three types of water habitats in the investigated area: streams and rivers approximately narrower than 5 m, occasional watercourses (which usually dry up during the summer period) and irrigation canals. Occasional watercourses have water only during the wet period of the year. Therefore, these watercourses are not as important as aquatic ecosystems. Irrigation canals also have water in parts of the year, ie in the periods when the fields are irrigated in the summer. Willow or reed belts usually develop around riverbeds (gullies) and are therefore important from the aspect of animal shelters. Although temporary, these places are especially important for insects and amphibians, as well as birds that feed on them.

Rivers (~ narrower than 5 m) EUNIS C2.2

Main characteristics- The most important permanent watercourse is Svetinikolska River. Svetinikolska River - originates from three rivers Berish, Karatash and Mavrovica. They join near Sveti Nikole and from there to the village Amzabegovo the watercourse is known as Svetinikolska Reka (fig.16), from this village to the inflow into Bregalnica it flows under the name Azmak. Azmak flows into Bregalnica southeast of the village Adzibegovo at 203 m above sea level. Svetinikolska River is 35 km long, covers a catchment area of 665 km², which is the largest such area among all tributaries of Bregalnica, but has a very small drop of only 11.6 ‰. Svetinikolska River in the Ovche Pole valley receives several tributaries. Unfortunately, this river is polluted most of the time of the year, because communal waste water from the town of Sv, Nikole end in river.

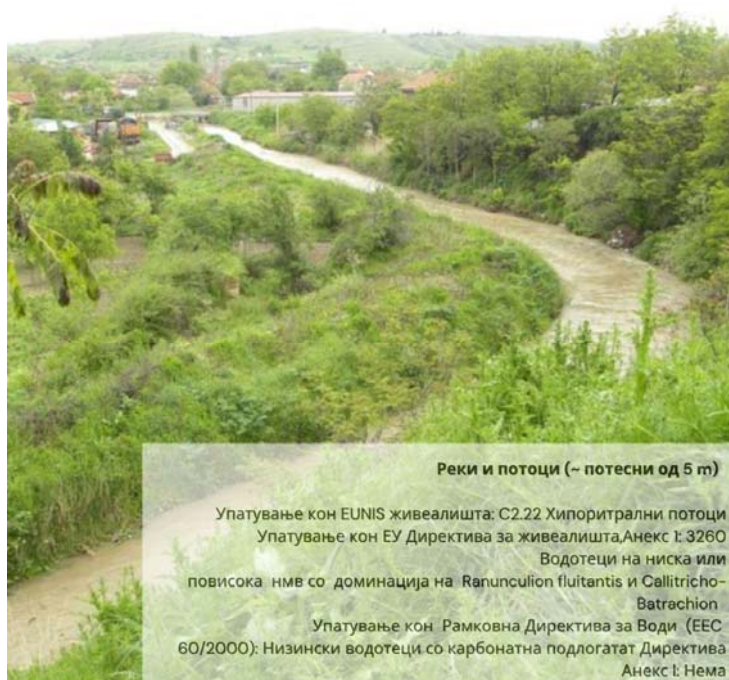


Figure 16. Svetinikolska River

Distribution in the gas pipeline corridor- The gas pipeline route is planned to pass under the riverbed of Svetinikolska River at a chainage km 6+162,00.

The strong eutrophication influence from communal wastewater as well as from agriculture enables massive development of macrophytes in the rivers. Macrophytes are present throughout the year. The most dominant species during the summer is *Potamogeton fluitans*, while in very slow watercourses the species *Lemna minor* is present, which covers the water surface. During the spring period the green alga *Cladophora glomerata* dominates. This composition of macrophytes enables intensive development of epiphytic diatom communities. A more specific bird is the white-throated dipper (*Cinclus cinclus*). Several semi-aquatic amphibian and reptile species are also found in this habitat. According to local people, coypu (*Myocastor coypus*) could be seen near the river. Coypu is invasive introduced species.

Amphibians - characteristic species are the lake frog (*Pelophylax ridibundus*), and of the reptiles the grass snake (*Natrix natrix*) and aquatic turtles *Emys orbicularis* and *Mauremys caspica*. The diversity of the aquatic fauna of the Svetinikolska River has not been sufficiently investigated.

Intermittent streams EUNIS C2.5

Main characteristics- In these watercourses there is water only during the wet period of the year. During the field investigations, organic pollutants could be observed (especially within the arable areas). In early spring, the water level is high, while for the rest of the year the riverbeds of the streams are dry. That is the reason why these watercourses are not very important as aquatic ecosystems. Sometimes lonely willow trees or reeds appear around it, which makes it very different from the surrounding grassy areas or agricultural areas. The bottom is mainly covered with *Cladophora glomerata* and *Spirogyra spp.* which provides a good layer for epiphytic growth of diatom species. The diatom composition consists mainly of eutrophication-tolerant species such as the genus *Nitzschia* and *Navicula*. **Distribution in the gas pipeline corridor**- There are several watercourses (fig.17) that dry out most of the year, and are in the corridor (please see habitat map).



Figure 17.Dervenski Stream

Amphibians- present are: yellow-bellied toad (*Bombina variegata*), common toad (*Bufo bufo*) and green toad (*Pseudepidalea viridis*).

Butterflies- typical for this habitat are: *Carcharodus flocciferus*, *Pygus alveus*, *P. sidae*, *Spialia orbifer*, *Parnassius mnemosyne*, *Zerynthia cerisy*, *Apanthopus hyperantus*, *Arethusana arethusa*, *Lasiommata petropolitana*, *Pyronia tithonus*, *Vanessa atalanta* and others. The proximity of the

agricultural areas, the septic tanks from the surrounding houses as well as the temporal character of the stream condition that the macrozoobenthos is represented primarily by tolerant species of pollution Hirudinea and diphtheria larvae.

Reed belts (*Phragmites australis*) EUNIS D5.1

Reed belts are not a typical biotope. They develop as narrow belts along the canals and slow watercourses and are usually fragments of the marshy plant community *Scirpo-Phragmitetum*. Reed (*Phragmites australis*) gives the physiognomy of this habitat, and *Typha latifolia* (bulrush) is also present. The most common vascular plants that grow on aquatic habitats are: *Veronica anagalis-aquatica*, *Veronica beccabunga*, *Stelaria aquatica*, *Lycopus europaeus*, *Myosotis scorpioides*, *Alisma plantago-aquatica*, *Rumex cristatus*, *Polygonum hydropiper* and *Ranunculus repens*. This type of biotope is much poorer in terms of flora and fauna. In some places the reed dominates, and in others the bulrush.

Distribution in the area of the gas pipeline corridor: Reed belts are present along the streams in the final part of the route, locality Nezirlik Ardi (fig.18).



Figure 18. Reed belt south of the corridor near chainage km 21+500

Mammals- typical species is the field mouse (*Apodemus agrarius*).

Birds - The only nesting birds in this habitat are the great reed warbler (*Acrocephalus arundinaces*) and probably the little bittern (*Ixobrychus minutus*).

Amphibians- this habitat is preferred by 6 species of amphibians: yellow-bellied toad (*Bombina variegata*), common toad (*Bufo bufo*), green toad (*Pseudepidalea viridis*), European tree frog (*Hyla arborea*), marsh frog (*Pelophylax ridibundus*).

Reptiles- Reptiles that are present in this habitat are: *Natrix natrix* and *Natrix tessellate*, *Emys orbicularis*. **Butterflies** - Wetlands are also very favorable habitats for butterflies due to their diverse flora. The following species are present in the investigated area: *Lycaena dispar*, *L. tityrus*, *L. candens*, *Apatura ilia*, *Thymelicus lineola*, *Argynnis pandora*, *A. paphia*, *Papilio machaon*, *Celastrina argiolus*, *Polyommatus icarus*, *Argynnis aglaja*, *Colias crocea*, *Pontia edusa*, *Aglaia io*, *Carcharodus alceae* etc.

5.1.2 Anthropogenic habitats

This section refers to anthropogenic habitats such as coniferous plantations and agricultural areas (cereals and fields). Favorable natural-geographical characteristics (favorable geomorphology, favorable pedological and hydrographic characteristics and favorable climate) conditioned the dominance of one type of crops at the expense of others, so that the region characteristics are specifically shaped. Thus, in the Ovche Pole area, cereals dominate, and this gives the specific visual effect of the region, so that within the agricultural regions, several separate region types are distinguished.

Fields and acres EUNIS I1.1

Main characteristics - Anthropogenic habitats that represent the largest percentage of the investigated area - most are the fields mainly represented by cereals and agricultural crops. Industrial plants are present in large areas, especially sunflower, and less tobacco. Corn fields are also found. Intensive monocultures where the use of large amounts of pesticides and fertilizers dictate the development of biocenosis with a small diversity of species. Therefore, they have a lower biodiversity value. Characteristic for Ovche Pole fields are Field-protective belts which are composed of different types of shrubs and fruit trees, among which the most common are: *Morus spp.*, *Pyrus spp.*, *Populus spp.*, *Robinia pseudoacacia* and *Juglans regia*. They have several important roles, including: marking and protection of property; wind protection; some of the borders have fruit trees and hence have a certain economic value; and more importantly, from the aspect of biodiversity conservation, they provide corridors for movement of animal species and increase the diversity of ecological niches (places for feeding, hunting, nesting, etc.). The presence of borders increases the value of the surrounding habitats.

Distribution in the area of the gas pipeline corridor- About 90% of the investigated corridor is represented by arable land mostly fields. Field protective belt could be seen from km 0 till 6+000 (fig.19).

Mammals - Fields are suitable habitat for many species of mammals, such as: mole (*Talpa europea*), günther's vole (*Microtus guentheri*), lesser mole-rat (*Nannospalax leucodon*), wood mouse (*Apodemus sylvaticus*), striped field mouse (*Apodemus agrarius*), Macedonian mouse (*Mus macedonicus*), european hare (*Lepus europeus*), red fox (*Vulpes vulpes*), least weasel

(*Mustela nivalis*) and European badger (*Meles meles*). Three species of **birds** (*Perdix perdix*, *Miliaria calandra* and *Galerida cristata*) live here permanently, and about a dozen species nest.

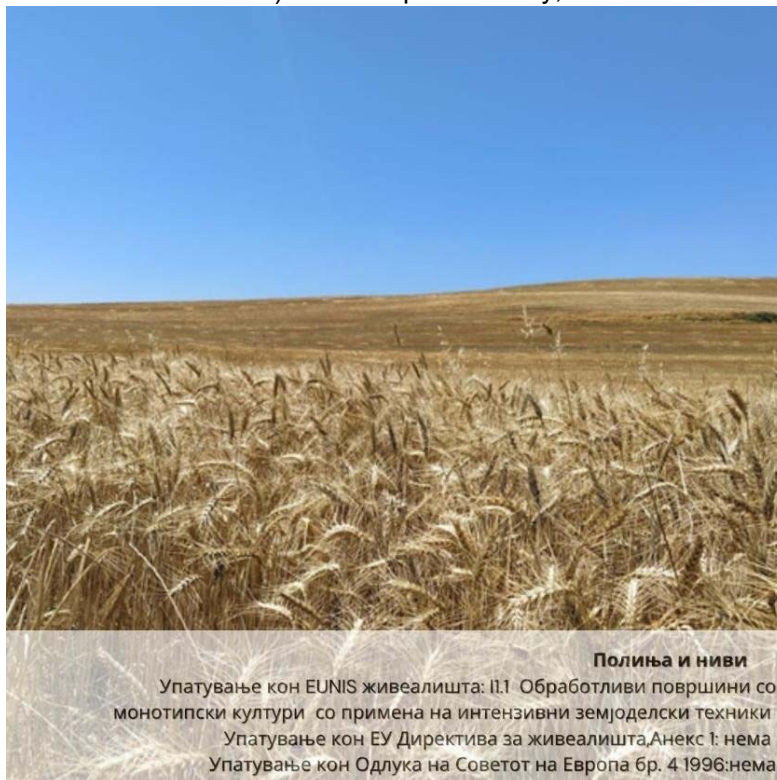


Figure 19. Field with cereal

Amphibians -There are only two species of amphibians: the common frog (*Bufo bufo*) and the green toad (*Pseudepidalea viridis*).

This habitat is favorable for **butterflies**. However, species of the family *Pieridae* can be found sporadically. In addition to these, other types of **beetles** are found: *Calathus melanocephalus*, *Chlaenius vestitus*, *Pterostichus niger* etc. There are 13 types of **orthoptera**: *Polysarcus denticauda*, *Tettigonia viridissima*, *Tettigonia caudata*, *Decticus verrucivorus*, *Oecanthus pellucens*, *Acheta deserta*, *Omocestus ventralis*, *Chortippus loratus*, *Euchortippus declivus stichai*, *Dociostaurus brevicollis*, *Aiolopus strepens*, *Acrotylus insubricus*, *Calliptamus italicus*, *Oedipoda germanica* and *Forficula auricularia*.

Vineyards EUNIS FB4.1

Main characteristics - Vineyards appear fragmented as a patch along the pipeline corridor. In terms of biodiversity, vineyards are more important than fields. This habitat is rich in birds because it provides good feeding conditions.



Figure 20. Vineyards

Distribution in the area of the gas pipeline corridor: The vineyards (fig.20) are spread everywhere in the area as fragments of arable land mixed with fields and orchards (please see map of habitats).

Birds -The most common bird species is the common starling (*Sturnus vulgaris*). Many birds breed here, such as the common blackbird (*Turdus merula*) and the House sparrow (*Passer domesticus*). **Butterflies**- Several species of butterflies can be found in this habitat, the most common of which are: *Artogeia napi*, *A. rapae*, *Celastrina argiolus*, *Colias alfacariensis*, *Leptotes pirithous*, *Polyommatus icarus*, *Pieris brassicae*, *Polyommatus icarus*, etc.

Orchards EUNIS G1. D

Main characteristics - In the area, they are present sporadically in larger areas. Cherries, plums, almonds, apricots and others are most often planted. **Distribution in the area of the gas pipeline corridor**- Orchards (fig.21) are mixed with the fields and could not be distinguish.



Figure 21. Orchards near Sveti Nikole

Mammals – species found in orchards can also be found in other agricultural habitats. The most common are: southern white-breasted hedgehog (*Erinaceus concolor*), European mole (*Talpa europea*), red squirrel (*Sciurus vulgaris*), lesser mole-rat (*Nannospalax leucodon*), Macedonian mouse (*Mus macedonicus*), European hare (*Lepus europeus*), red fox (*Vulpes vulpes*) and others. Several species of bats use this habitat as a place for hunting and feeding *Myotis*. **Birds** -Very few species are present in the orchards, *Merops apiaster*, *Upupa epops*, *Galerida cristata* and *Oenanthe oenanthe* nest here, and other species come in search of food.

The fauna of **amphibians and reptiles** is the same as in neighboring habitats. Several species of butterflies and coleoptera can be found in the orchards. The most representative are the species of Scolytidae that live in the forests and the bark of the trees cultivated in the orchards (*Scolytus mali* on the apple trees, *S. amygdali* on the *Amygdalus communis*, etc.).

Butterflies that could be seen are: *Iphiclides podalirius*, *Pyrgus malvae*, *Aglais io*, *Melanargia galathea*, *Maniola jurtina*, *Pontia edusa*, *Plebeius agestis*, *Melitaea phoebe*, *Erynnistages*, *Lycaena phleas*, *Pyrgus alveus*, *Vanessa cardui*, *Pieris brassicae*, *P. manni*, *Polyommatus icarus*.

Abandoned arable land EUNIS I1.53

Main characteristics - In recent decades, the abandonment of arable land is quite a common process in RNM. Vegetation wise, the most important characteristic for this habitat, is the degree of dominance of weed and ruderal plant communities over the grass community's characteristic of the grass habitats.

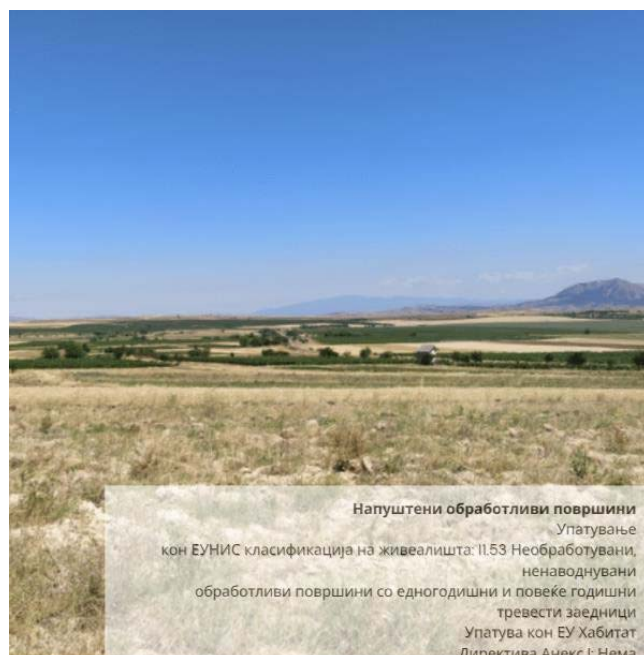


Figure 22. Abandoned field

Plant species that indicate abandoned fields and meadows from the grass floor are: *Cynodon dactylon*, *Lolium spp.*, *Bromus spp.*, *Hordeum vulgare* etc. *Andropogon ishemum* often enters from the surrounding pastures. The presence of other grass species (mostly weeds) such as *Tribulus terrestris* is also characteristic of this habitat. Common species of tall grasses are: *Arctium lappa*, *Hyosciamus niger*, *Datura stramonium*, *Cichorium intybus*, *Xanthium spinosum*, *Onopordon sp*, *Cirsium spp.* etc. The successive process is followed by gradual healing of the areas with grass (annual and perennial) communities, shrubs and trees. Several species of bird's nest in the bushes (species of the genera *Lanius*, *Luscinia*, *Sylvia*). Shrub species (*Paliurus spina-christi*, *Rosa spp.*, *Prunus spinosa*), which often overgrow abandoned arable land, together with grass communities define the physiognomy of these habitats. There are no typical or characteristic mammalian species in this habitat.

Distribution within the project corridor: Abandoned fields and meadows can rarely be seen within the investigated corridor of influence, most often between lots of agricultural land, most often along roads at the end of the corridor (see habitat map)

Coniferous trees plantations EUNIS G3.F

Main characteristics - Coniferous plantations are most often represented by black pine (*Pinus nigra*), and in some places cypress plantations (*Cupressus sempervirens*, *C. arizonica* and others) are found (fig.22). Coniferous plantations prevent erosion, and also have great landscape value. They are planted mainly on the southern slopes of the hills. There is not much difference in the ground vegetation where elements of the adjacent vegetation types are found. The disadvantage of these artificially raised forest ecosystems is that as monocultures they are easily susceptible to calamity pests, and there is a high risk of fire. **Distribution in the area of the gas pipeline**

corridor: Larger areas with evergreen plantations are from km 8+000 - 9+500, near km 17+500 and km 27+500 (please see habitat maps).

Fungi - In pine plantations can be found species of lignicolon fungi, saprobes or pine parasites, such as *Meruliopsis taxicola*, *Peniophora pini*, *Phellinus pini*. There are also some specific species

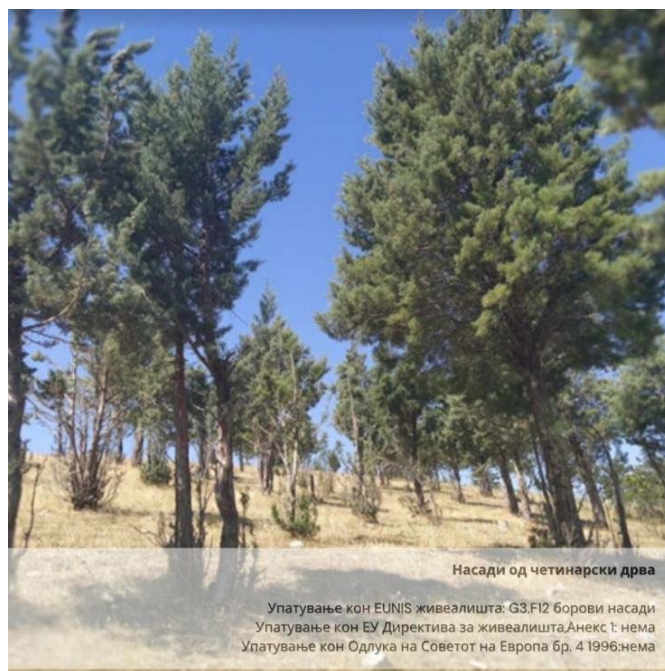


Figure 23. *Cupressus arisonica* plantations near Veles

that mycorrhize with pines such as: *Suillus granulatus*, *S. luteus*, *Lactarius deliciosus* etc.

Mammals- Of the mammals in this habitat are found: red squirrel (*Sciurus vulgaris*), lesser mole-rat (*Nanospalax leucodon*), mouse (*Apodemus sylvaticus*), striped field mouse (*Apodemus agrarius*), red fox (*Vulpes vulpes*), least weasel (*Mustela nivalis*), European badger (*Meles meles*), wild boar (*Sus scrofa*) and roe deer (*Capreolus capreolus*).

Birds- There are many species of birds that use these habitats for food. Common are the Eurasian jay (*Garrulus glandarius*), European greenfinch (*Carduelis chloris*), some species of sparrows and some members of the family Fringillidae.

Reptiles- most common are the lizards (*Lacerta spp.*), and snake (fam. *Colubridae*) Due to unfavorable hydrographic conditions and soil layers this habitat is very poor with amphibians.

Butterflies -The most common representatives of butterflies are: *Artogeia rapae*, *Polyommatus icarus*, *Gonepteryx rhamni*, i.e. species that are common in the largest number of the habitat types.

Agricultural structures EUNIS J2.4

Main characteristics - In the vicinity of the gas corridor, there are dispersed structures in the rural surrounding determined for the purposes of the agricultural activities, permanent or temporary dwellings, small trade, craftsmen or industrial activities, recreation, etc. They include isolated

greenhouses, animal shelters, structures for drying harvest, sheds and cottages (fig.24), cottages in the middle of a field or pasture. The gas pipeline does not pass directly through populated areas (villages) or similar structures, but they are registered in the corridor of 500m.



Figure 24. Cottage in the middle of a field

Mammals- The most common species are: red squirrel (*Sciurus vulgaris*), yellow-necked mouse (*Apodemus flavicollis*), wood mouse (*Apodemus sylvaticus*), striped field mouse (*Apodemus agrarius*), fat dormouse (*Glis glis*), house mouse (*Mus domesticus*), red fox (*Vulpes vulpes*), the weasels (*Mustela nivalis*, *Mustela putorius*), the beech marten (*Martes foina*), the European badger (*Meles meles*).

Birds- Among the birds there are species that are associated with the anthropogenic habitats: *Pica pica*, *Corvus monedula*, *Corvus cornix*, *Corvus corax*, *Passer domesticus*, *Passer montanus*, *Ciconia ciconia*, *Falco tinnunculus*, *Columba livia*, *Streptopelia decaocto* etc. Many bats find shelter in old dilapidated houses.

5.1.3 Habitat Sensitivity Assessment

The sensitivity was assessed with purpose matrices for assessing the sensitivity of the natural ecosystems and habitats, but also for the 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 R. N. M.
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 in order to show the national and international (in Europe and the World) importance of the ecosystems/habitats and their species composition. The higher value of the habitat (applying of larger number of criteria) corresponds with higher sensitivity of habitat.

ls-There are no significant obstacles for performing the construction works, however the aesthetic value of the area shall be observed; any type of unnecessary disturbance shall be avoided (*the impacts on these habitats will have lower significance*).

ms-The performance of construction works is allowed, but the activities should include appropriate precaution measures, partial or complete disruption of this type of habitat should be avoided, and if the disruption is inevitable, appropriate measures for mitigation of the impacts should be undertaken (*the impacts on this type of habitats will have certain significance*).

hs-These habitats (this category includes PBF), sites will have higher significance for the biodiversity, any type of construction works should be avoided; if there is no other solution, the strictest measures should be taken for reduction, preservation and protection; in relation to natural habitats, special construction regime should be applied (For example seasonal restrictions, strict territorial recommendations, etc.); damage caused to this type of ecosystem should be compensated, in accordance with the existing laws; It is mandatory to organize constant *monitoring* by the investor (*the impact is assessed as average*).

vhs- It is forbidden to perform any type of construction works. Any type of construction activities near such sites – (this category includes Critical Habitats) should be limited, and as stated in the case with the high sensitivity (**hs**) habitats, protection and constraint measures should be undertaken. The negative impacts will lead to irreversible changes in these habitats, i.e. the habitats will be completely lost. During the phase it is mandatory to organize permanent monitoring by the investor (The impact intensity is high).

Habitats/features which trigger CH/PBF irrespective of the above assessment method are automatically assigned the corresponding sensitivity score (i.e. Vhs/Hs) regardless of cumulative scoring from the individual criteria, in line with PR6.

Although the water habitats are part of Annex 1 from the Habitats Directive, in the subject area there is only the Svetinkolska River which is not explored, and it is under a strong anthropogenic impact from the discharge of waste waters.

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 11).

Table 11. 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 annual of Thero-Brachypoditea</i>	3 *	3	2	2	2	1	1	CH	Y	14	vh s hs
<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	Ms
<i>Intermittent streams</i>	0	1	1	3	3	0	1	-	N	8	Is
<i>Reed belts</i>	0	1	2	1	1	0	1	-	N	5	Is
Rivers narrower than 5 meters	0	0	1	1	1	1	1	-	N	6	Is
Abandoned fields with ruderal vegetation	0	0	0	1	1	1	1	-	N	4	Is
<i>Fields and acres</i>	0	0	0	0	3	3	0	-	N	6	Is
<i>Orchards and vineyards</i>	0	0	0	0	1	3	0	-	N	4	Is
<i>Coniferous plantations</i>	0	0	0	1	0	2	3	-	N	6	Is
<i>Agricultural structures</i>	0	0	0	0	0	3	0	-	N	3	Is

Ranking:

0- No significance

1- Low significance

2- Average significance

3- High significance

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 habitats

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:

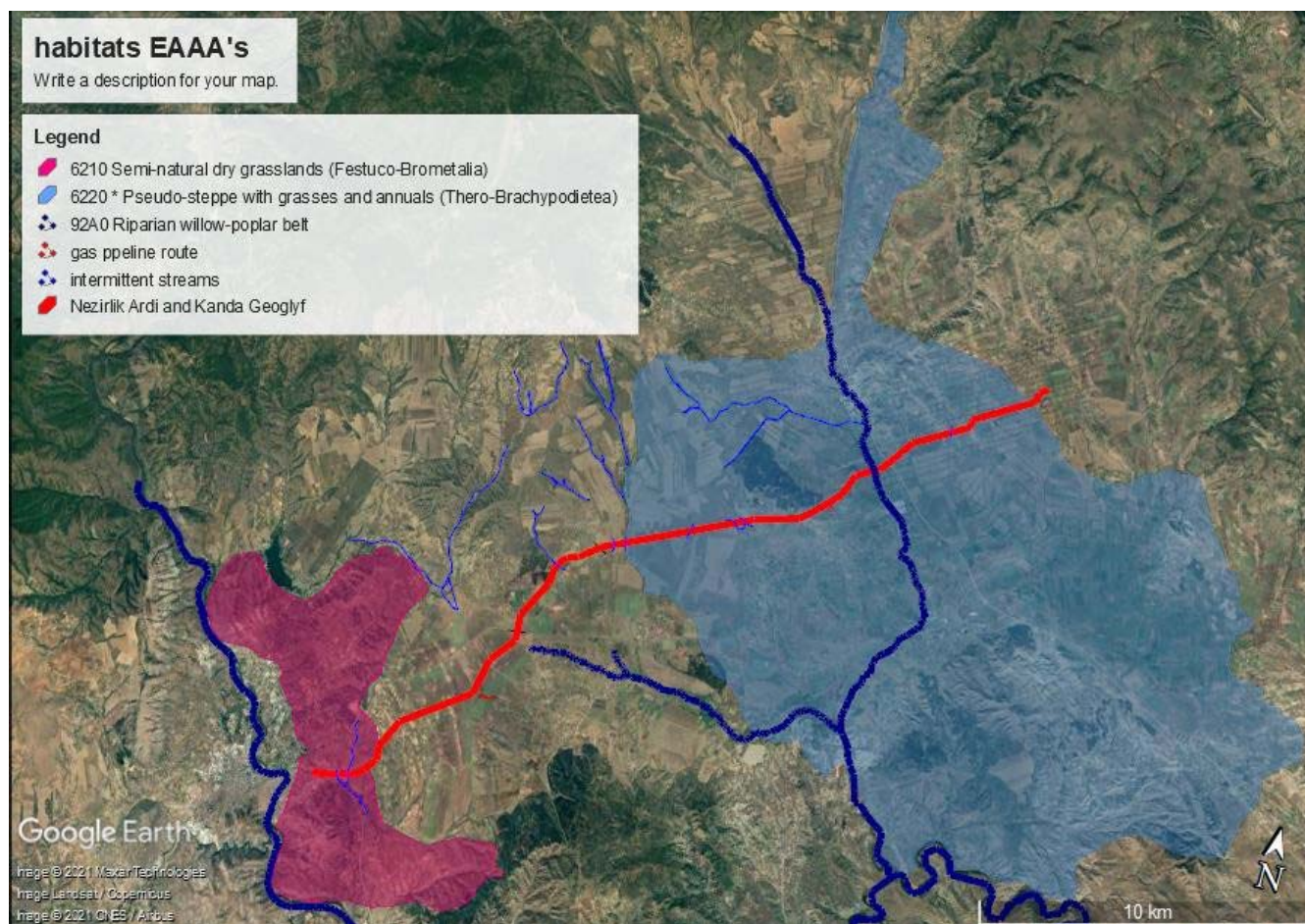


Figure 25. Habitat EAAAs in the Zol (the most sensitive ones)

Figure 25 provides an overview of sensitive habitats (and their associated EAAA) 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).

5.2 Ecosystem Services

The area provides some ecosystem services of value to the local communities. The data available does not reflect the current situation on medicinal plants, as there is a lack of legal regulations on their collection, use, care, conservation, trade and export.



Wild fruits: With regard to the Project area, collection of wild fruits by the local population is typically practiced. Dog rose, raspberries, blackberries, Cornelian cherry and plums, are collected by the local population and used for making juice and jam.



Medicinal and aromatic plants: the most common medicinal and aromatic plants and berries in the area of interest are: *Achillea millefolium*, *Althaea officinalis*, *Chamomilla recutita*, *Crataegus monogyna*, *Cornus mas*, *Equisetum arvense*, *Rosa canina*, *Hypericum perforatum*, *Malva silvestris*, *Onionis spinosa*, *Plantago lanceolata*, *Plantago major*, *Taraxacum officinale*, *Tussilago farfara*, *Urtica dioica*, *Delphinium consolida*, *Fumaria officinalis*, *Tanacetum vulgare*, *Saponaria officinalis*, *Prunus spinosa* and the lichen *Pseudevernia prunastri*. Other species of medicinal herbs, such as: *Juglans regia*, *Origanum vulgare*, *Rubus fruticosus*, *Sambucus nigra*.



Mushrooms: The most common species collected for the market are: boletes (*Boletus aestivalis* & *B. aereus*), the chanterelle (*Cantharellus cibarius*), morels (*Morchella* spp.), the saffron milk cap (*Lactarius deliciosus*), and likely other species as well.



Food: Ecosystems in the Project Areas provide conditions for growing food especially wheat. Food comes principally from managed agro-ecosystems. Within the area under the influence of the construction of a gas pipeline, human activities took place and are taking place with different intensity, which left a strong mark on the entire territory, the areas and nature in general. The main activity and land use along the corridor of interest is agriculture, primarily agriculture, and less viticulture and fruit growing. Arable land intensively cultivated is presented by large area fields and cereal fields, mostly wheat, oats, barley and rye, and vineyards. Because of the usage of fertilizers and pesticides for fields, this area is not suitable for maintenance of biodiversity.



Livestock is especially important in the economy of the project affected municipalities, Sveti Nikole, Lozovo and Veles¹⁶. The pastures in the municipalities, with a total area of 67,849 ha or 25.7% of the total arable area, are an extremely important resource for livestock. Small and large cattle are raised in the municipality. There are mostly agricultural holdings where poultry is raised, followed by pigs, as well as cattle, sheep and goats.

Ecosystem services of protected woodland belt

The first part of the corridor has narrow strips of woodland acting as ancient boundaries between irregular shaped. They are single or multi-row line, artificial plantations of forest or fruit trees or shrubs in order to protect agricultural areas, as well as various economic facilities from the wind (damage sediment, snow) or water erosion.

¹⁶ According to Social Expert Report

1. With its position, in relation to the winds and with its construction, the belts contribute to the even moistening of the field during precipitation, without eddies and accumulations behind elevations and depressions.

2. Belts slow down the wind and thus:

- significantly reduce the evaporation of soil moisture in the warm period of the year
- they slow down the cold wind, and thus prevent or reduce the freezing of soils that in such a condition cannot absorb any water, which significantly increases the infiltration of moisture. Slowing down the cold wind reduces or prevents freezing of cultivated crops between belts.
- with the slowing down of the dry and warm wind, the transpiration from the leaves of the cultivated crops decreases, which thus exist with less soil moisture
- with the slowing down of the wind, the belts hunt the seeds of the chaff, carried by the wind, and they, as light-loving species, perish in the shadow of the belt, due to which they will need less protective means to remove them.

3. Belt trees attract many songbirds, who use belts for nesting, and they find insect food on crops sown between belts. This provides free biological protection that is, the production of organic food.

4. Belt trees consume a lot of water for their survival, which they extract from the soil. With this transpiration they dry the substrate. Because the groundwater in project area is salty, belts enable agricultural production on saline soils with retention of groundwater at a certain depth making the soil arable.

5.3 Conservation Significance of Species

5.3.1 Valorisation of Flora Species

Based on the categorization methodology described above, the following plant species listed as present (table 12) for part of the route are of particular interest:

1. Species which are on the CORINE European List- *Silene vulgaris* (bladder campion) which is very common in North Macedonia;
2. Species listed in the Annexes of Habitat Directive- none are known to be present in the Study Area;
3. Species which are on the CITIES Convention- *Dactylorhiza romana* and *Ophrys apifera*;
4. Species listed in the Bern Convention- none are known to be present in the Study Area;
5. Species which are on the IUCN National Red List of threatened species- *none are known to be present in the Study Area*;
6. Species which are on the IUCN Global Red List of threatened species- *Silene vulgaris* (LC) *Allium meteoricum* (DD), *Triglochin palustris* (LC) *Tamarix ramosissima* (LC)
7. IPA species in area around the route- in vicinity *Centaurea marmorea* and *Hedysarum macedonicum*; and
8. National List of Strictly Protected and Protected Wild Species- *Alyssum bargalense*, *Astragalus gracaninii*, *Camphorosma monspeliaca*, *Centaurea marmorea*, *Colchicum*

soboliferum, *Potentilla tridentula*, *Suaeda maritima*, *Tragopogon kindingeri*, *Hedysarum macedonicum* (strictly protected)

9. Macedonian endemic species present in space around the route- *Alyssum bargalense*, *Astragalus gracianinii* *Hedysarum macedonicum*, *Tragopogon kindingeri*

No sensitive plant species were found within the Project corridor (500 m study area), such as those designated as priority species in the Habitats Directive.

The last section of the corridor near Veles (hill pastures on calcareous ground), specific grass vegetation occurs with abundant and specific flora. From conservation perspective, the species from Orchidaceae family are particularly important for this habitat type. Regrettably, there is insufficient literature data on the aforementioned section of the corridor while a rather small number of species without notable conservation significance were sighted during the field visits within the current study.

Some species are found away from the project zone of influence are especially important as they are representatives of the steppe-like vegetation. They are: *Astragalus parnassi*, *Convolvulus holosericeus*, *Morina persica*, *Onobrychis hypargyrea* and *Potentilla tridentula*. Those plants won't be affected by this project.

Eight Macedonian endemic species could be found in the area of interest, as follows: *Hedysarum macedonicum*, *Astragalus cernjavskii*, *Tulipa mariannae*, *Onobrychis megalophylla*, *Ferulago macedonica*, *Heptaptera macedonica*, *Salvia jurisicii* and *Potentilla tridentula*, but field surveys did not confirm their presence.

15 species of plant are evaluated as being valuable. The main threats to these plant species are habitat change and intensification of agriculture.

Table 12.PBF / notable plant species potentially present within the survey corridor

Species Name	Description	Location along route (km)	IPA species and range restriction
<i>Silene vulgaris</i>	Bladder campion is very common in Macedonia; Its IUCN status is LC last concerned	Likely to be present hill pastures with sparse shrubs and abandoned arable land with ruderal vegetation	
<i>Allium meteoricum</i>	A perennial plant that grows on calcium-rich soil in dry grasslands, in rocky outcrops, and in pine and oak forests. Its IUCN status is DD data deficiency	<i>Allium</i> sp. was identified on hill pastures with sparse shrubs and abandoned arable land with ruderal vegetation	The species is native to Greece
<i>Alyssum bargalense</i>	Endemic to the North Macedonia. It is part of the List of Strictly Protected and Protected Wild Species (MOEPP 2011)	No	
<i>Astragalus gracianinii</i>	Endemic to the North Macedonia. It is part of the List of Strictly Protected and Protected Wild Species (MOEPP 2011)	<i>Astragalus parnasii</i> identified at archaeological monument	No information is available

		Kanda Geoglyph	on this Balkan endemic species, but due to the wide geographic extent of the Balkans area, the area unlikely to support > 1% of the global population
<i>Camphorosma monspeliaca</i>	It is a typical plant of steppe and semi-desert regions. It is part of the List of Strictly Protected and Protected Wild Species (MOEPP 2011)	No	
<i>Centaurea marmoreal</i>	It is one of the trigger species of IPA Ovche pole Bogoslovec, also part of the List of Strictly Protected and Protected Wild Species (MOEPP 2011)	During the scoping phase, only <i>Centaurea</i> sp. Was identified in abandoned arable land with ruderal vegetation	A(iii) No information is available on this Balkan endemic species, but due to the wide geographic extent of the Balkans area, the area unlikely to support > 1% of the global population
<i>Colchicum soboliferum</i>	It is part of the List of Strictly Protected and Protected Wild Species (MOEPP 2011)	No	
<i>Dactylorhiza romana</i>	<i>Dactylorhiza romana</i> , the Roman <i>dactylorhiza</i> , is a species of orchid. It is native to the Mediterranean Region of southern Europe and northern Africa, the range extending eastward to Iran and Turkmenistan. It is Protected by Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)		
<i>Hedysarum macedonicum</i>	Endemic to the North Macedonia and part of the List of Strictly Protected and Protected Wild Species (MOEPP 2011). It is one of the trigger species of IPA Ovche pole Bogoslovec	No	A(iii)

<i>Ophrys apifera</i>	Known in Europe as the bee orchid, is a perennial herbaceous plant of the family Orchidaceae. Its IUCN status is LC. It is Protected by Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)	No	
<i>Potentilla tridentula</i>	Endemic to the North Macedonia. Also, it is part of the List of Strictly Protected and Protected Wild Species (MOEPP 2011)	No	
<i>Suaeda maritima</i>	Herbaceous sea-blite has a worldwide distribution. It is part of the List of Strictly Protected and Protected Wild Species (MOEPP 2011)	No	
<i>Tragopogon kindingeri</i>	Perennial with a tuberous ovoid to globose rootstock. Endemic to North Macedonia also part of the List of Strictly Protected and Protected Wild Species (MOEPP 2011)	No	
<i>Triglochin palustris</i>	Known as marsh arrowgrass is a species of flowering plant in the arrowgrass family Juncaginaceae. It is found in damp grassland usually on calcareous soils, fens and meadows. Its IUCN status is LC.	No	
<i>Tamarix ramosissima</i>	Commonly known as saltcedar salt cedar, or tamarisk, is a deciduous arching shrub with reddish stems, feathery, pale green foliage, and characteristic small pink flowers. Its IUCN status is LC.	No	

Highly restricted-range plant species (range < 500 km²) *Hedysarum macedonicum* Bornm. *Salvia jurisicii* Kusanin and Restricted range plant species (range <50000km²) *Anchusa macedonica* Degen & Dorfl. *Galium rhodopeum* Velen are present in AOI but not detected on in project area.

As regards **invasive species**, the false acacia (*Robinia pseudoacacia*), the tree of heaven (*Ailanthus altissima*) and the indigo bush (*Amorpha fruticosa*) were observed along the pipeline corridor.

5.3.2 Valorization of Fauna Species

Mammals

In the area there are data suggesting the presence of 22 mammal species. All of the observed species are common and widespread in North Macedonia. They are found in all types of habitats with different species composition. The complete list of all registered mammal species is provided in Annex.

There is no threatened mammal species in the area of interest in line with the IUCN's Global and European Red List. There are total of 4 species in the area that are listed in Appendix II and 9 in Appendix III of the Bern Convention. Two species are included in Annex IV and one in Annex II and one in Annex II, IV and V of the Habitats Directive. Four species are listed in Appendix II of the Bonn Convention. As stipulated in the provisions of the Law on Hunting, one species is

categorized as permanently protected game species whereas two species have temporary (seasonal) protection (open and closed hunting season).

In compliance with the criteria, only the wolf (*Canis lupus*) might be considered as species of particular conservation concern in the broader area of the pipeline corridor. Wolf presence was registered in the hilly areas near Veles. However, there is no need for a baseline survey for the wolf given that the species is common and widespread, and no crucial habitats for the species will be affected by the pipeline construction to a great extent.

Survey study – consultation with local people confirmed presence of the Coypu (*Myocastor coypus*)¹⁷, species that could have a direct negative impact on the indigenous fauna of mammals.

Invasive non-native species can threaten native species or their habitats, causing ecological damage and damage to economic activities. The reason is in inherently high reproductive rates and consecutive many of introduced species may become invasive, especially if their expansion is not controlled. Additionally, they occupy the habitats of indigenous species and displace them (MoEPP, 2003).

Birds

Desktop literature review, data from previous research datasets available (please see chapter 2.5) as well as field survey, resulted in creating a provisional inventory of birds occurring in the Project area.

Annex 3 lists the bird's species that are present in the Project area, along with their conservation status. Most birds in the area of the route (77 species) belong to category of least concern (LC) according to IUCN Global Red List. Only three bird species fall under the threatened categories of valorisation according to IUCN's categorisation on a global level – the Red-Footed Falcon is a near threatened (NT), the Egyptian Vulture is globally endangered (EN), and the Eastern Imperial Eagle is a globally vulnerable species (VU). One third (1/3) of the species are included in Annex I of the Birds Directive, two thirds (2/3) of the species are enshrined in Appendix II of the Bern Convention, and only 3 species are listed in both Appendix I and Appendix II of the Bonn Convention. Pertaining to national valorisation, 31 of the birds from this inventory are identified as strictly protected species, and 7 are only protected species under the Law on Nature Protection of the RM (Lists of Protected and Strictly Protected Species of RM). With regard to the Law on Hunting of RM, 32 species are under permanent protection from hunting, 7 are under seasonal protection, and 50 species are deemed as not-a-game-species in the country.

3 species are identified as priority ones: the Eastern Imperial Eagle, the Lesser Kestrel and the Egyptian Vulture. The stronghold of national populations of the Eastern Eagle and the Lesser Kestrel is located in Ovche pole Important Bird Area (the pipeline alignment entirely corresponds to the territory of the IBA). Unpublished research reveals that the Lesser Kestrel has demonstrated a significant population decline in Ovche pole IBA (approximately 90%), making it a nationally threatened species. As for the Eastern Imperial Eagles, they have sustained their national population relatively stable but they are very much isolated to three regions in the country (with Ovche pole IBA distinguished by the highest density of species nesting sites of, pers. comm.). The Egyptian Vulture is a globally endangered species that uses the project area (surrounding the pipeline and throughout the IBA) for foraging done by individuals that bird in the adjacent IBAs (namely, from Dolna Bregalnica IBA).

¹⁷ http://real.mtak.hu/22074/1/28_Purger_Kriystufek_1991_Biol_vestn_394_19_24_u_174759.101872.pdf

According to a vulture expert (consulted stakeholder), there are 5 active nests of *Aquila heliaca* in the AOI surrounding. Neither of them will be destroyed by the construction activities, but measures must be taken.

Amphibians

Annex 3 lists the amphibians which are likely present in the survey corridor. In the area of the route, there is data indicating the presence of 8 species of amphibians. According to the IUCN Global and European Red List, all species belong to category of least concern (LC), while according to National Red list two species (*R.dalmatina* and *H.arborea*) are considered as near threatened (NT).

One species is listed in Appendix II, five in Appendix IV and one in Appendix V of the Bern Convention, and in the CITES Convention on international trade with threatened species from the Wild Flora and Fauna (included in Annex II). None of the present species in the pipeline area are on the CITES List. Four species (*B. variegata*, *R. dalmatina*, *B.viridis* and *H.arborea*) are quoted as protected in the National List of Strictly Protected and Protected Wild Species.

Reptiles

Annex 3 lists the reptiles which are likely present in the survey corridor. In the area of the route, there is data indicating the presence of 15 species of reptiles. On the National Red List of Reptiles, there are three species (*Testudo graeca*, *T.hermanni* and *E.orbicularis*) assessed as vulnerable (VU); four species (*M.kotschy*, *E.quatuorlineata*, *M.insignitus* and *P.najadum*) are categorised as near threatened (NT); eight species are categorised as least concern (LC).

According to the IUCN Global Red List of Threatened Species, only one species is considered threatened (*T. graeca*), and it is categorized as vulnerable (VU). Three species (*T. hermanni*, *E. orbicularis* and *E. quatuorlineata*) are treated as near threatened (NT). Eleven species are listed as least concern (LC).

Identical categorisation as in the IUCN Global Red List of Threatened Species is applied in the IUCN European Red List of Threatened Species except for one species (*A. fragilis*), which is not categorised.

In EU Habitat Directive, four species (*T. graeca*, *T. hermanni*, *E. orbicularis* and *E. quatuorlineata*) are listed in Annex II while there are 12 species (*T. graeca*, *T.hermanni*, *E.orbicularis*, *L.trilineata*, *L.viridis*, *P.erhardii*, *P.muralis*, *M.kotschy*, *D.caspicus*, *E.quatuorlineata*, *P.najadum* and *V.ammodytes*) in Annex IV.

In Bern Convention, 11 species (*T. graeca*, *T.hermanni*, *E.orbicularis*, *L.trilineata*, *L.viridis*, *P.erhardii*, *P.muralis*, *D.caspicus*, *E.quatuorlineata*, *P.najadum* and *V.ammodytes*) are listed in Appendix II while all the remaining species are listed in Appendix III.

Two species (*T. graeca* and *T.hermanni*) are in Appendix II on the CITES List.

All reptile species are listed in the List of Strictly Protected and Protected Wild Species as protected, excluding *A.fragilis*, *M.insignitus* and *N.natrix*.

Special attention needs to be paid to the species which are Balkan endemics – the Hermann's tortoise (*Eurotestudo hermanni*) and the Greek tortoise (*Testudo graeca*).

5.4 Priority Biodiversity Features and Critical habitat

PR6 identifies two classes of important biodiversity, likewise based on the principles of threat (vulnerability) and geographic rarity (irreplaceability):

- Priority Biodiversity Features; and

- Critical Habitat.

Identification of features which potentially meet thresholds for Priority Biodiversity Features and Critical Habitat was carried out for the Project. Priority biodiversity features have a high, but not the highest, degree of irreplaceability and/or vulnerability. Although a level below critical habitat in sensitivity, they still require careful consideration during project assessment and impact mitigation.

All biodiversity features within the AOI were assessed in detail to determine whether they triggered critical habitat. Based on screening of approximately 120 biodiversity features known to occur or potentially occurring within the project AOI, some of which have biodiversity features were identified that could qualify for critical habitat under the adopted criteria.

In summary, the main species which may considered to be '*priority biodiversity features*', due to the listing recorded above, are as follows.

5.4.1 PBF / Notable Mammals

Twenty notable large mammals have been recorded within the study area. Of these only one is considered to be of international importance and PBF (due to the fact that it is in Annex II, IV& V of HD and App. II of the Bern Convention), as shown in the table 13 below.

Table 13. PBF / notable large mammals which may be present within the BRUA corridor

Name	Description	Location along the Project route	European Legal Protection
Grey Wolf (<i>Canis lupus</i>)	<p>The current status of the Macedonian wolf population is stable and it ranges between 800 and 1000 individuals. The distribution range of wolf in Macedonia includes most of the country' mountainous areas, thus excluding the central plain. The wolf within the Republic of North Macedonia is a game species without any protection during the whole year. The institution in charge for wolf management is the Ministry of Agriculture, Forestry and Water Management as well as the Ministry of Environment and Physical Planning¹⁸</p> <p>They mate between January and March and the young are born 7 weeks later in a den which has been dug among bushes or rocks. Wolves respond to the presence of humans. Except during the nomadic life stage cycle when foraging for food, wolves will avoid areas where humans are actively constructing. Wolves' reactions change over time as the wolves adapt to the changes in their environment</p>	Most likely to be present from km 26-27 in hilly areas near Veles. Ecological corridor Kartmanovo-Ivankovci is used by grey wolf	HD 2;4;5

However, the grey wolf is common and widespread species in North Macedonia, and no

¹⁸ Salvatori, V., & Linnell, J. (2005). *Report on the conservation status and threats for wolf (Canis lupus) in Europe* (p. 24). Council of Europe.

crucial habitats for the species (fig.26) will be affected by the pipeline construction to a great extent.

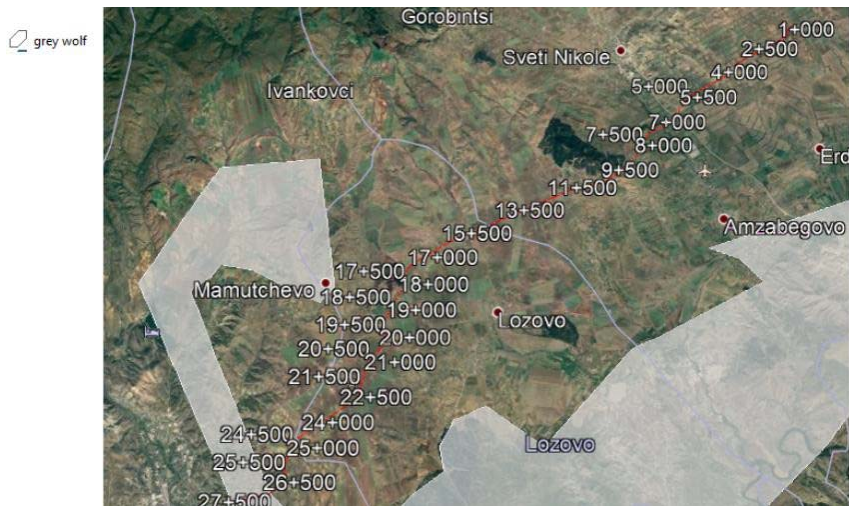


Figure 26.Distribution of grey wolf in Aol

5.4.2 PBF / Notable Birds

Seventy-seven notable bird receptors have been identified within the study area, of which 3 species are identified as priority ones: The Eastern Imperial Eagle, the Lesser Kestrel and the Egyptian Vulture. These species are considered to be of PBF value, as presented in the table 14 below (their distribution is given on fig.27,28).

Table 14.PBF / notable birds with potential to be present along the route

Species Name	Description	Location along route	European Legal Protection
Imperial eagle <i>Aquila heliaca</i>	This species has a small population globally, in a continuous decline, primarily due to the loss and degradation of habitat, mortality of adults through persecution and collision with power lines, robbing the nests and lack of prey (Birdlife international) . According to IUCN this species is categorized as Vulnerable (Vulnerable)..The growing population of imperial eagles in Central Europe (Hungary, Czech Republic, Slovakia) is a result of a strong conservation measures undertaken. This contributed at European level, this species to be classified as Near Threatened (Near threatened) to Least Important (Least Concern).Although the population of Imperial Eagles in N.Macedonia seems stable or only slightly declining in recent years, however, their population has history of declining- since the 80s of the 20th century to today. On the territory of N. Macedonia, imperial eagles are facing poaching, electrocution and poisoning, drying or cutting the stems of the nest, and regular harassment.Their population in the region of Ovche pole has been reduced (from 25 couples in 1990, to 13-15 pairs in 2015). Due to the optimal conditions for the	Species may be present breeding on old oak or poplar trees at some distance of the PZI.	Bird Directive Annex I

	<p>survival of this species in Ovcepolka Valley, despite breeding couples during the winter can be recorded and individuals that come even from the Pannonian Plain (Status of Birds in Macedonia, Metodi Veleviski and others. Macedonian Ecological Society, 2012 / 2013). The imperial eagles are breeding species in Ovce pole. Satellite tracking of three young birds in 2013 was fitted with transmitters in Ovcepole region (monitored continuously since 2013 by the MME-Hungary I NCA - Aquila), shows that all of them use the region of Ovche pole as a hunting ground throughout the year. About the PZI at some distance there are five breeding territories of Imperial eagles, and all five couples use as pasture grounds and food source.</p> <p>Eastern Imperial Eagles, they have sustained their national population relatively stable but they are very much isolated to three regions in the country (with Ovche pole IBA distinguished by the highest density of species nesting sites).</p>		
<p>Lesser kestrel</p> <p><i>Falco neumannii</i></p>	<p>Kestrel is a migratory species that nests in Europe, central Asia and winters in Africa. They are kind of small falcon that primarily makes its nests in colonies under the eaves and ceilings of houses. Basic food for Kestrel are insects, but also small birds, reptiles and rodents (especially mice), which often hunts height of land. Recent studies suggest that their populations are stable or show slightly positive trend of the overall population over the last three generations. Consequently, the qualification of Kestrel has been changed, and from VU (Vulnerable) now it is qualified as LC (Least Concern) type, because it is not close to any of the thresholds for vulnerable species according to IUCN criteria.</p> <p>The discovery of numerous populations of steppe Kestrels <i>Falco neumannii</i> especially in Ovcepole, Vardar and Pelagonia in the census in 2002 (FWFF-Macedonia, unpublished data), unfortunately, did not last long. Repeat census in 2012 (MED-CAP L'Aquila), showed a drastic decline in their numbers in Pelagonia (59%, from about 850 to 350 couples) and a larger (90- 95%) in Ovche pole (from 230 -300 to 20 pairs). Along with the observed decline in Vardar region, it's been assessed that the overall population has declined by over 70% in just 10 years, which makes this species endangered in N.Macedonia. The reasons for the drastic decline in population, loss and degradation are due to potential nest abandonment of many villages, loss of pasture and excessive use of pesticides in the processing of land because they lose their source of food.</p>	<p>May breeds in suitable habitats at low density along the route, but most likely to be present around km 1-19.</p>	<p>Bird Directive Annex I</p>
<p>Egyptian vulture</p> <p><i>Neophron percnopterus</i></p>	<p>During the last decades, the number of Egyptian vultures declined dramatically in Europe. Egyptian vultures are opportunists and eat very varied. Their diet consists mainly of carrion, but also small mammals, young birds, fish, eggs and even rotting fruit. The species can fly up to 80 kilometers per day in search of food. Due to their smaller size, Egyptian vultures must often wait for other species</p>	<p>This species uses project area (surrounding the pipeline and throughout the IBA) for foraging done by individuals</p>	<p>Bird Directive Annex I</p>

	<p>to have finished eating.¹⁹The Egyptian vulture is the only European vulture that migrates to Africa in winter. This is why they breed later in the year than other vulture species, and lay on average two eggs in April or May. Couples build nests together, in rocky areas, often on cliffs).</p> <p>In the AOI they have been found foraging in the agricultural grassland areas.</p>		
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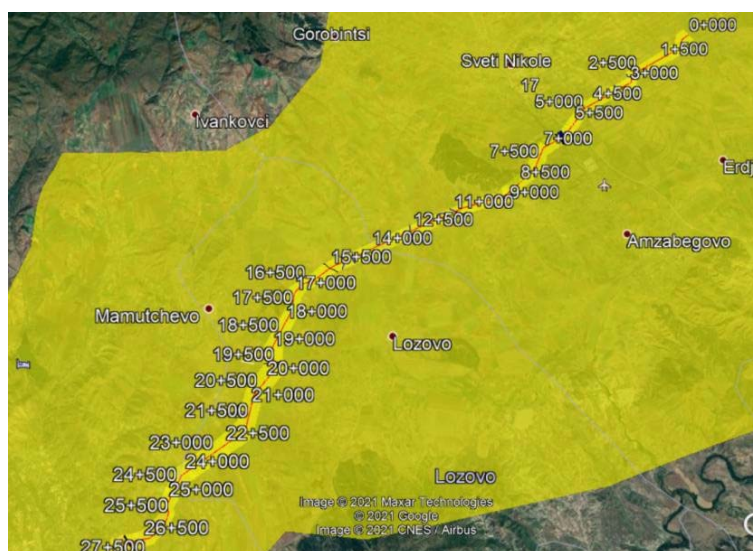


Figure 27. *Aquila heliaca* distribution in Aol

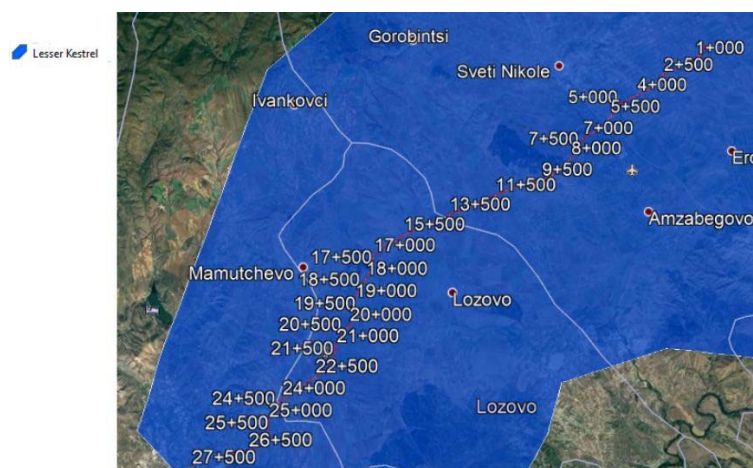


Figure 28. Distribution of Lesser kestrel in Aol

5.4.3 PBF / Notable Amphibians

Seven amphibian species have been recorded in the Aol of which one is considered to be of regional value. Five amphibians are listed in Annex IV of the EU Birds & Habitats Directive of

¹⁹¹⁹ <https://www.4vultures.org/vultures/egyptian-vulture/>

these amphibians are considered PBF (fig.29). One species is listed on Appendix II of the Bern Convention and on Annexes II and IV of the EU Birds & Habitats Directive

Table 15. PBF / notable amphibians which may occur along the route

Species Name	Description	Location along the route	European Legal Protection
Yellow bellied toad <i>Bombina variegata</i>	The regional valuable species is the yellow-bellied toad (<i>Bombina variegata</i>). The toad is inhabiting zones of steppe, broad-leaved and mixed forests consisting of different species of trees. In the forest steppe and steppe zones, they inhabit bushlands, forests and wetlands in floodplains, covered with dense vegetation but also open landscapes, using drainage channels as pathways for dispersal. Sometimes they inhabit semi-flowing waters: springs, irrigation channels, rivers and stream pools. <i>B. variegata</i> typically use unshaded temporary pools within, or close to, forest and are more tolerant of poor water quality for breeding. Eat insects, spiders, millipedes, molluscs and earthworms captured in or nearby the water. Reproduction takes place from April to July/August and is induced by heavy rainfall. Spawn consists of small clutches of several clutches of 10–40 eggs each which are attached to plants. Tadpoles hatch after 2–5 days and metamorphose after 5–12 weeks from July to September or after hibernation in spring. Young toads are 11–15mm long and remain at the water's edge. Maturity is reached at an age of 1–2 years. Destruction of wetlands due to intensification of agriculture is the most serious threat to populations.	May be present associated with riparian belts and surrounding habitats in the proximity of the project	Habitat Directive Annex II, IV Criterion 1 CH
Agile frog <i>Rana dalmatina</i>	This species is considered common in suitable habitats in North Macedonia. It is found in glades and open sites within light deciduous woodland (oak, beech, hornbeam etc.), and less frequent in meadows and thickets. It generally does not occur on pastures, arable areas or in coniferous forests. The Agile Frog is active from mid March until beginning of October. Activity can be delayed and shortened at higher altitudes within elevation range. starting mid-April until mid-September. Reproduction starts in the beginning or mid-March and on higher altitudes in the beginning of April depending on weather conditions. It spawns in small wetlands (pools, fens and marshes, ditches) within forests and at their edges. The spawn clumps consist of 400, up to 1000 eggs that are usually attached to trees near water. High levels of larval mortality have been recorded. This species is protected by national legislation as it is on the list of the protected wild species of N. Macedonia (Official gazette No.139/2011).		Habitat Directive Annex IV Appendix III of the Bern Convention
Greek stream frog <i>Rana graeca</i>	The Greek Stream Frog is widespread across North Macedonia, but is nevertheless limited to its suitable habitats of forest and high-mountain streams and rivers (generally). This species is considered common in suitable habitats in North Macedonia. Globally and in Europe this species has been assessed as Least Concern.		Habitat Directive Annex IV Appendix III of the Bern Convention

European tree frog <i>Hyla arborea</i>	This species is considered common in suitable habitats in North Macedonia. Generally associated with open, well-illuminated broad-leaved and mixed forests, bush and shrub lands, meadows, gardens, vineyards, orchards, parks, lake shores and low riparian vegetation. Dark and dense forests are avoided. Populations can tolerate periods of dryness and can be encountered in dry habitats. The species has also been reported from man-made landscapes. The European Tree Frog is active from mid-March until early October.		Appendix II of the Bern Convention and Annex IV of the EU Birds & Habitats Directive.
Green toad <i>Bufo viridis</i>	This species lives in a wide range of habitats: forests, steppes, scrubland, grasslands and alpine habitats. Animals may be present in modified areas– and often benefits from disturbed habitats. It is quite common during rainy spring and summer days especially in the evening hours. This species is usually active at dusk and can walk long distances while hunting insects and other invertebrates. The Green Toad is active from mid March until the beginning of October.		Appendix II of the Bern Convention and Annex IV of the EU Habitats Directive.

5.4.5 PBF / Notable Reptiles

Seventeen important reptile species have been identified within the Aol.

Table 16. PBF / notable reptiles which may occur along the route

Species Name	Description	Location along route	European Legal Protection
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<p>Large Whip Snake</p> <p><i>Dolichophis caspius</i></p>	<p>Although the quality of the Caspian Whip Snake's habitats have been observed to be decreasing, it is still very widely distributed across the country (AOO = 23.790 km², EOO = 1.496 km²) and its populations are likely not fragmented. Additionally, it is present in all neighboring countries and can likely travel long distances (e.g. Gregory et al. 1987), which can facilitate rescue effects. Globally and in Europe it is assessed as Least Concern. In North Macedonia the population size is not accurately determined. Likely the most common whip snake in the country. Seems particularly abundant in valleys up to 900 m asl. It is found in dry areas of open scrubland and woodland, steppe and other grassland, rocky hillsides, semi-desert, overgrown areas, vineyards, olive groves, rural gardens, stone walls and ruins. This species hibernates in large groups. It is active during the day in spring, while during hot summers it has two peaks of activity. Females lay eggs (6–18 eggs in the clutch) from middle of June to the beginning of July, with young appearing in the first part of September (Aghasyan et al. 2017, Speybroeck et al. 2016).</p>	<p>May be present within agricultural land, grassland, pastures or sparsely vegetated areas</p>	<p>Annex II of the Bern Convention and on Annex IV of the EU Habitats Directive.</p>
<p>Four lined Snake</p> <p><i>Elaphe quatuorlineata</i></p>	<p>The Four-lined Snake's geographic range (extent of occurrence [EOO] = 17.948 km² and area of occupancy [AOO] = 532 km²) implies a Vulnerable status. Nevertheless, despite observed degradation of its habitats, its populations do not seem highly fragmented and are not reduced to only few locations; it has thus been assessed as Near Threatened. In North Macedonia the population size is not accurately determined. Seems common and abundant particularly in valleys up to 900 m asl. Edges of open oak forests, secondary growth forests with ample vegetation, or meadows with broad hedgerows and dry-stone walls (Speybroeck et al. 2016). Mating occurs in April and May and by July or August females lay three to 18 eggs (Speybroeck et al. 2016).</p>	<p>May be present within Edges of open oak forests, secondary growth forests with ample vegetation, or meadows with broad hedgerows and dry-stone walls</p>	<p>Annex II of the Bern Convention and on Annex IV of the EU Habitats Directive.</p>

<p>Green Lizard</p> <p><i>Lacerta viridis</i></p>	<p>This is a ubiquitous species in North Macedonia, present in many habitats and localities, and can be found in and around man-made habitats (Crnobrnja-Isailović et al. 2009; Speybroeck et al. 2016). Globally and in Europe, this species has been assessed as Least Concern. The national population size of the Green Lizard in North Macedonia has not been accurately determined. Can be found in a wide range of habitats usually containing a lot of vegetation such as forest edges, open woods, hedgerows along roads and paths, scrubland, overgrown fields and gardens.</p>	<p>May be present within open woods, hedgerows along roads and paths, scrubland, overgrown fields and gardens.</p>	<p>Annex II of the Bern Convention and on Annex IV of the EU Habitats Directive.</p>
<p>Balkan Green Lizard</p> <p><i>Lacerta trilineata</i></p> <p>(range restricted on Balkan)</p>	<p>This is a ubiquitous species in North Macedonia also present in all neighbouring countries, occurring in many habitats and localities, even around man-made ones. Globally and in Europe, this species has been assessed as Least Concern. The national population size of the Balkan Green Lizard in North Macedonia has not been accurately determined. Can be found in a wide range of habitats usually containing a lot of vegetation such as forest edges, open woods, hedgerows along roads and paths, scrub-land, overgrown fields and gardens (Böhne et al. 2009; Speybroeck et al. 2016).</p>	<p><i>May be present near open woods, hedgerows along roads and paths, scrub-land, overgrown fields and gardens</i></p>	<p>Annex II of the Bern Convention and on Annex IV of the EU Habitats Directive</p>

<p>nose-horned Viper</p> <p>Vipera ammodytes</p>	<p>The Nose-horned Viper is very widespread in North Macedonia (extent of occurrence [EOO] = 24.286km²) and its limited area of occupancy (AOO) of 1.636 km² is most likely an underestimation due to the general elusive nature of snakes. However, individuals (particularly large adults) are commonly persecuted by humans. This species is associated with rocky areas but can be opportunistic in other habitats. It can be found in dry, often rocky habitats, including open woodland and scrub, sand dunes, hillsides, screes, stone walls, traditionally cultivated land, gardens, vineyards, open oak forests and beech forests. Equally favours man-made or natural rock formations. The species is ovoviviparous; mating occurs in May and by August females give birth to between four and 15 young (Agasyan et al. 2009; Speybroeck et al. 2016).</p>		<p>Annex II of the Bern Convention and on Annex IV of the EU Habitats Directive</p>
<p>Erhard's Wall Lizard</p> <p>Podarcis erhardi</p>	<p>This is a ubiquitous species in North Macedonia, present in many habitats and localities, and is one of the most successful species in man-made habitats (Lymberakis et al. 2009; Speybroeck et al. 2016). Globally and in Europe, this species has been assessed as Least Concern. The national population size of Erhard's Wall Lizard in North Macedonia has not been accurately determined. Can be found in a wide range of habitats such as rocky areas, scrubland, deciduous and coniferous woodland, orchards, vineyards, fields, stone walls, and on buildings. It is one of the most successful species in man-made habitats (Lyberakis et al. 2009; Speybroeck et al. 2016)</p>		<p>isted on Annex II of the Bern Convention and on Annex IV of the EU Habitats Directive</p>

<p>Common Wall Lizard</p> <p><i>Podarcis muralis</i></p>	<p>This is a ubiquitous species in North Macedonia, present in many habitats and localities, and is one of the most successful species in man-made habitats, therefore assessed as Least Concern (Böhme et al. 2009; Speybroeck et al. 2016). Globally and in Europe, this species has been assessed as Least Concern. The national population size of the Common Wall Lizard in North Macedonia has not been accurately determined. Can be found in a wide range of habitats such as rocky areas, scrubland, deciduous and coniferous woodland, orchards, vineyards, fields, stone walls, and on buildings. It is one of the most successful species in man-made habitats. Mating takes place between March and June and oviparous females often lay two-three clutches of two to 11 eggs (Böhme et al. 2009; Speybroeck et al. 2016).</p>	<p>Can be found with in agricultural land, scrubland etc</p>	<p>listed on Annex II of the Bern Convention and on Annex IV of the EU Habitats Directive.</p>
<p>Dahl's Whip Snake</p> <p><i>Platyceps najadum</i></p>	<p>In North Macedonia the population size is not accurately determined, although here the species is at its eastern distribution edge, globally, making it quite a rare sight in the country. In general, this species is associated with dry or xerophytic landscapes. It is found in meadows, but also at the slopes of foothills and mountains covered with bush vegetation and woods, in juniper open woodlands, oak groves, border of forests (Lymberakis et al. 2009). It often prefers stony habitats such as eroded hillsides, rocky outcrops and boulder formations (Speybroeck et al. 2016). Mating occurs in April or May and by June or July females lay between three and 16 eggs (Lymberakis et al. 2009).</p>	<p><i>May be found in meadows</i></p>	<p>listed on Annex II of the Bern Convention. In Annex IV of the EU Habitats Directive</p>

<p><i>Hermann's tortoise</i> <i>Testudo hermanni</i></p>	<p>The Hermann's tortoise is likely the best researched reptile species of the Republic of North Macedonia. National population size is estimated at 17.000.000 coming from the rough estimate of an approximate average national density of 10 individuals per hectare, with 1.700.000 hectares of suitable habitat (unpublished data). The Hermann's tortoise prefers shrubs, or openings in thermophilic forests, in North Macedonia most often oak or degraded forests of predominantly Jerusalem spine (<i>Paliurus spina-christi</i>) and/or False acacia (<i>Robinia pseudoacacia</i>). It enjoys habitats with preserved mosaic structures with both open patches and such with dense bush where it can hide during the warmest parts of hot summer days. It can sometimes venture into arable land, particularly vineyards and sometimes orchards, or even urban parks (Speybroeck et al., 2016; personal observations).</p> <p>Juvenile age-specific annual survival probabilities steadily increase from ~0.3 at birth to a plateau of ~0.9 at five years of age (Arsovski et al. 2018), with adult annual survival probabilities within the range of 0.85-0.91. Between May and July, female Hermann's tortoises deposit between two and twelve eggs into flask-shaped nests dug into the soil, up to ten centimetres deep. The eggs are incubated for around 90 days. Females produce an average of 4.3 eggs (Arsovski 2018, Bertolero et al. 2011). The main threats are: loss of habitat due to agricultural expansion and intensification; agro-chemicals and other pollution impacts; urbanization and tourist infrastructure development; wildfires; collection for pet trade; genetic pollution; road mortality; and potentially disease impacts from released pet tortoises (Stubbs et al. 1985). It is listed on Annex II of the Bern Convention and on Annex II and IV of the EU Habitats Directive. It appears on the list of nationally protected wild species.</p>	<p>Most likely to be present within agricultural land, grassland, pastures or sparsely vegetated areas</p>	<p>Habitat Directive Annex II, IV</p>
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<p>Spur-thighed tortoise <i>Testudo graeca</i></p>	<p>National population trends of the Spur-thighed tortoise have not been assessed and are thus unknown. Nevertheless, intensive habitat degradation and being the target of some legal and illegal harvest suggest a decreasing population trend, and urge the inference of potential severe fragmentation or fluctuations in numbers of subpopulations. Prefers for open habitats of small bush and shrub, degraded secondary growth habitats or sandy slopes, rather than forests. Can also be observed in, or near urban parks. Globally, mating occurs in spring and autumn, females laying up to a maximum of three clutches annually with up to eight eggs (Speybroeck et al. 2016). The main threats are: loss of habitat due to agricultural expansion and intensification; agro-chemicals and other pollution impacts; urbanization and tourist infrastructure development; wildfires; collection for pet trade; genetic pollution; road mortality and illegal trafficking. In Macedonia over collection is likely the biggest threat, especially if we recognize that in the lack of strict control, legal tortoise-farms can easily be used as platforms that facilitate the export of wild-caught individuals.</p>	<p>May be found within open habitats of small bush and shrub, degraded secondary growth habitats</p>	<p>Habitat Directive Annex II, IV</p>
<p>European pond turtle <i>Emys orbicularis</i></p>	<p>Valued at the national level Sites of Community Importance (SCI) are partly managed to protect the Romanian distribution of the species. It is found in a wide variety of freshwater habitats, including ponds, lakes, streams, rivers and drainage canals, some of which may dry up completely during the summer months. The species hunts underwater for fish, amphibians, tadpoles, worms, molluscs, crustaceans and aquatic insects, as well as foraging for the occasional plant. Mating begins from March to May, depending on the latitude and temperature, eggs, usually nine or ten,</p>	<p>Most likely to be found within Nezirik Ali near 21 km</p>	<p>Habitat Directive Annex II, IV</p>

	are laid in May and June in small holes dug in the ground. The incubation period varies from around 57 to 90 days, and young may emerge in autumn or stay in the nest until the following spring. In the northern parts of its range, a long hot summer is required for eggs to hatch, so this turtle may only successfully reproduce one in every four or five years. Threats to the species are largely from intensive agriculture and climate change ³³ .		
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These include one internationally important species, one nationally important species, eight regionally important species and four locally important species. Of these, two species distribution are selected to be shown as PBF (fig. 29 and 30).

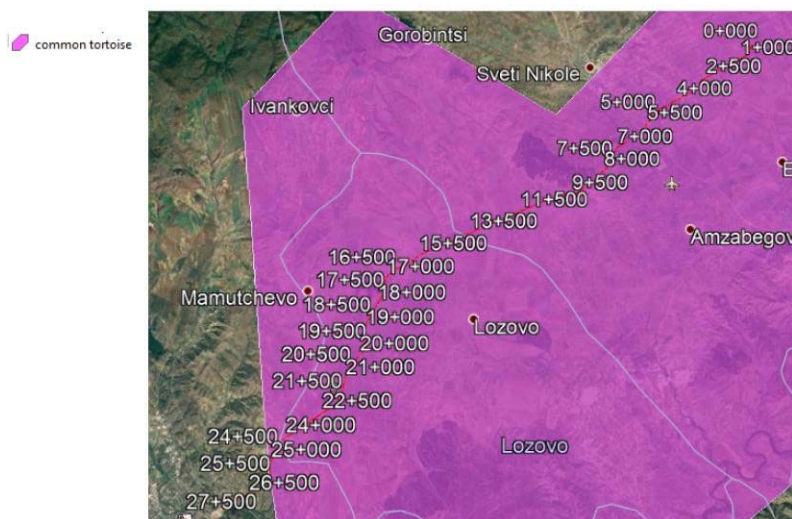


Figure 29. Distribution of common tortoise in Aol

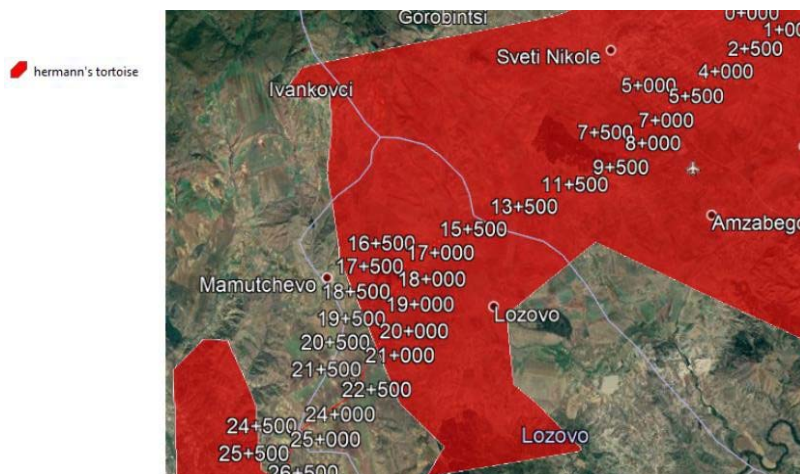


Figure 30. Distribution of hermann's tortoise in Aol

5.4.6 Summary of PBF of species

A number of species were identified as PBF due to their 'value' in the assessment tables and/or their IUCN red list categorization, in line with PR6. Species with a value > 3 identified as endangered / vulnerable and part of Annex II **were identified as PBF**, however this list was only used to determine species valuations and offsetting requirements. The presence of PBF in areas was also used to inform the CH assessment. The PBF list was also used to determine species which require specific mitigation.

Table 17. 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	Considered to drive Biodiversity Specialist actions and PBF mitigation around riparian habitats, water courses and intermittent streams
<i>Rana dalmatina</i>	LC/NT	Annex IV	4	
<i>Rana graeca</i>	LC/NT	Annex IV	4	
<i>Bufo viridis</i>	LC	Annex IV	3	
<i>Hyla arborea</i>	LC/NT	Annex IV	4	
<i>Emys orbicularis</i>	NT / VU	Annex II	4	Will drive good site practice to prevent killing and injury and drive Biodiversity Specialist actions (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>Platyceps najadum</i>	NT	Annex IV	4	
<i>Falco neumanni</i>	LC	Annex II	3	Will drive good practice and Biodiversity Specialist actions around the presence of nesting birds in and around.
<i>Aquila helica</i>	VU	<i>Annex I / II</i>	5	Considered to drive Biodiversity Specialist actions and mitigation around nest.
<i>Neophron perconopterus (only for foraging)</i>	EN	<i>Annex I / II</i>	5	Considered to drive Biodiversity Specialist actions and mitigation. Drives 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	
<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	Considered to drive Biodiversity Specialist actions in hilly areas near town of Veles. Drives good site practice, mitigation and restoration.

In some instances, the mitigation for the PBF above will protect a range of other PBF species (umbrella effect). Where this is the case the mitigation is not repeated to reduce repetition and to determine the need to achieve no net loss in line with PR6.

In these areas, Imperial Eagle nests are mainly located in poplar trees (*Populus alba*) or oak (*Quercus ceris*) but also on pylons on natural or artificial platforme nest. In the past Imperial Eagles were considered to be migratory. Recent observations demonstrate that breeding pairs, even some of the young eaglets, are wintering in their breeding territories or around rubbish dump of big cities. There are 5 (fig.31) active nests (according to regural surveys of NCA Aquila Kavadarci). Neither of them will be removed. Nevertheless, due to disturbance it is necessary to implement migitation measures for their protection.



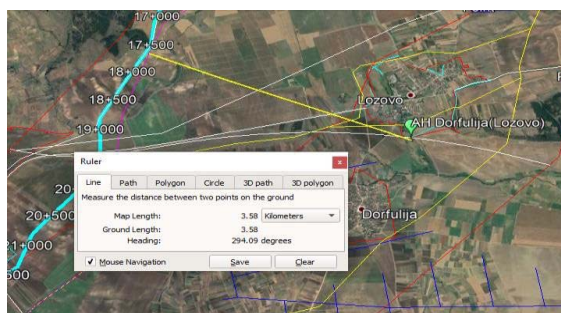


Figure 31. Location of nests (not for public)

Breeding habitat loss is one of the main threats. The illegal tree felling is serious threats. The majority of nests are in poplar trees, which are usually the only remaining tall trees in the lowland areas. In North Macedonia, the Imperial Eagle is strictly protected. Poisoning, shooting or trapping are completely forbidden.

5.4.7 Summary of PBF and Critical Habitats

This section summarizes the features described which may be categorized as *Priority Biodiversity Features or Critical Habitats*. Generally, Priority Biodiversity consists of features of high irreplaceability and/or vulnerability, but it is not sufficient to qualify an area as Critical Habitat. These include species which are important components of the natural environment. EBRD PR6 considers biodiversity as a priority for conservation and consequently a priority to consider in mitigation planning.

Table 18. Priority Biodiversity Features and Critical Habitats

Priority Biodiversity Features as per EBRD PR6		
Threatened habitats		<p>Three EU HD Annex I habitats are present and considered to be PBF:</p> <ul style="list-style-type: none"> -92A0 Riparian willow-poplar belt (<i>Salix alba</i> and <i>Populus alba</i> galleries); -6220*: Pseudo-steppe with grasses and annuals of the Thero-Brachypodieta and - 6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* 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 due to the fact that 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 meters away from the planned pipeline alignment. This is an important reproductive center 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 they are dependent upon the presence and continued flow of these rivers.
Critical Habitat as per EBRD PR6	
(i) <i>Highly threatened or unique Ecosystems</i>	priority habitat 6220 *Pseudo-steppe with grasses and annuals of the Thero-Brachypodieta
(ii) <i>Habitats for significant importance to endangered Species</i>	- None present.
(iii) <i>Habitats of significant importance to endemic or geographically restricted Species</i>	-none present.
(iv) <i>Habitats supporting globally significant migratory species</i>	None present.
(v) <i>Areas associated with key evolutionary processes</i>	None present.
(vi) <i>Ecological functions necessary for maintenance of CH</i>	None.

5.4.7.1 Habitats that support PBF

EBRD's PR6 defines priority biodiversity features to include '*(i) threatened habitats; (ii) vulnerable species; (iii) significant biodiversity features identified by a broad set of stakeholders or governments (such as Key Biodiversity Areas or Important Bird Areas); and (iv) ecological structure and functions needed to maintain the viability of priority biodiversity features described in this paragraph.*'

-Riparian Willow-Poplar Woodlands & Belts:

According to PR6 these are considered priority biodiversity features as they are listed in Habitats Directive (Annex I: 92A0) *Salix alba* and *Populus alba* galleries. They are also listed in the Berne Convention. In the area of the planned gas pipeline corridor, riparian forests are dominated by poplars (*Populus nigra*, *Populus tremula* and *Populus alba*).

The riparian belt habitats are present as contiguous bands that follow the lines of their associated watercourses throughout their length within the wider areas of the broad valley in which the pipeline alignment is located. Amphibian and reptile species listed in Annex II and IV could be found in this habitat. This habitat, along with the watercourses, provide habitat for *Bombina variegata*, which is listed on EU HD Annex II and therefore represents a PBF trigger, but also for *Rana graeca*, *Rana temporaria*, *Hyla arborea* and *Emys orbicularis*.

Riparian belts are found at the place where the planned corridor intersects with Svetinikolska river (station km 6 + 100), where an area of vegetation will need to be cleared to form new river crossing. Well-preserved forests of this type are currently very rare. People used to clear these stands for providing fertile alluvial soil for agriculture which is characteristic for Ovce

Pole plain. **Steps should be taken (Revegetation and Rehabilitation Plan) to minimize the works footprint at this location and to ensure the rehabilitation of healthy riverine vegetation once the works are complete.**

-Hill pastures with sparse shrubs in the area near the town of Veles) - habitat 6210: (*important orchid sites) listed in Annex I:

. Despite the fact that it does not have a priority status, it is still of particular significance as a habitat where a myriad of orchid species occurs. Stands of this habitat were chiefly recorded in the vicinity of Veles but they do not have substantial coverage and they are in a stage of scrubs overgrowth. Reptiles and mammals listed in Annex IV of HD could be seen in this habitat. Because it is habitat with grass and shrubs, after construction it is best to be left on the natural regeneration - local species of plants to settle instead to be planted by the man.

Nezirlik Ardi (reed belt):

Even it is not a typical biotope, nor habitat listed in Annex I, it is habitat that support PBF and very important for amphibians especially for *Bombina variegata* species listed in Ann.II/IV of Habitat Directive.

5.4.7.2 Habitats which could be considered as CH

EBRD's PR6 defines the most sensitive biodiversity features as 'critical habitat, which comprise one of the following: (i) highly threatened or unique ecosystems; (ii) habitats of significant importance to endangered or critically endangered species; (iii) habitats of significant importance to endemic or geographically restricted species; (iv) habitats supporting globally significant migratory or congregator species; (v) areas associated with key evolutionary processes; or (v) ecological functions that are vital to maintaining the viability of biodiversity features described in this paragraph.' The fulfilment of one of the PR6 criteria is enough to qualify habitat as critical. All habitats listed in Annex I of the Habitat Directive are of special EU importance, and they ought to be considered during further activities. Under this, one habitat could be considered as Critical Habitat. Due to the intensive agriculture, this habitat along the project corridor is found only in fragments.

Pseudo-steppe with grasses and annuals of the Thero-Brachypodietea, (EU HD (Annex I) 6220*):

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. This habitat supports important reptilespecies like: *Testudo graeca*, *Testudo hermanni*, listed in National Red List of Threatened Reptiles and assessed as vulnerable (VU), *Platycephalus najadum* and *Elaphe quatuorlineata* listed in Ann.IV.

Also this is typical habitat for small mammals like vole,hare and mouse which are important diet of important bird species lie Eastern Imperial Eagle (*Aquila heiaca*) -VU Egyptian Vulture (*Neophron pecopterus*) – EN , and some buzzards and kestrels. Green Toad (*Bufo viridis*) amphibian species listed in annex II of HD, is common here.

Surveys identified place near the gas pipeline corridor, which support or is fragment from the EU Priority Habitat 6220* Pseudo-steppe with grasses and annuals of the Thero-Brachypodietea within the project AOI. This type of habitat was spread in Ovche Pole on Paleogene sediments, at some places mixed with habitats with halophytic vegetation, which is the reason for designation as IPA. Habitat's EAAA is presented on fig.25 Due to the intensive

agriculture, field surveys along pipeline corridor detected only fragment of this habitat at the locality known as Kanda Geoglyph in close proximity to Dolno Crniliste (please see habitat map). The area is about 150m away from the PZI (not crossed directly by the pipeline) at higher altitude. Also, this place has archaeological value as an Archeoastronomy point (fig.32).

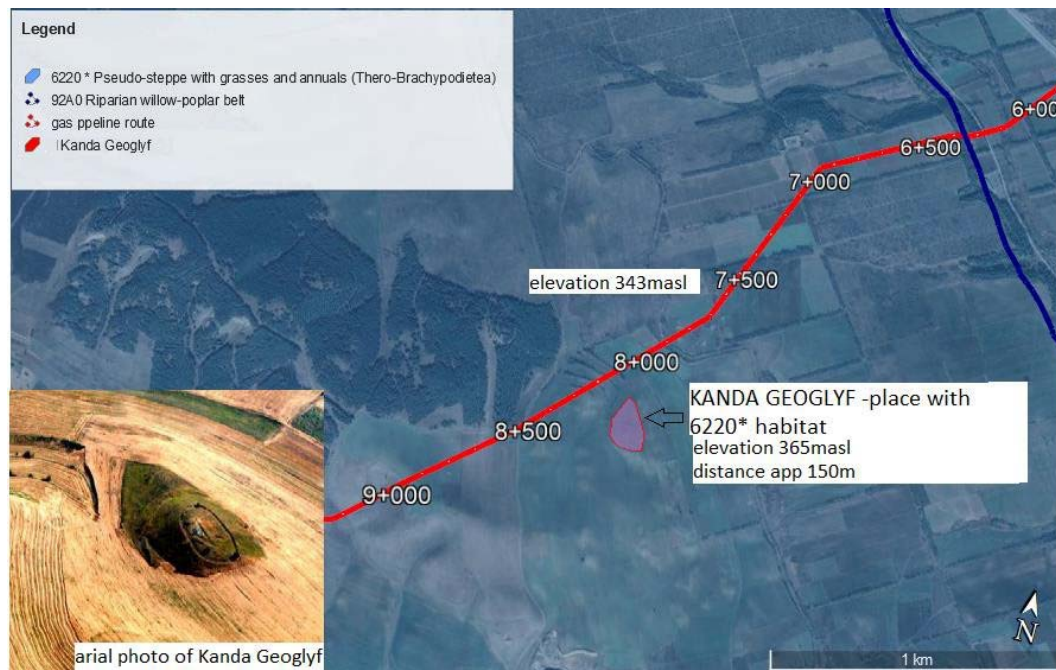


Figure 32. fragment of priority habitat 6220* (Kanda Geoglyph)

The intensive agricultural activities contributed to habitat fragmentation. On a precautionary basis, the surrounding areas are assumed to support 6220* which could be seen on habitat's EAAA.

According to the EU Habitat Directive, this habitat type is of community interest and require the designation of special areas of conservation. This habitat has been considered as CH and PBF for the purposes of this assessment and in accordance with PR6.

6. DESCRIPTION & ANALYSIS OF PROJECT ALTERNATIVES

This Section summarizes briefly the various alternatives that were considered (or available) for the scheme, and presents critique of their environmental, biodiversity & social effects.

6.1 Description of Alternatives (Alignments, Design Features)

In order to reduce impacts at the beginning phase of the project, an alternative routes assessment has been made. Four routes have been proposed by the Designer (yellow, red, pink and white). All of them are assessed according to criteria like crossing protected areas, IPA, IBA, ecosystem services etc. The finale route of the gas pipeline, section Sveti Nikole Veles is white alternative, with small adjustments (fig.33).



Figure 33. Proposed alternative routes

Table 19. Summary of Alternatives Assessment

Criteria	RED	PINK	YELLOW	WHITE	
	Rate	Rate	Rate	Rate	Comments
Well-developed Forest	0	0	0	0	All alternatives are passing through agricultural areas where the main type of 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 are passing through agricultural areas, mostly fields and acres with high anthropogenic influence. Even with no-implementation of the project, there is environmental impact: noise, air, soil and water pollution) by agricultural machinery and the traffic on the regional and access roads to agriculture fields. Anthropogenic factor has great impact on the environment, owing primarily to alterations of habitats and intensification of agriculture, but also increasing use of pesticides. According to Integrated Biodiversity Assessment Tool, agriculture is the most significant global threats to species that occur in this country.
Crossing through bio-corridor	-1	-1	-1	-1	All alternatives are passing 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 Gjuzumliska reka is important area for mammals and yellow and red alternative are passing through this area

Protected Areas under National legislation	0	0	0	0	All alternatives aren't passing through protected areas according to the National legislation
Areas proposed for protection according to the Spatial Plan of the RM	0	0	0	0	All alternatives aren't passing 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 are passing through proposed Nature Park "Gjuzumliska Reka". The area spreads over an area starting near and east of the village Dorfulija, along Gjuzumliska Reka and the surroundings of the village of Kjoseleri. The basic value of the area proposed for protection – Nature Park "Gjuzumliska Reka" is the presence of plane grasslands (humid and mesophilic) that are still used for livestock feed production. Apart from grasslands, the area also encompasses Gjuzumliska Reka with riparian vegetation of willows and canes.
Emerald sites	-1	-1	-1	-1	All alternatives are passing through Emerald sites. Proposed 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). 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> .
Important Bird Areas	-1	-1	-1	-1	All alternatives are passing through IBA Ovce-Pole, mostly Western slopes which support important population of Lesser Kestrel, for which great drop in the number of breeding couples has been observed. Apart from these, the area supports big 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 species of prey birds can be seen in search for food.
Prime Butterfly Areas	0	0	0	0	All alternatives aren't passing through PBA sites
KBA	-2	-1	-2	-1	All alternatives are passing 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	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 Gjuzumliska River. Parts of riverine forest of Svetinikolska River will be impacted by all alternatives. The area of dry grassland is represented on some place, only in the vicinity of v.Chaloshevo, v.Karatmanovo, v.Hadzimatovo, Dolno Crniliste, Dorfulija, Azambegovo mostly presented by alliance <i>Saturejo-Thymion</i> 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. At 41° 45' 14,90"N; 21° 50' 53,98"E (~ 21+700km) 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
Flood risk and climate change	0	-2	-2	-1	field-protective belts s can help 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 hedges (near Sveti Nikole)
Total	-13	-10	-13	-9	According to the preliminary rating, white ALTERNATIVE has smaller impact followed by pink.

- 0 no consequences
- (-) 1 slight negative effect
- (-) 2 significant negative effect
- (-) 3 distinctively negative effect
- (+) 1 weakly positive effect 1
- (+) 2 good positive effects
- (+) 3 extremely positively effect

After the assessment process a consultation has been made with the Designers in order to make corridor adjustments.

6.2 Avoidance of direct impact upon significant biodiversity features

Few actions have been taken to avoid adverse impacts on biodiversity features. These are actions, such as relocating a project route or changing its spatial layout to prevent impacts in specific locations.

1. Locality of Nezirlik Ardi (fig.34)

- Significant biodiversity features (final route is at ~220m distance)
- Reed belt (EUNIS habitat D5.1)
- At (~ 21+700km) yellow and pink alternative are passing through Typha reed belt 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

Ovce Pole is an arid area where water resources are limited. This provides specific conditions for amphibians, whose life cycle depends on water bodies (ponds, swamps and wet meadows), which are vital reproductive centres for survival of the species from the current taxonomic group. Such an example was observed at the locality of Nezirlik Ardi.

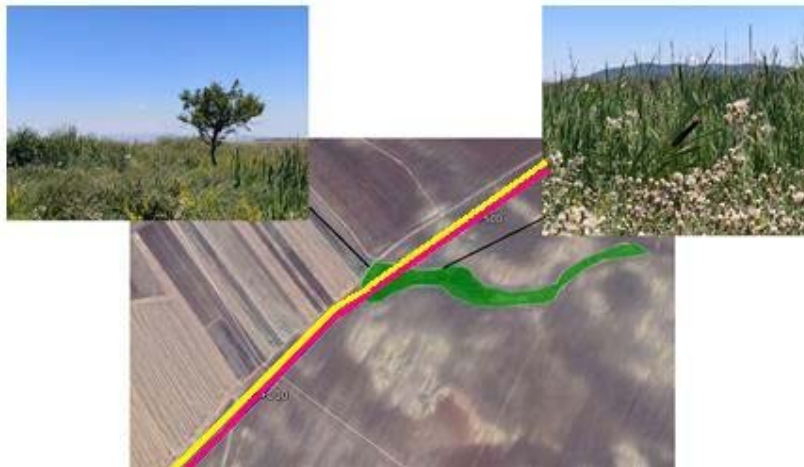


Figure 34. Nezirlik Ardi (green) and the alternative routes which are passing through it

2. Gjuzumliska River (fig. 35)

- Proposed for protection as nature park- IUCN category IV
- The basic value of the area proposed for protection is the presence of pastures and meadows (wet and mesophilic) and good willow & polar woodland (HD Annex 1)

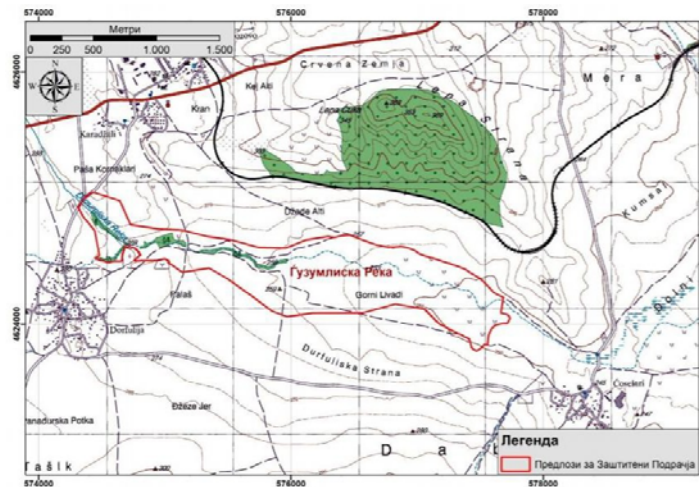


Figure 35. Gjuzumlička River (source: bregalnica-ncp.mk)

3. Key Biodiversity Areas

- KBA Taorska Klisura and KBA Babuna-Topolka-lower Bregalnica (fig.36)

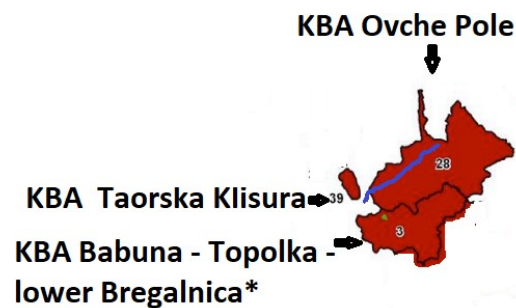


Figure 36. KBA's (red) and final route (blue)

7. IMPACT ASSESSMENT

7.1 Approach and Methodology

7.1.1 Summary

The following section below provides an overview of key potential impacts given in table 1. Potential impacts on sensitive receptors within the AoI have been assessed before mitigation is applied to ensure that the correct mitigation can be signposted for each receptor where required. In order to do this the potential impacts of the project were identified and characterized. As described earlier, impacts of CHs and PBFs were specifically assessed to determine if mitigation measures were required.

7.1.2 Detailed Approach

Once an interaction between an aspect and a receptor is identified the level of impact is identified and evaluated. Deciding whether a project aspect is likely to cause significant adverse environmental effects is central to the concept and practice of impact assessment.

Specific mitigation is only provided for habitats that supports PBF or are CH, impacts to other receptors is included within the GIP mitigation (Good International Practice). The zone of direct influence or Project's physical footprint is the 22m (15m from left and 7m from right side) along the Project route, however indirect effects are not expected, because no new access road or workers camp will be designed according to the Designer "Prostor" Kumanovo.

7.1.2.1 Construction impacts

These potential impacts upon biodiversity are derived from multiple sources largely relating to pipeline construction and associated activities such as:

- Vehicle mobilization, including transport of people and equipment within the works area;
- Effects of the production of wastes, interactions with wildlife and indirect pressure of workers' presence;
- Pipeline working corridor vegetation clearance and topsoil removal and fragmentation;
- Pipeline construction activities including disturbance of soils and the potential for indirect and direct pollution from construction, including water crossings of the pipeline;
- Unlikely Events; and
- Cumulative effects.

7.1.2.2 Operational Impacts

Operational impacts are associated with the maintenance of the Rights of Way (RoW) of the pipeline, i.e. keeping the over ground area above the pipeline free of vegetation so that access can be maintained and so that roosts from vegetation will not damage the pipeline. Expected impacts are:

- Increase in hunting or predation utilising the RoW for access;
- Spread on non-native invasive species along the maintained RoW or transferred during maintenance of the RoW;
- Impacts upon habitats and species directly resulting from the maintenance of the RoW;
- Increased disturbance due to increased accessibility and activity during maintenance; and
- Visual, noise and air quality issues related to the operation of the compressor stations.

IMPACT CHARACTERISATION

With regards to the particular receptors present, the following impacts identified from the project have the potential to cause the following adverse effects:

Habitat loss; degradation and simplification;

- vegetation clearance for the preparation of the working corridor;
- habitat removal to facilitate pipe installation;
- construction of pipe laydown areas etc.;
- vehicles causing soil compaction and erosion;
- dust produced by vehicles causing reducing the fitness of plants and therefore habitats; and
- laying of temporary roads (if any).

Habitat Conversion

- Conversion of habitats in order to maintain a RoW along the route;
- ↗ Fragmentation;
- From disruption to routes through which fauna utilise to move through the landscape, both physically and through creating barriers of disturbance;
- ↗ Changes in water conditions;
- ↗ Habitat pollution; including deposition and runoff;
 - Dust emissions can pose a number of problems including detrimental effects on health, nuisance problems and effects on vegetation such as:
 - Covering of the leaf surface, resulting in shading and consequently reduction in net photosynthesis, altered pigment levels and/or reduced productivity;
 - Blocking of stomatal pores to prevent them from fully functioning;
 - Additional nutrients from the dust that may lead to increased growth and or deficiencies;
 - Changes in pH levels over time if the dust has different pH conditions to surrounding soils;
 - Soil pollution via deposition from the air or water run-off;
 - Creation of a surface film on still water bodies.
- ↗ Possible direct mortality of fauna due to vegetation clearance and pollution;
- ↗ Possible direct mortality to fauna due to interactions with workers and through the consumption of wastes / food brought into the works area;
- ↗ Disturbance to species including visual and noise disturbance;
 - Construction noise and visual disturbance can result in short term, localised effects, although many animals will become habituated to the noise;
 - Birds are amongst the best studied animal receptors in response to noise. Noise levels in excess of 65dB over the long term or spikes over 70dBs are likely to elicit an adverse response²⁰²¹. According to CEIM measurements, current noise level is above 69dB, at the location nearest to the imperial eagle nest.
- ↗ Spread of non-native or invasive species.

7.1.3 Summary of Impact Assessment Results

Full results of the impact assessment are presented in Table 20.

Table 20. Potential Impact Assessment Results (by Impact Character)

Issue	Potential Impacts
Habitat loss, conversion, degradation and simplification	<p>In line with the mitigation hierarchy, the majority of habitats will be restored immediately following construction, in so far as is possible. This will minimize long term impacts, however there will be some short-term degradation and disturbance within the Aol.</p> <p>There will be a long-term impact from the retention of a 6m wide RoW through certain habitats.</p>

²⁰ Wright, M.D., Goodman, P & Cameron, T.C. (2010). Exploring behavioural responses of shorebirds to impulsive noise. *Wildfowl* 60: 150-167.

²¹ Dooling RJ, Popper AN, (2007). The effects of highway noise on birds. Environmental Bio Acoustics LLC for the California Department of Transportation, Division of Environmental Analysis

Fragmentation	The fragmentation of habitats is largely temporary and unlikely to result in a significant effect on populations.
Changes in water conditions (hydrological impacts)	<p>Two construction methods for water crossings have been proposed. The technology of construction of crossings under rivers and canals is prescribed by the Contractor with the approval of the Supervisory Authority.</p> <p>A series of pollution prevention measures will be used as appropriate per crossing type. These will involve; retaining vegetation cover on the banks where possible to minimize the soil exposure, the use of silt fences to prevent silt from travelling downstream, minimizing the duration of trenching by back filling as rapidly as possible and restoring banks to pre-construction contours using temporary erosion control measures</p> <p>Pre-clearance site surveys will target sensitive vegetation and apply additional mitigation where required. Reinstatement of banks will use mid-term soil stabilization measures if required such as willow revetments, to retain soil until the vegetation has established.</p>
Habitat pollution; including deposition and runoff;	<p>GIP mitigation will ensure that there are no significant impacts from run off. On the river crossing, mitigation and monitoring by the Biodiversity Specialists will ensure no significant effects</p> <p>With regards to dust, for this site it is anticipated that PM10 in the absence of mitigation would result in effects from dust being minor with an effect up to 50m from the source. With the proposed mitigation in ESIA, it would be reduced.</p>
Direct mortality	<p>Locating construction camps (to storage equipment) away from sensitive areas and enforcing a hunting ban on construction workers will help ensure that there are no significant adverse effects, along with good site practice regarding the storage of waste and food.</p> <p>Speed limits on vehicles and restrictions to existing and/or dedicated haul routes will prevent direct mortality and disturbance from vehicles;</p> <p>In addition to a hunting ban, pre-clearance site surveys and the movement of animals out of the working corridor by the Biodiversity Specialist, combined with timing of works in sensitive areas will prevent direct mortality. There may be some low level unavoidable direct mortality but this would not be significant in the short or long term.</p>
Disturbance to species including visual and noise disturbance	<p>Construction noise and visual disturbance will result in short term, localized effects, although many animals will become habituated to the noise.</p> <p>The noisiest activities associated with the development are those from static plant used to excavate trenches, clear vegetation, lay pipes, hammering and compacting concrete. The noise levels at the site are likely to be in excess of 80dB decreasing to 50 to 64dB at 300m. This is likely to result in abandonment of the areas closest to the construction sites although there may be a degree of habituation.</p> <p>This will result in a short-term adverse effect, however the most sensitive habitats and species, works will be confined to the least sensitive timeframes. Monitoring by Biodiversity Specialists will also ensure that should valuable species be breeding in an area, works do not take place during these sensitive times i.e. for birds that the young have successfully fledged.</p>

Spread of non-native or invasive species.	Pre-clearance surveys combined with the demarcation and treatment of non-native species will prevent their spread. Monitoring post-construction will ensure that newly restored areas are not inundated with non-native species from adjacent areas.
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7.1.4 Impacts to Designated Sites

Potentially significant impacts to designated sites can be summarized in Table 21 below.

Table 21. Potential impacts to designated sites

Issue	Description
Construction Impacts	
Direct impacts	Impacts have generally been limited through appropriate route selection (avoidance of 2 KBA, potential Natura 2000 etc), and for the sites through which the pipeline passes the route has been designed to generally pass through disturbed areas (arable land) or areas not containing the habitats for which the sites are designated. Impacts will be further reduced by working methods, for example directional drilling of watercourses within sites.
Mitigation Measures	Where impacts to designated sites are unavoidable, a range of mitigation measures are proposed. These include both sensitive timings of works and appropriate working methodologies including noise reduction, pollution control and habitat restoration. Full details of the control measures proposed are presented in the tables and will be specified in site-specific method statements.
Offsets	Despite this, some residual impacts may result as a result of permanent habitat loss and fragmentation. These impacts will be addressed through suitable offsetting by Biodiversity specialist.
Indirect impacts	A future Natura 2000 area may be indirectly impacted by the project, through disturbance or pollution. Impacts to these sites will be addressed through timings of the works, working methodologies, monitoring of river pollution and other control measures. No significant residual effects on these sites is foreseen.
Operational Impacts	
Operational Impacts	During the operation of the project, impacts upon IBA, IPA sites identified are related to the maintenance of a Right of Way along the Route. If the mitigation is correctly implemented, no additional significant residual effects are anticipated.

All works within designated sites will be conducted according to site specific method statements to ensure that appropriate mitigation is implemented.

7.1.5 Impacts to Habitats

The majority of the project route passes through habitat of low ecological value, predominantly intensive agricultural land. Impacts in such areas are generally expected to be on negligible to low ecological impact. However, the pipeline also passes through some much more valuable habitats including riparian and some notable grasslands and scrub areas. Mitigation is proposed to avoid these impacts or minimize the impacts to acceptable levels. Where mitigation does not fully mitigate these effects compensation via offsetting will be proposed. The proposed mitigation is presented in summary in the impact tables, but also within the GIP mitigation and specific mitigation tables presented below.

For work in riparian areas Biodiversity Specialist a specific method statement will be created. Mitigation proposed includes reduction in the pipeline corridor working width in notable habitats (if possible), avoiding impacts to habitats through directional drilling, habitat restoration.

Minimal impacts to habitats resulting from the operation of the gas pipeline are foreseen, and are predominantly related to the limited maintenance of the RoW along the route. The

mitigation for these impacts means that no additional significant residual effects are anticipated.

Critical Habitats

Construction impacts to CH (pseudo-steppe) may impact 1,63 ha, which represents c. 0,006% of the habitat's EAAA (25,225ha). This impact is not considered likely to compromise the habitat's integrity across the EAAA given the relatively small area.

There are no global estimates for 6220* available, but the habitat occurs mainly in Europe. European estimate (EU only) of 6220* – 706,122 ha. Mediterranean estimate (EU only) – 693,747 ha (98% of EU total), there is no National estimate of 6220*. Habitat of pseudo-steppe vegetation in AOI is approximately 1,63 ha, which is 0.2% of the European estimate. This impact is not considered likely to compromise the habitat's integrity. The impact magnitude is therefore considered to be Minor.

Considering the very high sensitivity attributed to the pseudo-steppe EAAAs and the minor impact magnitude expected, the overall significance to this habitat will be **Moderate adverse (Significant)**.

Priority Biodiversity Features

Construction impacts to hill pastures and riparian belt (PBF) are expected to result in a loss of 18.5 ha, which represents c.0,4 % of the habitat's EAAA. This impact is not considered likely to compromise the integrity of habitat across the EAAA given these low losses. The impact magnitude to this PBF is therefore considered to be **Minor**.

Considering the high sensitivity attributed to the hill pastures EAAAs and the minor impact magnitude expected, the overall significance to this habitat will be **Slight adverse (not Significant)**.

Construction impacts to riparian willow belts (PBF) are expected to have impact of 1,65 ha, which represents c. 0,1% of the habitat's EAAA. This impact is not considered likely to compromise the integrity of habitat across the EAAA given these relatively low losses. The impact magnitude to this PBF is therefore considered to be **Minor**.

Considering the high sensitivity attributed to the riparian belt EAAAs and the minor impact magnitude expected, the overall significance to this habitat will be **Slight adverse (not Significant)**.

7.1.6 Impacts on Species

As a component of the impact assessment, the value the species likely to be within the Study Area and with the potential to be impacted by the project were assessed. Of these species, 9 were assessed as being Priority Biodiversity features in line with PR6. Impacts identified include direct mortality from the construction works, from fragmentation of habitats, visual and noise disturbance and impacts from pollution. Potential impacts resulting from the operation of the project identified were limited to impacts from the maintenance of the RoW noise form compress station and the potential for increased hunting in the areas around the project route as accessibility would be increased. Specific mitigation to prevent these impacts is proposed.

7.1.7 Cumulative impacts

The areas may also come into impact during construction stage and operational stage with cumulative combine impacts of it and other project activities in the surrounding area:

- GEN-I's future solar power plant (4km away from the project), which will be located in the village of Amzabegovo in the Sveti Nikole municipality, is expected to be fully operational by early 2023.- SEA has been prepared
- Wind Park Bogoslovec (9 km way from the project) in the Sveti Nikole municipality is expected to be finished by 2023- conducted EIA according to National legislation
- Regional landfill Mechkuevci (6km ay from the project) in the Sveti Nikole municipality, construction works of the regional landfill are expected in 2022- ESIA, with Biodiversity assessment and management plan have been prepared accoridiong to EU

7.1.8 Anticipated threats

Climate change – No current data are yet available on the impact of climate change on the populations of species. Nevertheless, it can be anticipated that the extreme climate related events can have an effect on the reproductive success of the populations. Long dry periods, for example, caused by the change in the climate, increase the risk of wildfires and droughts that are direct limiting factor for populations.

8.PROPOSED AVOIDANCE, MITIGATION, RESTORATION AND OFFSETTING

Where the assessment has identified potential project related impacts to biodiversity, according to EBRD PR6 the Client will manage its risks in accordance with the mitigation hierarchy (fig.32) and the Good International Practice. Mitigation proposed follows the mitigation hierarchy²², whereby avoidance is the primary approach, to limit impacts, followed by mitigation, restoration and finally offsetting if necessitated.

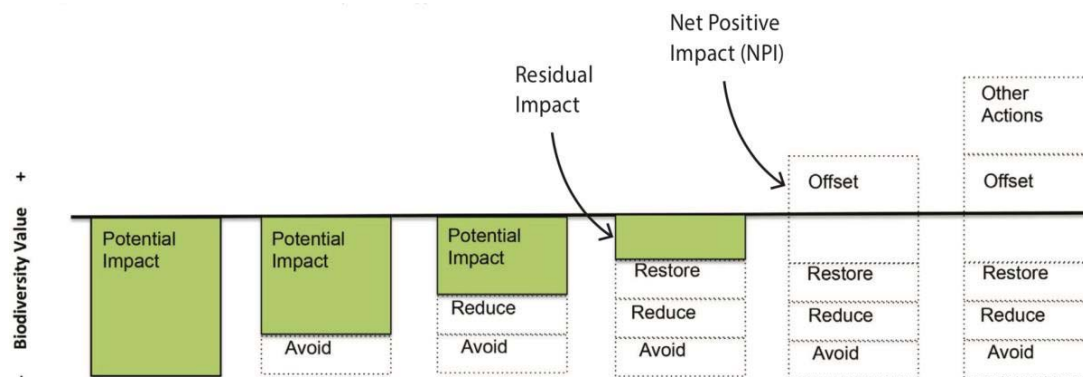


Figure 37. Mitigation Hierarchy

In addition to GIP, the following mitigation is proposed to address impacts to ecology and nature conservation. **This should be developed further by the project into a project Biodiversity Action Plan.**

8.1 General Avoidance Overview

The project seeks to reduce impacts initially through avoidance. These measures are primarily based around the positioning of the route, along the RoW of an existing pipeline, through

²² The mitigation hierarchy comprises measures taken to avoid creating environmental or social impacts from the outset of development activities, and where this is not possible, to implement additional measures that would minimise, mitigate, and as a last resort, offset and/or compensate any potential residual adverse impacts

already degraded habitats and through habitats of low biodiversity value. The avoidance measures implemented in the selection of the routing are described in chapter 6.2. Other avoidance measures to be implemented include seasonal timings of works (for example to avoid removing trees when birds are nesting). Where residual effects are identified, mitigation is proposed to address these issues.

8.2 General Mitigation Overview

All of the works must be completed according to GIP (Good International Practice). GIP will be applied and delivered by the Biodiversity specialist. This will include measures such as pre-construction checks and destructive searches to minimise risks of animal mortality during construction. The BS will also deliver Toolbox Talks (TBT) to Project contractors to communicate good ecological practice (e.g. such as securing works areas, covering excavations, preventing access to non-works areas, etc.).

This will prevent or reduce the impacts to receptors i.e. the duration, intensity and/or extent of impacts that cannot be completely avoided. Beyond the GIP, the Project seeks to proactively address the majority of direct impacts to habitats and species to reduce their potential severity, based around detailed pre-construction surveys and the use of Biodiversity Specialist. These surveys / inputs are also considered necessary to bring the project in line with PR6. After the completion of the construction, the impacted areas are to be restored insofar as is possible.

In order to mitigate for the impacts and with particular relevance to PR6 compliance, a comprehensive mitigation strategy (including (at least) like-for-like replacement for PBF habitat losses) and a replanting plan that secures a net gain in the extent of the EAAA will be implemented.

A BMP (**Biodiversity Management Plan**) should be produced for the project, with details of the requirements for the Biodiversity Specialist. The BMP will specify the baseline condition of each habitat and species, the target condition and the recommended actions required to achieve this restoration. Specific details regarding mitigation measures will be provided within a BMP, to ensure No Net Loss/Net Gain is secured in perpetuity in accordance with EBRD PR6.

8.2.1 Pre-works surveys

Prior to works starting, the route must be fully surveyed for the up to date baseline condition and to identify the presence / potential presence of notable species. The survey must be conducted by suitably qualified ecologist(s) (Biodiversity specialist), at a suitable time of year and in line with PR6 should consider all priority biodiversity features. **This survey must be undertaken a minimum of two weeks ahead of the works to allow for any modification to the working methodology to be implemented if required.** The Biodiversity Specialist will be responsible for confirming that adequate information has been collected to ensure that there is an appropriate baseline to inform the bespoke mitigation and monitoring alternatively they will determine the appropriate pre-cautionary approach to take. As an experience from BRUA gas pipeline project in addition to pre-works survey, a component of the responsibilities of the Biodiversity Specialist will be to reassess the RoW ahead of the works through a 'walkthrough'. This will need to be conducted ideally one to two days ahead of the works to obtain up to date information on the presence of example nesting birds etc. Just before enabling works, a pre-commencement walks through should be done in order to identify presence of sensitive receptors such as nesting birds, sheltering reptiles etc. Look for potential presence of PBF species not identified as being present within the Aol.

8.2.3 Bespoke Habitat Mitigation

In addition to the GIP mitigation, proposed construction mitigation for all sensitive habitats identified along the route for all habitats, areas that support the sensitive habitat to be affected (including transitional/degraded states) will be made before construction commences.

There are areas of riparian habitat that qualify as PBF threatened habitat. The method of crossing will be determined by considering the width of the river, the composition of the river bed and the volume and the flow of the river. Crossings will either be directionally drilled avoiding the need to dig up the river bed or open cut (wet or dry using coffer dams depending on the status of the watercourse).

There will be short to mid-term impacts until the benthos (river bed) self establishes and the banks re-vegetate and stabilise. This will require monitoring and offsetting like improved bankside vegetation in degraded areas to offset impacts across the project RoW. Monitoring of the restoration success shall be targeted and monitored via the development of the BAP.

Table 22. Specific Mitigation for PBF/CH Habitats

Habitats and Reasons for Specific Mitigation requirement	Mitigation Method Description	Post restoration Monitoring	Locations
Pseudo-steppe with grasses and annuals of the Thero-Brachypodietea Grasslands . value =5	Preconstruction surveys in Spring to Autumn will determine/confirm the extent of these habitats. Because it is habitat with grass (steppe vegetation), after construction it is best to be left on the natural regeneration - local species of steppe plants to settle instead to be planted by the man.	Monitoring of the restoration success shall be targeted and monitored via the development of the Framework BAP	km8+000
Hill Pastures with Sparse Shrubs . value =5			Km 27+000-end
Riparian Willow- Poplar belts . value =5	Riparian habitat along Svetinikolska River qualify as PBF. The method of crossing has been determined by considering the width of the river, the composition of the river bed and the volume and the flow of the river. Crossings will either be directionally drilled avoiding the need to dig up the river bed or open cut (wet or dry using coffer damns depending on the status of the watercourse). Silt fences would be used in areas of wet open cut, strategically positioned to prevent sedimentation downstream. Banks would be restored to ensure soil/integrity before vegetation matures to provide soil stability. There would be re-planting of scrub in some areas or vegetation would be allowed to colonize naturally as appropriate. All riparian works and river crossing should follow the prescriptions of the water chapter of the ESIA	Monitoring of the restoration success shall be targeted and monitored via the development of the BAP	6+100 along Svetinikolska River

8.2.4 Bespoke Species Mitigation

Bespoke species mitigation for sensitive species is presented in the following. These measures will be included within a bespoke method statement for the following sites.

Table 23. Specific Mitigation for PBF Animal Species (value >3)

Species and Reasons for Specific Mitigation requirement	Mitigation Method Description	Works ahead of construction programme required	Locations
AMPHIBIANS			
Agile Frog (<i>Rana dalmatina</i>) IUCN status: NT Species of value > 3	If the ponds are to be destroyed, drainage should be conducted via pumping with a suitable pump filter (to prevent animals and debris being drawn into the pump). Translocation of amphibians away from works area. All animals present within the pond should be moved to appropriate habitats away from the works. If possible, pond drainage should be avoided April – September. The translocation of specimens identified in work zone into favorable habitat areas identified adjacent to the works. Checks to be conducted by Biodiversity Specialists ahead of the excavation. Routes will be maintained properly in order to avoid creation of puddles capable of attracting amphibians; Conduct standard measures to limit water pollution and soil	Translocation of amphibians away from works area.	Riparian belts and Nezirlik Ardi (maybe at streams)
Yellow-Bellied Toad (<i>Bombina variegata</i>) IUCN status: LC Species of value > 3 Listed in Ann.II/IV of HD	The alteration, disruption or destruction of <i>Bombina variegata</i> can occur due to the clearance of riparian vegetation, temporary water diversion and as a result of an inappropriate construction methods. This habitat is considered to be a maximum of high sensitivity based on the presence of fire-bellied toad (PBF). Pollution/hydrological impacts here have the potential to have a long-term impact on the viability of fire-bellied toad across the EAAA, given hydrological connectivity and the species' reliance on water. Identification and mapping of areas occupied by this species prior to the commencement of clearance. River drainage to be avoided April-September where possible. Checks to be conducted by Biodiversity Specialist ahead of excavation. the active working corridors will be maintained properly in order to avoid creation of puddles capable of attracting amphibians; Conduct standard measures to limit water pollution. Prohibition of access to Nezirlik Ardi of all workers.	Translocation of amphibians away from works area.	Riparian belts and Nezirlik Ardi (maybe at streams)
European Pond Turtle (<i>Emys orbicularis</i>) IUCN status: NT / VU Species of value 4	The working areas should be carefully searched by the Biodiversity Specialists prior to the commencement of the work; any individuals found to be carefully transported outside risk areas in habitats matching their ecological requirements; Any individuals found on site to be relocated to favorable habitats	Mitigation suggest by Biodiversity Specialist.	Entire route
Common tortoise (<i>Testudo graeca</i>) IUCN status: VU / VU Species of value 5	A morning trench check should be performed, if trapped tortoises are found, a ramp should be installed within open trenches to allow these species to escape		

Hermann's Tortoise (<i>Testudo hermanni</i>) IUCN status: NT / VU Species of value 5			
Imperial eagle <i>Aquila helica</i> IUCN status: VU Species of value 5.	A long-term monitoring of the priority bird species is recommended. None of the species breeds on the ground in PZI but all of them (the Eastern Imperial Eagle, the Lesser Kestrel and the Egyptian Vulture) rely on food they retrieve – hunt or scavenge – from the ground. Given that the pipeline is envisaged to traverse the feeding habitats of all three bird species and that it is in close proximity to a handful of established nests of Eastern Imperial Eagles, it is imperative to monitor the impact of disturbance and potential changes to feeding areas for the priority species during the breeding season (from March till September for the Lesser Kestrel and the Egyptian Vulture), and throughout the year for the Eastern Imperial Eagles (juveniles and immature birds tend to stay close to their nests all over the year before undertaking any migration route). This monitoring ought to be implemented in the entire area of Ovce Pole IBA, and it should survey nesting territories (occupancy, breeding success) and feeding range (especially if there are any changes).	All trees should be assessed for bird nests ahead of removal during the bird nesting season.	
Egyptian vulture <i>Neophron perconopterus</i> IUCN status: VU Species of value 5.	<p>Felling of trees should be undertaken between September and February inclusive, felling of trees during the breeding bird season (March to August inclusive is to be avoided). Noisy work (i.e. hammering is not permitted in these areas from March to August inclusive). Dead wood should be retained on site. RoW to be permitted to be colonise naturally.</p> <p>Check for nest must be done prior to construction work</p>		Entire route

8.3 Construction Controls

8.3.1 Prohibition of access to Nezirlik Ardi (near km 21+500)

Preservation of this locality is important, particularly as some reed belt in the vicinity may be used by workers. The area should be marked off on a map and clear instructions given to the contractor not to enter these areas. *This should be included in the contract documentation, and the Supervising Engineer made aware of the prohibition.*

8.3.2 Plan to avoid disturbing pseudo-steppe habitat EUNIS Code E1.3, N2000 code 6220* at Kanda Geoglyf (near km 8+000)

The PBF species linked with the 6220* habitat (CH), makes it difficult to describe in brief specific habitat management measures for each one of them. However, such measures do exist and that is why specific management plans have shown to be effective for protecting individual species. As a general rule, traditional extensive management systems aimed at maintaining a mosaic-like landscape pattern are suitable for most plant and animal species linked to the 6220* habitat type (González & San Miguel 2004, Pardini et al. 2004, Alrababah et al. 2007).

Due to the pioneer or semi-pioneer character of every community included in the 6220* habitat type, it is obvious that management is required to perpetuate them. However, management intensification is also negative both for their persistence and for conserving high biodiversity levels at many scales: landscape and structure (γ diversity), ecotones (β diversity), species (α diversity) and genetics (e.g. plant ecotypes selected by livestock grazing through millennia). Therefore, as a general rule, traditional extensive management schemes should be considered as the desired conservation management model.

The restoration of 6220 habitat type communities on bare land is not easy, since the seeds of most of the characteristic species are not available for purchase, although they are usually present in the soil seed bank. **It is usually therefore just a matter of time, natural succession and extensive grazing.**

Preservation of the Annex I Priority Habitats is important, particularly as some grassland areas close may be used by workers. The area of steppe-like grasslands, should be marked off on a map and clear instructions given to the contractor not to enter these areas. ***This should be included in the contract documentation, and the Supervising Engineer made aware of the prohibition.***

Biodiversity management plan to be designed to ensure that the Project has no adverse effects on the conservation value of the 6220* habitat, and preferably a net benefit.

For Restoration of 6220* habitat type, relevant documents ²³ to be consulted.

During operational phase NER have a responsibility to ensure it doesn't cause further harm to the environment. Leaks, emissions, and other damage from pipelines can destroy vegetation, harm local wildlife, and add to local water and air pollution levels. Operators can help avoid these issues by strict inspection and maintenance routines.

No planting autochthonous grass species. Habitat to be left for natural revegetation.

²³ San Miguel A. 2008. Management of Natura 2000 habitats. 6220 *Pseudo-steppe with grasses and annuals of the Thero-Brachypodietea. European Commission

8.3.3 River Protection Measures for all Stream Crossings

In order to preserve the riverine and aquatic habitats, and maintain water quality in the river as far as possible, the following provisions should be included in the construction contract documentation:

- No access or works in any river channel or dry watercourse unless absolutely necessary to construct the works;
- No parking of plant or storage of any equipment within 100 m of river channels or dry watercourses;
- Stabilize construction entrance to prevent the transport of sediment from the work site;
- Revegetation and Rehabilitation Plan of riverine habitat;
- Revegetation to be conducted with willow and poplar trees which are an effective ecological restoration, in both structure and function to stop erosion processes of the riverbed slopes;
- River flow must be maintained at all times. If access is required to the flow channel, measures should be taken to divert the flow past the works;
- No storage or discharge of any wastewater, effluent, excavation soil or any other material may be made to the river channels or watercourses;

All measurements given in the basic design, in order to prevent any kind of possible pollution of the riverbeds and contact with groundwater, should be fully respected and implemented during construction;

- Contractor should be prepared for unlike events like fires; and
- Any pollution event in the watercourses shall be made good by the Contractor, to the satisfaction of the PIU/Supervising Engineer and MoEPP.

The Contractor should be required to prepare a detailed method statement for working in all watercourses, for approval by the PIU/Supervising Engineer.

In addition, an ecologist should be engaged to monitor the vegetation clearance/excavation works. The ecologist should supervise a pre-construction clearance of any mobile animals (e.g. tortoises) which should occur immediately before construction begins in the area.

The success of these measures will be captured through ongoing water quality monitoring (as prescribe in chapter 9)

8.3.4 Protection Measures at IBA

As noted, the IBA is important for trigger species. In order to minimize damage to nesting birds at the IBA, the Contractor should follow these activities along this stretch:

- Engaging experienced ornithologist to monitor;
- Construction work to be done from September till May (to avoid breeding period);
- Prohibition of removal of vegetation during the breeding period of Imperial Eagle in the spring, from the end of May to the middle of June;
- No entering of any forested areas except those strictly necessary for construction of the permanent works;

- No clearing any forest vegetation except within the working corridor;
- No excavating any material for fill or aggregate, or any other purpose except within the corridor of the permanent works; and
- Not allowing construction workers to enter the forested areas for any purpose, or to search for nests or eggs.

8.5 Operation

Operation of the pipeline is not expected to have a material adverse impact on biodiversity and nature conservation given the avoidance approach, the proposed mitigation measures and the limited extent of the maintenance RoW required.

The operation of the pipeline itself is not considered likely to have an impact upon PBF. The operation of the 2 compressor stations is unlikely to have an impact upon any bird's nest as the closest is over 500m from a known Eagle nest and the operational noise and visual disturbance of the operation of this facility is considered unlikely to have an impact upon the notable features. However, current noise level is 69dB which is above maximum allowed levels, due to the presence of regional road Sveti Nikole-Stip²⁴, so the animals are habituated.

The Rights of Way maintenance will require a permanent 6m zone of clearance to be maintained.

8.6 Rehabilitation and Restoration Measures

Rehabilitation and restoration actions are taken to assist in the recovery of a feature that has been degraded, damaged, or destroyed.

8.6.1 Rehabilitation at River Crossings, especially River Svetinikolska Crossing

Once the construction works in the river channels are complete, the areas should be rehabilitated by the placement of soil, willow/poplar trees to allow regrowth of natural vegetation. Assistance from botanical specialists and forestry expert should be sought to guide the rehabilitation works.

The area should be monitored quarterly following site handover, to establish whether regrowth of vegetation is occurring. If not, additional measures – seeding, transplanting of saplings, import of additional topsoil, etc. – should be taken to encourage regrowth of riverine vegetation.

Afforestation activities to be performed in line with the No net loss principle, i.e. preparation of Land Restoration Plan. Riparian vegetation along the streams of Svetinikolska river to be restored to achieve No Net Loss.

Re-planting of the PBF riparian habitats will take place within and around the EAAAs (cannot be re-planted directly on top of the pipeline for safety reasons). The materials required for replanting will be included in the Bill of Quantities. The land required for replanting will be secured by the NER, and will be maintained as the specified habitat type in the long-term (i.e. for the lifetime of the Project), through commitments secured from the landowners by NER. The Detailed Design will include sufficient land for revegetation at a minimum of 2:1 revegetation ratio. This includes Priority Biodiversity Feature species.

²⁴ Monitoring report of noise and PM10 level on the gas pipeline Sveti Nikole- Veles, CEIM, February 2021

8.6.2 Rehabilitation at Other Areas

The Contractor should consult Public Enterprise "National Forest" for the trees from field-protective belts in the vicinity of Sveti Nikole that will be removed. Due to their ecosystem services, these belts need to be rehabilitated.

All other areas where vegetation was cleared, should be soiled and rehabilitated by planting with appropriate native vegetation or left for natural regrowth (especially at certain locations as mentioned above). Area should be monitored quarterly for following site handover, to establish whether regrowth of vegetation is occurring. If not, additional measures – seeding, transplanting of saplings, import of additional topsoil, etc. – should be taken to encourage regrowth of vegetation.

A Biodiversity specialist should oversee this.

8.7 Plan to control invasive species

The principle measures for controlling invasive alien species are: a) prevention of their intentional and unintentional introduction; b) early detection and eradication; and c) management to prevent their spread where they are already established. EU regulation 1143/2014 sets out requirements for member states and is accompanied by an official list of invasive alien species of Union concern. Clients in non-member countries should not intentionally introduce invasive alien species and should establish controls to prevent their unintentional introduction and/or spread where this is a risk, even if such an introduction is not forbidden by the host country regulatory framework.

Acacia (*Robinia pseudoacacia*) is present throughout the route and can spread reducing the quality of other habitats. Cutting of trees enhances vigorous regrowth of root suckers and necessitates increased future control measures to limit dispersal. *Robinia pseudoacacia*²⁵ establishes readily in open areas with exposed soil so minimize the amount and time of soil exposure.

Within the expropriation area, all individual trees and saplings of *Robinia pseudoacacia* will be located and cut, with the stumps killed. Fallen trunks and branches will not be removed, to provide micro-habitats to specialized species. This work will be overseen by a trained ecologist. When cutting trees, the best season to do so is in August which gave the lowest volume of sprouts.

The tree of heaven (*Ailanthus altissima*) and the indigo bush (*Amorpha fruticosa*) were also observed along the pipeline corridor.

Invasive *Ailanthus altissima* trees (including saplings) should be eliminated (uprooting all individuals) when clearing vegetation prior to construction works. Indigo bush (*Amorpha fruticosa*) can be controlled by repeated defoliation and digging and severing the root 3 to 4 inches below the crown.

Monitoring post-construction will ensure that newly restored areas are not inundated with non-native species from adjacent areas.

9. MONITORING

The following monitoring should be conducted:

²⁵ E. Boer, 2013, Risk assessment *Robinia pseudoacacia* L. Naturalis Biodiversity Center, Leiden. 50 <http://www.cabi.org/isc/datasheet/26716>

Table 24. Summary of Monitoring Requirements

What to be monitored?	Where is the parameter to be monitored ?	How is the parameter to be monitored?	When is the parameter to be monitored ? Frequency	Responsibility	Notes/Comments
Pre-construction					
Water Quality	3 Monitoring sites downstream of river Svetinikolska: -first at change 6+100 (where the crossing will be) -second- 1,5km downstream of river Svetinikolska -third at the junction of River Svetinikolska in River Bregalnica	<u>Physical parameter:</u> -Turbidity -Ph -Dissolved Oxygen (According to accredited methods)	One month before preparation phase for crossing	Responsible for Monitoring: Monitoring contractor	Supervisor : Construction Contractor These will act as pre-construction baseline record (and will indicate any changes), since the river basin construction works are unlikely to begin immediately. The pre-construction measurements may be compared with those taken during construction
	<u>Biological parameter:</u> Qualitative and quantitative analysis of benthic macroinvertebrates. Samples from different substrates to be collected with a Surber sampler and hand-net with a mesh size of 500 µm, and in some	One month before preparation phase for construction of the bridge			

		cases (coarse sand and silt) with an Ekman grab, following the standard methodology for collecting bottom fauna (EN 28265:1994, EN 27828:1994, EN 9391:1995)				
Riparian Habitat	Along the River Svetinikolska between 6+100 and 6+200	Visually through photographs of existing vegetation and species before construction	One month before preparation phase for crossing	Responsible for Monitoring: Monitoring contractor	Supervisor : Construction Contractor	These will be used to assist with the rehabilitation planning
Invasive species control (Robinia pseudoacacia)	Within the expropriation area	Visual inspection on site. All individual trees and saplings of Robinia pseudoacacia will be located and cut, with the stumps killed. Fallen trunks and branches will not be removed, to provide micro-habitats to specialized species. Indigo bush and tree of heaven removal to be monitored to.	When cutting trees, the best season to do so is in August which gave the lowest volume of sprouts. Before beginning of Construction work	This work will be overseen by a trained ecologist.	Contractor/s Supervising engineer NER	
During Construction						
Water Quality	3 Monitoring sites downstream of river	<u>Physical parameter:</u> -Turbidity -Ph	Parameters should be monitored weekly during the period when construction activities	Responsible for Monitoring: Monitoring contractor	Supervisor : Construction Contractor	

	<p>Svetinikolsk a</p> <p>-first at change 6+100 (where the crossing will be)</p> <p>-second- 1,5km downstream of river Svetinikolsk a</p> <p>-third at the junction of River Svetinikolsk a in River Bregalnica</p>	<p>-Dissolved Oxygen (According to accredited methods)</p> <p><u>Biological parameter:</u> Qualitative and quantitative analysis of benthic macroinvertebrat es. Samples from different substrates to be collected with a Surber sampler and hand-net with a mesh size of 500 µm, and in some cases (coarse sand and silt) with an Ekman grab, following the standard methodology for collecting bottom fauna (EN 28265:1994, EN 27828:1994, EN 9391:1995)</p>	<p>are ongoing in the river channel, and for a period of 3 months following the end of all constructio n works in the river channels.</p> <p>Parameter s should be monitored monthly during the period when constructio n activities are ongoing in the river channel, and for a period of 3 months following the end of all constructio n works in the river channels.</p>	<p>Responsibl e for Monitoring: Monitoring contractor</p>	<p>Supervisor : Constructi on Contractor</p>	
Riparian Habitat	<p>Along the River Svetinikolsk</p>	<p>Visually seeing the condition of the willow and poplar belt through</p>	<p>Parameter s should be monitored monthly during the</p>	<p>Responsibl e for Monitoring:</p>	<p>Supervisor :</p>	

	a between 6+100 and 6+200	photographs of the site	period when construction activities are ongoing in the river channel, and for a period of 3 months following the end of all construction works in the river channel	Monitoring contractor	Construction Contractor	
Following Construction						
Rehabilitated Areas	Throughout works	Visually seeing the successfulness of the rehabilitation through photographs of the site and site seeing	Quarterly for 24 months following handover.	Responsible for Monitoring: Monitoring contractor	Supervisor : Construction Contractor	The aim of this is to establish whether regrowth of vegetation is occurring.
Riparian Habitat	Along the River Svetinikolsk a between 6+100 and 6+200	Implementation of a Revegetation and Rehabilitation Plan	Once a year	Responsible for Monitoring: Monitoring contractor	Supervisor : Construction Contractor	Minimizing as much as possible the impact on and degradation of riparian habitats

Table 25. Monitoring the environment components

Phase	Protocol	Frequency
Pre-construction	Comparative analysis of the situation at the locations based on the sample charts prepared for each 5 km section	Before the commencement of the works
During Construction	Recording incidents caused by interaction with the fauna species; Documenting the dynamics of the translocated elements in line with the management requirements.	Quarterly
Following Construction	The degree of restoration of the vegetal carpet (coverage coefficient) The degree to which the land was restored to the natural/productive circuit, Dynamics of the alien, ruderal, invasive, species, etc. Documenting of the persistent negative effects (erosion, compaction, etc)	Quarterly

10. ANNEXES