

**Construction of new railway section from Kriva Palanka to
the border with Republic of Bulgaria, as part of Corridor VIII**

Biodiversity Management Plan

**Public Enterprise for Railway Infrastructure Railways of Republic of
North Macedonia – Skopje**

June, 2023

This document has been prepared by Mott MacDonald | CONNECTA Consortium as part of the assignment “Gap Analysis and Safeguard Documentation: Category A Project CORRIDOR VIII Railway - Section 3 Kriva Palanka-Border with the Republic of Bulgaria, North Macedonia”, supported by the Technical Assistance to connectivity in the Western Balkans EuropeAid/13785/IH/SER/MULTI.

Explanation note:

The project is expected to be financed in part by an approved Instrument for Pre Accession II (IPA II) grant. This grant shall be deployed through the IPA Operating Structure. See for further details: IPA 2014-2020 (IPA II) - CFCD (finance.gov.mk). In that context, the Environmental and Social instruments, including this document, shall be implemented by the Public Enterprise for Railway Infrastructure Railways of Republic of North Macedonia – Skopje in collaboration with the Contracting Authority, the Central Financing and Contracting Department within the Ministry of Finance, and the Ministry of Transport and Communication.

Contents

1	Introduction	8
1.1	Summary of the Supplementary Biodiversity Assessment	9
1.2	Objective of the Biodiversity Management Plan	10
1.3	Scope	11
1.4	Interaction with other Management Plans.....	11
2	Legislative, Regulatory and Policy Framework.....	13
2.1	National law.....	13
2.2	Policies, requirements and standards.....	14
2.2.1	EBRD policies, requirements and standards	14
2.2.2	EIB policies, requirements and standards.....	15
3	Biodiversity baseline	16
3.1	Biodiversity	16
3.1.1	Habitats	16
3.1.2	Species.....	16
3.2	Protected areas and areas proposed for protection.....	17
3.2.1	Emerald sites.....	17
3.2.2	National system of protected areas.....	18
3.2.3	Bio corridors	20
4	Roles and responsibilities	23
4.1	Overview	23
4.2	Project roles and responsibilities.....	24
4.2.1	Biodiversity Expert.....	24
4.2.2	Biodiversity Supervisor.....	25
4.2.3	Mammal, amphibians and reptiles monitoring specialist.....	28
4.3	Contractor roles and responsibilities	28
4.4	Training	29

5	Biodiversity Management Plan	29
5.1	General mitigation measures and management actions	30
5.2	Specific mitigation measures and management actions for sensitive habitats and notable species 39	
5.3	Monitoring and evaluation plan	57
	Appendices	60
	Appendix 1: Locations of focus monitoring sites	61
	Appendix 2: Locations of sensitive habitats	62
	Appendix 3: Construction timeline and seasonal restrictions on construction activities	65
	Appendix 4: Pre-construction and Pre-Clearance Surveys.....	66

List of figures

Figure 1 Proposed EMERALD sites along the railway line Section 3 – Kriva Palanka (T'Iminci)-Deve Bair	18
Figure 2 Protected areas and areas proposed for protection along the railway line Section 3 – Kriva Palanka (T'Iminci)-Deve Bair.....	20
Figure 3 Bio-corridors in along the railway line Section 3 – Kriva Palanka (T'Iminci)-Deve Bair.....	22
Figure 4 Overview of focus areas for monitoring of conservationally important species. Sites were outlined using GPS field data findings as a reference.....	61
Figure 5 Overview of sensitive habitats along Kumanovo-Deve Bair railway line, Section 3 – Kriva Palanka (T'Iminci) to Deve Bair: part 1 – T'Iminci to Kriva Palanka.....	62
Figure 6 Overview of sensitive habitats along Kumanovo-Deve Bair railway line, Section 3 – Kriva Palanka (T'Iminci) to Deve Bair: part 2 –KRiva Palanka to Zhidilovo	63
Figure 7 Overview of sensitive habitats along Kumanovo-Deve Bair railway line, Section 3 – Kriva Palanka (T'Iminci) to Deve Bair: part 2 –KRiva Palanka to Zhidilovo	64

List of tables

Table 1 Details on responsibilities and coordination activities during construction and operation of the Project (R=Responsible, A= Approves, I= Informed, C= Consulted M= monitoring role).....	23
Table 2 General mitigation measures and management actions; Co- Company; Cr-Contractor	30
Table 3 Specific mitigation measures and management actions for sensitive habitats	39
Table 4 Specific mitigation measures and management actions for species	48

Table 5 Monitoring activities.....57

List of Abbreviations

Abbreviation	Meaning
AEWA	African-Eurasian Migratory Waterbirds
AOI	Area of Interest
ASCI	Areas of Special Conservation Interest
BD	Bird Directive
BMP	Biodiversity management plan
CBD	Convention on Biological Diversity
CFCD	Central Financing and Contracting Department
CHA	Critical Habitat Assessment
CITES	Convention on the International Trade in Endangered Species of Wild Flora and Fauna
EAAA	Ecologically Appropriate Areas of Assessment
EBRD	European Bank for Reconstruction and Development
EIA	Environmental Impact Assessment
EIB	European Investment Bank
EOO	Estimated Extent of Occurrence
ESIA	Environmental and Social Impact Assessment
ESP	Environmental and Social Policy
ESS	Environmental and Social Standards
EU	European Union
EUNIS	European nature information system
GPS	Global Positioning System
HD	Habitat Directive
IBA	Important Bird Area
IPA	Important Plant Area
IUCN	International Union for Conservation of Nature
LC	Least Concern
MTC	Ministry of Transport and Communications
PBA	Prime Butterfly Areas
PBF	Priority Biodiversity Feature
PE ZRSMI	Public Enterprise Railways of the Republic of North Macedonia, Infrastructure
PEEN	Pan-European Ecological Network
PR	Performance Requirements
SBA	Supplementary Impact Assessment
SHPP	Small Hydro Power Plant
UNESCO	United Nations Educational, Scientific and Cultural Organization
HNVF	High nature value forests
HPP	Hydro-power plant
ES	Ecosystem services
CLC	Corine Land Cover
Mts.	Mountain

Biodiversity Management Plan

Abbreviation	Meaning
NNL/NG	Nonet loss/ Net gain
MAFWE	Ministry of Agriculture, Forestry and Water Economy
MoEPP	Ministry of Environment and Physical Planning
PCC HYDRO	Private company managing small hydro power plant
PIU	Project Implementation Unit
UNEP	United Nations Environmental Programme
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
ha	hectar
NGO	Non-Goermental Organisation
SDC	Swiss Agency for Development and Cooperation

1 Introduction

The railway line from Kumanovo to Deve Bair (Bulgarian border) is an integral part of the identified Corridor VIII and includes 3 sections: section 1: Kumanovo-Beljakovce, then section 2: Beljakovce to Kriva Palanka (T'Iminci) and section 3: Kriva Palanka (T'Iminci) to Deve Bair (Bulgarian border). As projected, the railway line has a total length of 88.1 km running across the North-Eastern region of North Macedonia, affecting five municipalities: Kumanovo, Staro Nagoricane, Kratovo, Rankovce and Kriva Palanka.

This Biodiversity Management Plan, covers Section 3 of the railway line, Kriva Palanka (T'Iminci) to Deve Bair (Bulgarian border). The project area (Section 3) is located on the territory of the municipality of Kriva Palanka, which belongs to the Northeast Region of the Republic of Macedonia. Section 3 starts before the town of Kriva Palanka (at km 64 + 942.01) and goes to the border with the Republic of Bulgaria (at km 88 + 364.65). Along the alignment there are 24 tunnels with a total length of about 9 km and 52 bridges with a total length of about 5 km.

The ESIA Study prepared in 2011-2012 covered all three sections of the Kumanovo-Deve Bair railway line. But, because of the expired relevance of the consent issued by the Ministry of environment and physical planning issued and changes in technical documentation with regards to number of bridges and tunnels, a completely new ESIA Study for the third section of the railway (Kriva Palanka-Deve Bair) was prepared in 2017.

Following a review of the two ESIA documents written in 2012 and 2017, a number of gaps were noted in the biodiversity baseline studies, primarily with consideration to updated EBRD and EIB requirements for a project of this scale. Supplementary Biodiversity Survey was carried to compensate data gaps for species of conservation concern in accordance with the updated EBRD PR6 requirements. The survey data was then used to inform an updated Biodiversity Impact Assessment, Critical Habitats Assessment and to target additional mitigation where required.

In accordance with the EBRD and EIB's requirements all projects shall meet national environmental, social, health and safety laws and regulations, and be carried out in compliance with relevant EU environmental and social standards, as well as the EBRD's Environmental and Social Policy (ESP) and Performance Requirements (PRs) of 2008. EIB's requirements will also have to be met in compliance with Environmental and Social Standards (ESS) 3, Biodiversity and Ecosystems.

In this context, Biodiversity Management Plan (BMP) is prepared as part of the Environmental and Social Impact Assessment (ESIA) process and forms part of the outcome of the Environmental and Social Impact Assessment (ESIA), the Supplementary Impact Assessment (SBA) and the Critical Habitat Assessment (CHA).

The BMP provides an instructional working document for management of biodiversity impacts during Project design and implementation, and will be used by the PE ZRSMI (Public Enterprise Macedonian Railways-Infrastructure) and its contractors to ensure that necessary measures are implemented to comply with national laws and lender policies, and to address stakeholder concerns relating to biodiversity and ecosystem services, as identified in the ESIA. The BMP describes mitigation and management measures, identifies the parties responsible for their implementation (e.g., company, contractor, and government) and specifies the required monitoring and monitoring schedule.

This BMP is a "live" document and is expected to evolve and to be enhanced as necessary throughout the Project's detailed design, construction, and operation phases, as part of project monitoring.

1.1 Summary of the Supplementary Biodiversity Assessment

Following a review of the two ESIA documents written in 2012 and 2017, the first covering the whole railway corridor from Kumanovo to Deve Bair, and the latter focusing on Section 3 of the corridor i.e. Kriva Palanka (T'Iminci-Deve Bair), a number of gaps were noted in the biodiversity baseline studies. Noted gaps were primarily outlined with reference to non-compliance to the updated EBRD and EIB requirements for a project of this scale, lack of up-to-date information on protected species and limited mitigation with regards to some protected species likely to be present. The Supplementary Biodiversity Survey was carried primarily to cover data gaps in line with the updated EBRD requirements, and hence was focused on species of conservation concern listed in the EU Directives and/or national/regional legal conservation documents that in accordance with the updated EBRD PR6 requirements qualify as PBF and/or CH. Supplementary biodiversity surveys were commissioned from April to June. However, with due consideration of the project timeline and the prolonged winter conditions in early spring of 2022, the field surveys were intensified throughout May and the first week of June 2022. To further compensate for the limited survey time, the SBA also took into consideration (i) all relevant available documents on supplemental assessment of impacts on and monitoring of biodiversity from project activities in the area of the Osogovo-German bio corridor during construction of Expressway A2; (ii) Supplemental Biodiversity Assessment Report and assessment and monitoring reports for project for reconstruction and rehabilitation of the state road, section Kriva Palanka – Deve Bair; (iii) Assessment, valorization and monitoring reports carried in the frame of conservation project activities and (iv) expert's personal field data i.e. available field data records on species and habitats collected as part of other survey activities in the area of interest. The data was then used to inform an updated Biodiversity Impact Assessment, Critical Habitats Assessment and to target additional mitigation where required.

The railway line under assessment - Section 3 (Kriva Palanka –T'Iminci to Deve Bair) goes along the foothills of Bilina Planina mountain, at the right bank of the valley of river Kriva Reka up to Zhidilovo where it crosses on its left bank through a bridge up until its entrance in the tunnel at Uzem. As projected, the railway largely passes through anthropogenic or modified/altered natural habitats.

Additional baseline surveys were undertaken for reptiles, birds and mammals, insects and habitats to establish likely presence or likely absence of species of conservation concern¹ or habitats of conservation importance within the survey area. Habitat map was revised based on the EUNIS (parent) habitat types, to establish if any EU Habitats Directive Annex I Habitats are present. Aquatic fauna and fish were not considered as part of the Supplementary Biodiversity assessment since none of the identified species recorded in the biodiversity assessment studies carried as part of the ESIA 2012 and 2017 were assessed to qualify as PBF and/or CH.

From total of ~40 habitats and ~415 species listed in the ESIA, 2017, the Critical Habitat assessment, took into consideration 10 habitat types and 68 species that, based on the Lenders' requirements qualify for PBF/CH. All species are considered to be relatively widespread and common in the region; for the majority of species assessed, it was found that if appropriate mitigation measures and management actions are implemented there would likely be no significant effect on the conservation status of the species as a result of the project.

Forest habitats were noted to be largely degraded/not representative mostly due to the long-term extensive use of this natural resource (firewood/construction material) by the resident population of Kriva Palanka

¹ Species of conservation concern are those listed on the IUCN Red List or National Red list as being Vulnerable (VU) Endangered (EN), Critically Endangered (CR); listed on the EU Habitats Directive under Annex II or IV; Birds Directive Annex I; Bern Convention, Resolution 4 of the Bern Convention; or protected under national legislation.

and the nearby rural settlements. Grasslands were found to occupy small areas and due to the ongoing process of abandonment of stockbreeding practices, large portion of areas under grassland is under succession i.e. overgrown with small trees from the subordinate layers of forests. The community structure of riparian woodlands was noted to be altered due to the presence of anthropogenic trees and invasive species. It is noteworthy that a large portion of the natural habitats, considered to be of conservation importance, particularly thermophilous forests and riparian woodlands and belts were severely degraded and being affected by ongoing construction of other infrastructural projects implemented in the area (access roads, landfills and borrow pits, construction sites). The two main construction projects in the area are as follows:

- The degradation of the river Kriva Reka valley, largely occurring due to the ongoing construction of the SHPP “Kriva Reka”, PCC HYDRO is particularly notable from Kriva Palanka to Zhidilovo (see Figure 6).
- The degradation from the ongoing construction of the Kriva Palanka Road Rehabilitation Project; Expressway A2, LOT 2: Sub-section Kriva Palanka – Dlabocica is most notable from T’Iminci to Stambolica and at Kiselichka Reka valley.

Ongoing construction activities were also noted to have a potentially negative effect on species presence. Presence of patches of representative habitats of conservation importance were also noted as present, largely in the area of Uzem.

The faunal surveys also recorded a range of species. It is also noteworthy that the mammal, reptile and bird surveys carried to inform the Supplementary Biodiversity Assessment recorded the presence of few species that were not noted in the previous ESIA: Soprano pipistrelle (*Pipistrellus pygmaeus*) and Schreiber's Bent-winged Bat (*Miniopterus schreibersii*), the Black stork (*Ciconia nigra*) and the Dahl's whip snake (*Platyceps najadum*).

All species are considered to be relatively widespread and common in the region; however to reduce any potential negative effects that project implementation may have on species and habitats this document – the Biodiversity Management Plan (BMP) aims to provide adequate management actions and mitigation measures to achieve no net loss/net gain for species and habitats, through the application of the mitigation hierarchy. Mitigation strategies account for those already stated in the 2012 and 2017 ESIA reports whilst accounting for additional management actions and mitigation measures in accordance with the updated EBRD PR6 requirements. When fully implemented, it is assessed that the project would have a non-significant impact on the faunal assemblage in the project area. The BMP also aims to achieve no net loss of biodiversity in alignment with lenders' guidance; and where possible a net gain.

1.2 Objective of the Biodiversity Management Plan

All infrastructural projects should aim to avoid impacts, but where impacts cannot be avoided, they should be minimised. If an impact cannot be minimised so that it is non-significant in nature, then under Lender's guidance, further mitigation, restoration and offset compensation may be required to demonstrate No Net Loss (NNL) or preferably a Net Gain (NG) for certain biodiversity features. This BMP aims to set out a detailed plan of how the recommendations arising from the ESIA and CHA will be implemented over time and identifies the actions that will be taken by the Company and its Contractor/s.

Although North Macedonia is not an EU member state, the EIB and EBRD-financed projects are expected to meet good international practice related to sustainable development. For this purpose, the Bank has defined specific Performance Requirements (PR) that its Clients must apply to manage its environmental and social risks and impacts. Furthermore, since North Macedonia is an EU candidate since 2014, it has adopted the legislative directives and ratified the conventions triggered by the Project. The Project is hence

required to comply with national and European legal requirements including those contained within the EU Habitats and EU Birds Directives² by ensuring that species protected at the EU level are maintained at favourable conservation status and that Annex I, and Annex I Priority habitats are maintained in favourable condition.

The BMP is also key to ensuring that any conditions imposed by the Republic of North Macedonia's Ministry of Environment and Physical Planning are addressed through appropriate interventions.

The main aim of this BMP is that all actions required as part of the Project's Mitigation Strategy, are clearly understood by all parties and that there are provisions in place to ensure that they are implemented adequately and in an appropriate timeframe to minimise residual risks and impacts on biodiversity and natural resources.

1.3 Scope

The core of the document is a tabulated list of mitigation and management measures, arising from the ESIA, which have been agreed to by the Company.

The BMP provides a framework for delivering:

- On-site mitigation and management of a high standard commensurate with the biodiversity importance of the Project's location to avoid and minimize impacts as specified in the ESIA and SBA.
- Adherence to the mitigation hierarchy with respect to impacts on natural and critical habitat as per Lender requirements. This means applying the mitigation hierarchy, with an emphasis on avoidance at all stages during detailed design and construction planning and implementation.
- Specific control measures and procedures to prevent the introduction or spread of invasive species by the Project.
- An adaptive management approach that allows for development of any new control measures that may be needed if monitoring reveals that unforeseen impacts are occurring or impacts of greater significance than envisaged in the ESIA. This will require rigorous monitoring of outcomes for biodiversity in general and for natural and critical habitat in particular. In compliance with the EIB requirements the semi-natural, modified and urban habitats have also been addressed.
- specific guidance on how to manage biodiversity in the operation phase Interaction with other management plans.

1.4 Interaction with other Management Plans

Taking into consideration the identified impacts on biodiversity, the identified affected parties and the identified mitigation measures that should be implemented during the construction phase of this Project, the Biodiversity management Plan is intersecting with the following Management Plans:

- Plan on protection of surface and ground waters,

² Council Directive 92/43/EEC May 1992 on the Conservation of Natural Habitats and of Wild Fauna and Flora, as amended.

Biodiversity Management Plan

- Environnemental management plan on soil protection,
- Environmental management plan in case of leakage of dangerous substances,
- Waste management plan.

2 Legislative, Regulatory and Policy Framework

2.1 National law

The legal basis for nature protection in the Republic of Macedonia is contained within the Constitution, the Law on Nature Protection (O.G. Nos. 67/04, 14/06 and 84/07, 93/2013, 187/2013, and 42/2014), the Law on Environment, and in international agreements signed or ratified by the Country and other laws regulating the use of certain natural resources.

The Law on Environment (OGRM No. 53/05, 81/05, 24/07, 159/08, 83/09,123/12, 93/13, 187/13 and 42/14) transposes the requirements of various EU requirements, including those of Directive 2003/35/EC³; Council Directive 96/61/EC⁴; Directive 2001/42/EC⁵; and Council Directive 82/501/EEC⁶.

The Law on Nature Protection (O.G. Nos. 67/04, 14/06 and 84/07, 93/2013, 187/2013, and 42/2014) transposes the following Directives: Council Directive 92/43/EEC⁷, Council Directive 79/409/EEC⁸, Council Regulation (EC) No 338/97⁹ etc. This law 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 release¹⁰, 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, organisation of nature protection including management of protected areas, financing inspection and supervision, penalties and final and transitional provisions.

The Law provides a good framework for developing a network of protected areas in line with the IUCN categorisation. In Article 53, it stipulates the establishment of a coherent ecological network. The obligation to set 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).

Also, several international environmental and conventions are relevant are listed below:

- Convention on Biological Diversity (CBD)
- Bern convention on the Conservation of European Wildlife and natural Habitat
- Bonn Convention: Conservation of Migratory Species of Wild Animals
- Convention on Wetlands of International Importance;
- Convention on the International Trade in Endangered Species of Wild Flora and Fauna (CITES);

³ Directive 2003/35/EC of the European Parliament and Council providing for public participation in respect of the drawing up of certain plans and programmes relating to the environment and amending with regard to public participation and access to justice Council Directives 85/337/EEC and 96/61/EC

⁴ Council Directive 96/61/EC concerning integrated pollution prevention and control;

⁵ Directive 2001/42/EC of the European Parliament and of the Council on the assessment of the effects of certain plans and programmes on the environment

⁶ Council Directive 82/501/EEC on the major-accident hazards of certain industrial activities

⁷ Reference is made to the Law on water, which needs to set a methodology for minimum environmental release.

⁸ Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora

⁹ Council Directive 79/409/EEC on the conservation of wild birds

2.2 Policies, requirements and standards

2.2.1 EBRD policies, requirements and standards

The EBRD is committed to promoting the adoption of European Union (EU) environmental principles, practices and substantive standards by EBRD-financed projects, where these can be applied at the project level, regardless of their geographic location. When host country regulations differ from EU substantive environmental standards, projects will be expected to meet whichever is more stringent. In the context of PR 6, three key directives must be considered: the EU Habitats, Birds and EIA Directives.

For all projects to which PR6 applies, EBRD expects the project to mitigate biodiversity and ecosystem service impacts following the mitigation hierarchy (described below) and in accordance with relevant legislation and GIP. PR6 provides performance requirements for impact mitigation for ecosystem services (PR6 para. 9-10, as well as relevant sections of PR5 and PR7), priority biodiversity features (PR6 para. 13, footnote 77), and critical habitat (PR6 para. 15-16, and footnotes 79-82). These requirements constitute the performance target for the project's mitigation plan.

The mitigation plan should follow a hierarchy of actions.

- *Avoidance*: actions taken to fully prevent impacts, such as relocating a project or changing its spatial layout to prevent impacts in specific locations
- *Minimization*: actions taken to reduce the duration, intensity and/or extent of impacts that cannot be completely avoided
- *Restoration*: actions taken to assist in the recovery of a feature that has been degraded, damaged, or destroyed
- *Offset*: measurable conservation outcomes resulting from actions designed to compensate for significant residual adverse biodiversity impacts arising from project development and persisting after appropriate avoidance, minimization, and restoration measures have been taken. Not every type of impact can be offset, as discussed below.

The client should achieve its mitigation targets by avoiding impacts wherever feasible, followed by minimization actions. Where impacts do occur, restoration may be proposed. The residual impacts, after these measures are considered, can in some cases be compensated with a biodiversity offset, or other means of compensation in the case of impacts to ecosystem services.

The core principles of biodiversity offsets are: a) deliver conservation gains beyond those that would have occurred in the absence of the offset; b) conserve biodiversity features that are the same as, or in some cases of higher conservation priority than,¹⁰ those impacted by the planned development; and, c) generate conservation benefits that endure as long as the residual impact of the project. Biodiversity offsets can take the form of conservation projects that *restore and protect* areas degraded by impacts unrelated to the planned development or that *avert the loss* of biodiversity from impacts unrelated to the planned development¹¹.

¹⁰ Offset design should secure broad stakeholder support when seeking to conserve features different than those impacted.

EBRD Performance Requirement 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources (v. September, 2022)

2.2.2 EIB policies, requirements and standards

The EIB too is committed to promoting European Union (EU) environmental principles, practices and substantive standards by EIB-financed projects, where these can be applied at the project level, regardless of their geographic location. When host country regulations differ from EU substantive environmental standards, projects will be expected to meet whichever is more stringent.

In the context of Standard 4 - Biodiversity and Ecosystems¹² EIB too recognises that protecting and conserving biodiversity and ecosystems and maintaining the ecological functions and processes of such ecosystems are fundamental to environmental and social sustainability. For all projects where EIB Standard 4 applies, the project is expected to be compatible with maintaining the integrity of areas important for biodiversity as well as the core natural functions, processes, and resilience of ecosystems; to halt, mitigate and reverse biodiversity loss, increase biodiversity and ecosystem benefits and, where required, achieve a Net Positive Impact on biodiversity.

Standard 4 – Biodiversity and Ecosystems applies to EIB financed projects which may entail a significant impact and risk affecting: (i) biodiversity and ecosystems; (ii) ecosystem services, including the communities whose access to or use of ecosystem services may be affected by project activities; (iii) protected areas or recognised areas of high biodiversity value; and (iv) critical habitat. The Standard also applies to projects that involve primary production and/or the procurement of living natural resources.

To tackle significant impacts and risks noted above, Standard 4 - Biodiversity and Ecosystems has specific requirements with reference to: Assessment of significant impacts and risks affecting biodiversity and ecosystems (as outlined in Standard 4 Specific requirements, paragraph 10 - a to e and paragraph 11 to 14); Protection and conservation of high-value biodiversity (paragraph 15 - a to d); Protection and conservation of critical habitat (paragraphs 16 to 18); Compensation and offsets (paragraphs 19 to 22); Legally protected areas and/or internationally recognised areas of biodiversity value for countries in EU, EFTA, candidate countries (paragraphs 23 to 26) and other countries (paragraphs 27 to 29); Invasive species (paragraph 30 to 33); Ecosystem service assessment (paragraph 43 to 36); Supply chains (paragraphs 37 to 40) and Sustainable management and use of living and natural resources (paragraphs 31 to 43).

All considered Standard 4 – Biodiversity and Ecosystems requires that as part of the EIA/ESIA the promoter shall consider the direct, indirect, cumulative and in-combination impacts of the project and associated works/facilities when assessing the significance of the impacts and risks on habitats, species, ecosystems, natural resources and ecosystem services. To mitigate and monitor effects the promoter is required to develop a biodiversity management plan (or equivalent) that outlines in detail the appropriate mitigation and management measures to avoid and minimise losses of biodiversity and provide opportunities for enhancement. The Biodiversity management plan should be responsive to changing conditions and the results of monitoring throughout the project lifecycle.

Should the project have significant, adverse and irreversible impacts on high-value biodiversity, the promoter shall not implement any project-related activities unless there are no viable alternatives; a meaningful consultation with relevant experts and stakeholders has been carried out; appropriate measures are put in place through the application of the mitigation hierarchy to ensure no loss and, where required, a Net Positive Impact on biodiversity features and the habitats that support them so as to achieve positive measurable conservation outcomes.

¹² European Investment Bank. Environmental and Social Standards. Standard 4 – Biodiversity and Ecosystems (February 2022)

3 Biodiversity baseline

3.1 Biodiversity

3.1.1 Habitats

The area of interest supports a number of habitat types that are listed under Annex I of the Habitat Directive, including those marked as “priority habitat type”. However, most were assessed as not representative and large portion of the habitats was found in different stages of degradation, in part due to ongoing construction activities related to other infrastructural projects implemented in the area of interest (SHPP “Kriva Reka”, PCC HYDRO; Kriva Palanka Road Rehabilitation Project; Expressway A2, LOT 2: Sub-section Kriva Palanka).

None of the habitats were determined to be of high priority for conservation by national systematic conservation planning and no high nature value forests are identified in the area of interest¹³.

North Macedonia has no reference to the IUCN Red list of threatened ecosystems.

The Critical Habitat assessment, took into consideration 10 habitat types that, based on the Lenders’ requirements qualify for PBF/CH. Of these, 8 habitat types were assessed as PBF and 2 were assessed as CH.

3.1.2 Species

From total of ~40 habitats and ~415 species listed in the ESIA, 2017, the Critical Habitat assessment, took into consideration 10 habitat types and 68 species that, based on the Lenders’ requirements qualify for PBF/CH. Of these, 8 habitat types were assessed as PBF and 2 were assessed as CH. Total of 21 species were assessed as PBF i.e. 19 birds, 1 amphibian and 1 reptile; and 39 were assessed as CH i.e. 16 mammals of which 13 bats; 13 reptiles; 5 amphibians and 5 insects. All species are considered to be relatively widespread and common in the region.

However, to avoid and minimise any potential negative impacts on biodiversity, mitigation measures and management actions will apply to all conservationally important species recorded along the railway line Section 3 – Kriva Palanka (T’Iminci)-Deve Bair. Specifics on the potential impacts on conservationally important areas are provided alongside mitigation measures and management actions elaborated in Section 4.

¹³ Macedonian Ecological Society (2022) Identification of high nature value forests at the national level and development of guidelines for the management of two selected pilot HNVFs sites (Bukovic and Belasica). STAR 5 – Achieving biodiversity conservation through the creation and effective management of Protected Areas and mainstreaming biodiversity into land use planning. UNEP, MoEPP.

3.2 Protected areas and areas proposed for protection

3.2.1 Emerald sites

This section of the railway alignment passes through 2 proposed EMERALD sites identified as conservationally important in accordance with international conventions and initiatives (Figure 1):

- Emerald site Pchinja-German – MK0000029¹⁴
- Emerald site Osogovo Mountains – MK0000023

The alignment of the railway passes through the **Emerald site Pchinja-German** from km 75 + 213 to km 77 + 070 ie in the length of 1.8 km (this will include pine plantations, black locust plantations, degraded thermophilic oak forests and mesophilic oak forests). Of these, 1.4 km pass through tunnels or bridges. From the significant forests, the alignment passes through thermophilic oak forests from km 76 + 550 to km 76 + 740 of which 130 m pass through a tunnel, and the remaining 60 m below the bridge.

Considering that the railway line will affect the edge of the designated Emerald site, should appropriate mitigation measures and management actions apply, no significant risk of species populations' displacement, reduction of species home range, feeding area, refuge areas, and alteration of favorable condition for breeding is expected.

Possible impacts on both species and habitats have been elaborated and accounted for within the corresponding sections of the Supplementary Biodiversity Assessment (Section 5; 6.1 and Section 7: Appendix 1) and detailed in Section 5 of this document.

The alignment of the railway passes through the **Emerald area of "Osogovo Mountains"** from km 83 + 080 to km 83 + 630 i.e. in length of 0.5 km. The full length of intersection of the railway line with the Emerald site is through tunnel.

Based on the Appropriate Assessment provided as Appendix in the Supplementary Biodiversity Assessment, it is assessed that the project will not have an adverse effect on the Emerald sites and with appropriate mitigation measures and management actions, any likely impacts will not have a significant effect on population of species and habitats in the area.

¹⁴ MoEPP (2008). Development of National EMERALD Network in Macedonia, Report. Ministry of Environment and Physical Planning, Skopje.

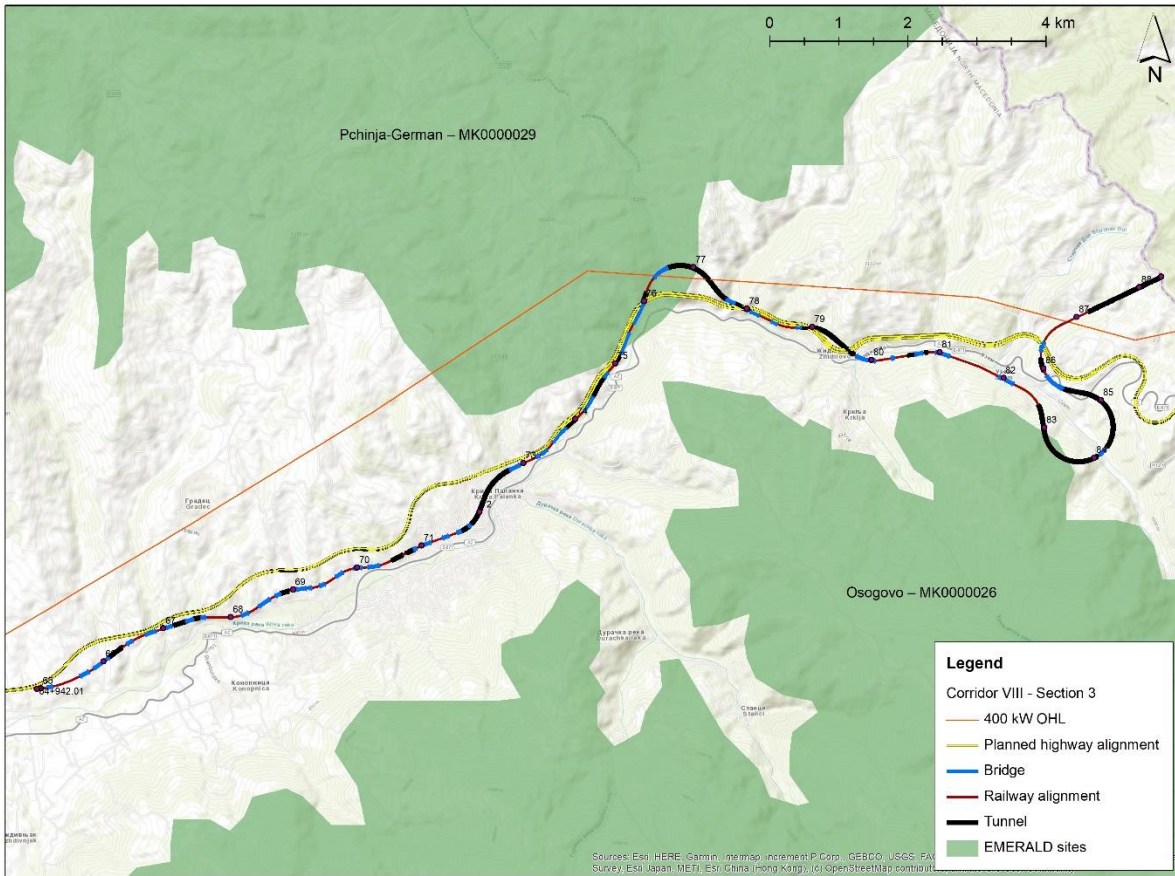


Figure 1 Proposed EMERALD sites along the railway line Section 3 – Kriva Palanka (T'Iminci)-Deve Bair

There are no officially registered or Nominated Natura 2000 sites in North Macedonia since the country is not member of EU.

3.2.2 National system of protected areas

Near the analysed railway corridor, there are no significant spaces that are included in the national system of protected areas. Such areas have not been identified either in the Biodiversity Strategy, the Strategy for Nature Conservation or in the Natural Heritage Study of the Spatial Plan of the Republic of Macedonia.

3.2.2.1 Proposed protected area – nature park „Kiselichka Reka Gorge“

The area was proposed within the Representative Network of Protected Areas¹⁵. The main reason for the proposal is the presence of the *Lutra lutra*. The area is proposed for protection in the category "Nature park" (Figure 2).

¹⁵ MES (2011). Strengthening the Ecological, Institutional and Financial Sustainability of Macedonia's National Protected Areas System (Project 00058373 - PIMS 3728.). Development of Representative National System of Protected Areas (Project activity Ref. RFP 79/2009). UNDP, Ministry of Environment and Physical Planning of the Republic of Macedonia, Macedonian Ecological Society.

However, a decade after, this area still has no legal protection which in turn has resulted in partial loss of its natural values, particularly at the lower boundary of the proposed area. The degradation in place is linked to building weekend houses, ongoing construction work related to the rehabilitation of the state road A2, section Kriva Palanka – Deve Bair.

It is also important to emphasize that the area under consideration does not have legal protection. Also, with due consideration of disturbance and degradation in place, it is noteworthy that should the initiative for protecting Kiselichka Reka gorge be raised again, the area would need to go through process of revalorisation and revision of borders.

Nonetheless care should be taken to mitigate impacts and avoid additional disturbances during construction and operation of the railway. Same mitigation measures and management actions, as well as recommended monitoring activities for habitat and species apply (see Section 4.1 and 4.2.)

3.2.2.2 Protected area “Protected landscape of the Osogovo Mountains”

Osogovo was proposed within the Representative Network of Protected Areas with a coverage of 77226 ha. The borders of the area of Osogovo initially proposed for protection¹⁴, were revised as part of the Valorisation study for establishing a protected area on Osogovo Mts¹⁶. Following the revalorization of the area, the site was protected under IUCN Category V – Protected landscape “Osogovo”, established in 2020. The railway line is projected outside of the wider project area of influence.

Hence, no negative impacts are expected during construction and operation of the railway.

¹⁶ <https://www.moepp.gov.mk/wp-content/uploads/2015/01/Studija-ZP-Osogovo-24.07.2019-Final.pdf>

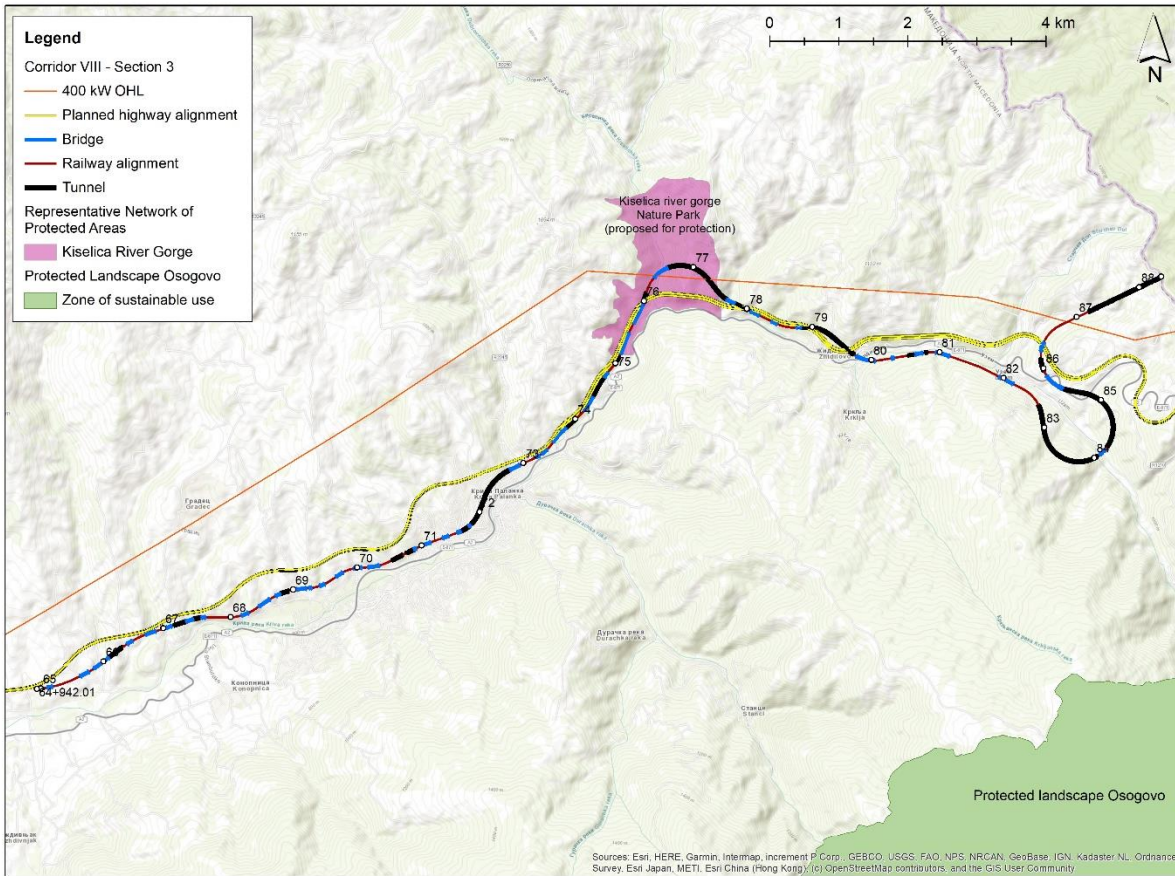


Figure 2 Protected areas and areas proposed for protection along the railway line Section 3 – Kriva Palanka (T'Iminci)-Deve Bair

3.2.3 Bio corridors

This section of the railway alignment also passes through areas identified as important corridors for large mammals in Macedonian Ecological Network¹⁷. These corridors are:

- Osogovo-Bilina Planina (Deve Bair) linear bio-corridor;
- Osogovo-German landscape bio-corridor

Bio-corridors are important as these enable various daily, periodical or seasonal movements and migrations of different animals or dispersal of plants. The most important role as bio-corridors in the area of project interest plays two south-north routes, recognized as important corridors for large mammals in Macedonian Ecological Network¹⁸

¹⁷ Brajanoska, R., Melovski, L., Hristovski, S., Sarov, A., Avukatov, V. (2011). Brown Bear Corridor Management Plan. Report under the Project: "Development of the National Ecological Network in the Republic of Macedonia (MAK-NEN). Macedonian Ecological Society, Skopje, 114 p.

¹⁸ Brajanoska, R., Melovski, L., Hristovski, S., Sarov, A., Avukatov, V. (2011). Brown Bear Corridor Management Plan. Report under the Project: "Development of the National Ecological Network in the Republic of Macedonia (MAK-NEN). Macedonian Ecological Society, Skopje, 114 p.

Identified bio-corridors in the area of project interest are Osogovo-German landscape corridor and the Osogovo-Bilina Planina (Deve Bair) linear corridor, as these secure the connection of Osogovo Mountains with the range of mountains on the border with Serbia (Kozjak, German and Bilina Planina).

Bio-corridors were assessed and established with consideration of the brown bear (*Ursus arctos*) habitat requirement - movements for searching food and migration. As noted previously, the presence of the brown bear in the area of interest has not been recorded for more than two decades.

However, these corridors are also important for the grey wolf - movements for searching prey; ungulates, particularly roe deer - movements and seasonal migration for grazing; and small mammals - periodical and seasonal movements.

Considering that the intersection of the railway line with the Osogovo-German landscape corridor affects largely anthropogenically altered and/or managed habitats, no significant impacts are expected even in the absence of mitigation. Furthermore, due to the large number of tunnels and bridges along the alignment, it is expected that the functional characteristics of the landscape won't be significantly affected in terms of migration of large animals.

Although the overall impact could be assessed as non-significant, care should still be taken to retain the functionality of the landscape corridors.

The Company and the Contractor (s) should abide to the general mitigation measures and management actions (as specified in 4.1) to minimize disturbance and avoid negative impacts, particularly during construction, but also during operation. The same mitigation measures and management actions applied to protected areas, as well as recommended monitoring activities for habitat and species apply (see Section 4.2.).

The alignment does not cross any IPA, IBA or PBA.

MAK-NEN – Macedonian Ecological Network was elaborated by Macedonian Ecological Society and European Center for Nature Conservation (Netherlands), still expected to be approved by the Ministry of Environment and Physical Planning

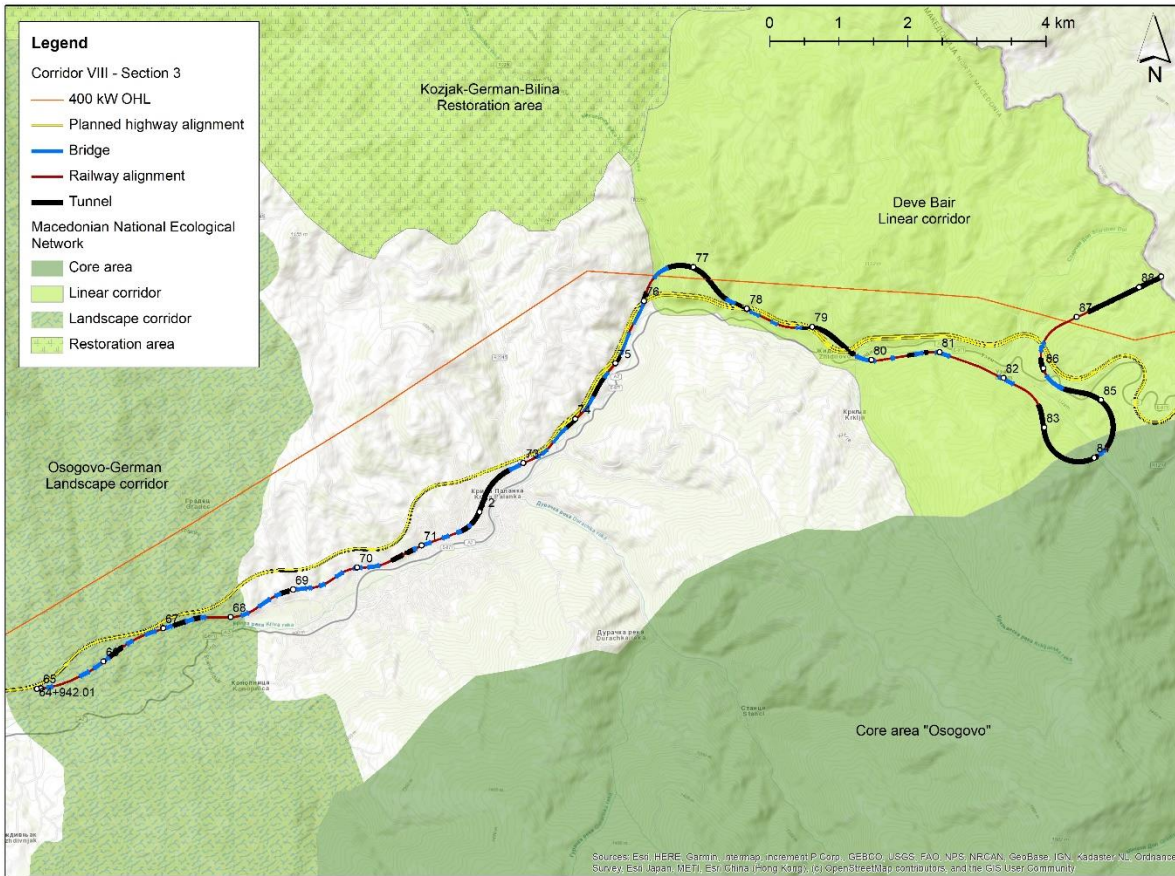


Figure 3 Bio-corridors in along the railway line Section 3 – Kriva Palanka (T'Iminci)-Deve Bair

4 Roles and responsibilities

4.1 Overview

An integrated approach to biodiversity management involves a range of stakeholders, including the Company i.e. PE ZRSMI (Public Enterprise Macedonian Railways-Infrastructure), the Contractors (and subcontractors), local authorities, regulatory agencies and the general public. Such a system therefore requires robust processes regarding information dissemination, training, and designation of responsibility, management actions, monitoring, control, and corrective actions. Generic roles and responsibilities for the Company and Contractors are detailed below (Table 1). Details on responsibilities and coordination activities between key stakeholders is provide in Table 6. A detailed RACI matrix (Responsible, Accountable, Consulted, and Informed) should be developed by the Contractor prior to work on site commencing.

Table 1 Details on responsibilities and coordination activities during construction and operation of the Project (R=Responsible, A= Approves, I= Informed, C= Consulted M= monitoring role).

Activities	PE ZRSMI (with support of PIU Consultant)	Contractor	Supervision Engineer
Construction Phase			
Initial Ecological Surveys	A	R	M
Pre Construction Surveys	A	R	M
Update BMP	A	R	M
Develop and implement Construction site management plan	A	R	M
Dissemination of information and training to workforce	A	R	M
Training of PE ZRSMI staff	R	N/A	N/A
Management and monitoring of day to day ecological impacts	I	R	M
Ecological mitigation implementation	I	R	M
Develop and implement Landscape Management Plan	A	R	M
Supervision of contractor performance	C ¹⁹	N/A	R
Corrective actions	I	R	M
Operation Phase			
Update BMP for Operation	R	N/A	N/A
Biodiversity Monitoring	R	N/A	N/A

¹⁹ As the Contracting Entity the Central Financing and Contracting Department will retain accountable for this as explained in the ESIA Addendum

Activities	PE ZRSMI (with support of PIU Consultant)	Contractor	Supervision Engineer
Maintenance of mitigations and habitat restoration	R	N/A	N/A

4.2 Project roles and responsibilities

PE ZRSMI (Public Enterprise Macedonian Railways-Infrastructure) management roles and responsibilities include but are not limited to:

- Development of procurement conditions regarding biodiversity management;
- Professional training of its representative on site;
- Surveillance and control;
- Management cooperation in case of environmental accident
- Management of pollution from its own operations
- Update and implementation of the BMP during the operations phase

A Project Implementation Unit (PIU) Consultant will assist in the fulfillment of these responsibilities. This consultant will include a biodiversity expert with responsibilities as outlined below. The Contractor will be contracted by CFCD (Central Financing and Contracting Department) and will be supervised by the Supervising Engineer. The Supervision Engineer will include a Biodiversity Supervisor with responsibilities as outlined below.

4.2.1 Biodiversity Expert

The biodiversity expert will be responsible on behalf of the PIU for:

- Training and capacity building of PE ZRSMI staff
- Providing recommendations, guidance and training as required to the Biodiversity Supervisor and Biodiversity Specialist(s) on BMP implementation and good practice requirements
- Reviewing key biodiversity related deliverables on behalf of the PIU for compliance with the Lenders standards e.g. pre-construction survey results, updated construction BMP, habitat restoration plans
- Undertaking quarterly site visits during construction to review the implementation of biodiversity related mitigations and review delivery of the BMP with regards overall compliance against Lender requirements, national legislation, etc.
- Updating the BMP prior to operation
- Developing on behalf of the PIU operational phase biodiversity monitoring plans

The Biodiversity expert will be an experienced biodiversity specialist with a track record of developing and implementing the following to meet Lenders standards: biodiversity mitigations, habitat restoration and monitoring to Lenders standards during construction and operation, including in linear projects.

4.2.2 Biodiversity Supervisor

The main role of Biodiversity Supervisor is to supervise the implementation of the mitigation measures outlined in the BMP, during the whole construction work period. Specific responsibilities of the biodiversity supervisor and the Supervision Engineer include:

- ensure biodiversity documentation compliance as well as regular coordination with the Contractor, PE ZRSMI, PIU Biodiversity Expert and responsible units within Ministry of Environment and Physical Planning and other stakeholders.
- Monitoring the Contractor's biodiversity monitoring activities during construction phase of the project.
- Ensure the Contractor undertakes pre-construction mitigation measure planning to ensure environmental measures are integrated into the planning process, including any seasonal constraints.
- Ensure pre-construction surveys by the Contractor are integrated into the Project planning and schedule and the results are used to update the schedule, BMP, method statements and other documentation as required and
- Monitoring Contractor's implementation of and compliance of the BMPs via daily field notes and photographs and including:
 - Supervision necessary for the effective implementation of all mitigation measures, and to ensure compliance with General mitigation and management actions as outlined in Section 4.1
 - Daily visits to the works, during construction, will be carried out to check compliance with MI01 to MI04, in particular whilst considering mitigation and management actions for MI05 to MI08.
 - Supervision of works underway, communications with worksite personnel, communications with the local population and stakeholder groups.
 - Monitoring of dump sites and borrow pits to ensure the effective implementation of all mitigation measures, and to ensure compliance with General mitigation and management actions as outlined in Section 4.1 during construction.
 - Collection of data, information, and evaluations that will be used to report on actual work phase impacts and residual impacts (if any) following mitigation measures
- Project environmental risk and mitigation presentations to increase staff/worker environmental awareness and promote best practices.
- Following completion of construction works, production of a final report summarizing the impact reduction measures employed, their relative strengths, success, weaknesses. This report will provide quantitative evaluations of total areas of critical and natural habitat areas lost, degraded, and protected during the construction phase period. Regular meetings will assist with rapid solutions to ecological issues, by gathering all interested parties together in one room at one time

and agreeing BMPs amendments as required.

Care should be given in areas outlined in Appendix 6.1 – Locations of sensitive habitats.

In case of need, the Biodiversity supervisor shall have the authority to contract a qualified ecologist/species specialist to support the implementation of the above responsibilities. The Biodiversity supervisor shall have experience in implementation of Lender's biodiversity requirements during construction and habitat restoration planning and implementation.

4.2.2.1 Biodiversity Specialist(s)

The Contractor shall appoint a Biodiversity Specialist to co-ordinate and ensure implementation of the BMP. The Biodiversity Specialist shall work closely in coordination with the Biodiversity Supervisor.

The overarching goal of a Biodiversity Specialist is to

- translate mitigation requirements written in BMP and other management plans into practical measures on the ground and be able to
 - ensure construction personnel are aware of seasonal constraints
 - ensure that all staff are fully aware of the environmental sensitivities of the site and their responsibilities, as outlined in the BMPs. This would be conducted via practical toolbox talks ahead of the construction.
 - Ensure completion of all pre-construction surveys and pre-clearance surveys using experienced experts in relevant biodiversity areas (e.g. amphibians; mammals etc) as required
- Document Management & Review
 - Maintain the BMP and update it after completion of pre-construction surveys and as and when required. As a minimum the BMP should be reviewed annually.
 - Draft biodiversity constraint maps indicated the location of sensitive areas, biodiversity protocols and method statements, such as tortoise rescue and relocation, including biosecurity protocols.
 - Review and approve method statements to ensure biodiversity risks have been appropriately considered and that adequate management measures are specified.
 - On-site Activity
 - Ensure pre-construction surveys are planned, integrated into the Project schedule and implemented in appropriate seasons in advance of the construction activities
 - Conduct walkthrough (rapid assessment) surveys immediately prior to works commencing in an area to identify features such as sensitive locations and species including the presence of bird nesting areas and presence of other sensitive ecological receptors such as reptiles.
 - This is required for all construction activities that pose risk to local biodiversity, such as site clearance, trenching, piling etc.
 - Supervise the site clearance works and provide advice to the workforce when required. Advise on the limits of the construction site when natural habitats may be affected to ensure compliance with General mitigation and management actions as outlined in Section 4.1 and Section 4.2: MI01 to MI04, in particular workers.

Biodiversity Management Plan

- If clearance work is taking place in multiple locations at any one time the Project Ecologist may require additional assistance, if this is the case additional field ecologists shall be provided by the Contractor in to help cover the sites fully.
- Training and Worker Awareness
 - Provide worker awareness and training sessions on the requirements of the BMP, the need for the protection of local fauna, and the code of conduct that forbids poaching or deliberate killing of animals.
 - Contribute to the production of an ecology section for the site wide induction which all new staff will have to complete prior to completing works on the site. This information should include details on the ecology of the site as well as identification charts for species found on the site.
 - Prepare and deliver biodiversity management and control measures as part of the Toolbox Talks (TBT), which should include protocols for recording of incidental sightings as well as any road casualties.
 - Organize and train personnel on animal rescue and relocation protocol.
- Checking and Reporting
 - Monitor and report on compliance against this BMP.
 - Conduct daily / weekly checks, where necessary, of the site during construction, such as working areas for cleaning operations and ensuring the requirements of the BMP are followed, and prepare daily field notes.
 - Monitor works and ensure that any species discovered are moved away from the work areas in accordance with the BMP.
 - Maintain a species database and update weekly based on site observations.
 - Undertake biodiversity monitoring, data analysis and reporting throughout construction phase of the project.
 - Submit all data and related assessments in a timely manner and ensure that findings from the field are reported back to relevant stakeholders at regular intervals (full reports to be provided at least every quarter.
 - Report any issues of non-compliance or incidents that require immediate action to the Biodiversity Supervisor

This individual may also require additional support when multiple contractors are included within the overall project work fronts. At least one Biodiversity Specialist shall be employed, however in some locations additional Biodiversity Specialists may be required, for example at times of high construction activity and works in sensitive areas, two Biodiversity specialists should be present on site at any one time to manage the workloads and to ensure effective communication.

Biodiversity Specialists should be well trained in the practical elements of protected species including handling of species that they may have to move and the recognition of sensitive habitats; they should also have a working understanding of wider environmental issues and the construction/engineering process. If these skills are difficult to obtain in the country of implementation, training exercises to 'upskill' Biodiversity Specialists shall be undertaken by the Contractor.

The Biodiversity specialists will have the following training and experience:

- Previous experience with construction projects, in particular linear projects (roads, rail,

transmission lines, pipelines...).

- Experience in ecological fieldwork in North Macedonia
- Training or experience in construction mitigation measures, stream restoration practices, and erosion and sediment control practices.

The Contractor is expected to secure external biodiversity expertise from an experienced consultant, with a track record of practical experience in implementing Lenders biodiversity standards during Project construction who can provide training on the above issues and support the specialist in updating the BMP, monitoring and reporting.

Monitoring should be focused in areas outlined in Appendix 6.1 – Locations of sensitive habitats.

4.2.3 Mammal, amphibians and reptiles monitoring specialist

Mammal monitoring specialist has a primary task to implement monitoring of mammal species, elaborate monitoring reports and design recommendations for additional or correct existing mitigation measures. In particular, Mammal monitoring specialist will implement Monitoring of animal collisions, Monitoring of Eurasian otter, Monitoring of Wolf (and eventually wild cat) and Monitoring of bats. All of these monitoring activities have a duration of at least 3, preferably 5 years. Mammal monitoring specialist prior to the start of the monitoring (after construction) will review the existing relevant documentation (ESIA, BMP, etc.) and prepare a detailed monitoring protocols for each of the monitoring activities. The Mammal monitoring specialist shall be engaged and monitored by PE ZRSMI.

The mammal monitoring specialist shall also be responsible for collection of data, information, and evaluations that will be used to report on actual impacts during construction (if any) and residual impacts (if any) following mitigation measures. The specialist shall also be responsible for contributing towards the production of a final report summarizing the impact reduction measures employed, their relative strengths, success, weaknesses. This report will provide quantitative evaluations of total areas of critical and natural habitat areas lost, degraded, and protected during the construction phase period.

Monitoring should be focused in areas noted for the presence of sensitive habitats and species as outlined in Appendix 6.1 – Locations of focus monitoring sites.

4.3 Contractor roles and responsibilities

Contractors will be responsible for the implementation of the BMP during the detailed design, pre-construction and construction phase as detailed within and for monitoring its implementation.

Overall responsibility for implementing this BMP will be the accountability of the Contractor Project Manager and site construction manager. The Contractor will provide sufficient resources responsible for implementing the BMP including a Biodiversity Specialist, with on-going access to support of a biodiversity consultant and in addition short-term contracts will be signed between contractors and external specialists e.g. with specific expertise in a particular area of biodiversity to ensure the work is completed in accordance with this BMP.

4.4 Training

Workers will be trained by the Contractor prior to construction work and during construction to increase their awareness and responsibility for the value of the surrounding natural environment, including vegetation. Training material/program will be prepared in consultation with the PIU Biodiversity Expert.

The Company shall develop an internal biodiversity training protocol to train and enable internal staff members to provide support to the contractors. During operations, the Company will train relevant personnel on their responsibilities under the BMP.

5 Biodiversity Management Plan

The BMP is a "live" document, to be adapted and enhanced as the Project progresses. In the event that impacts not anticipated by the ESIA arise during the Project, and require mitigation, then they will be added to the BMP. Mitigation should always be devised in line with the mitigation hierarchy with avoidance as key, followed by reduce/minimise, restore, offset.

It should be noted that a fundamental assumption of the BMP is that during construction suitably qualified and trained staff (under the supervisor and management of the Biodiversity Supervisor) will be present on site, who will be engaged in checking and verifying that the various mitigation measures are being implemented correctly.

5.1 General mitigation measures and management actions

Table 2 General mitigation measures and management actions; Co- Company; Cr-Contractor

Focus	Specifics	Location	Requirement (Collecting mode/treatment/evacuation/final disposal)	Pre-construction	Construction	Operation	Responsibility	Verification process
Biodiversity - General	Interaction with other plans	All	This BMP will be applied in conjunction with all other relevant management plans, including, but not necessarily limited to those outlined in Section 1.4 of this BMP.	x	x	x	Cr – implement during construction Co-implement in construction and operation	Internal audit Program and record
Biodiversity - General	Use of Biodiversity Specialists	All	The Project will seek to minimize impacts on notable species and loss, fragmentation, alteration, disturbance and disruption of habitats assessed as PBF and those sensitive habitats that are conservationally important. A principal management tool in this will be the use of Biodiversity Specialists. A minimum of one Biodiversity Specialist will be employed by the Contractor in the phase of construction that will work in close coordination with the Biodiversity Supervisor. The Biodiversity specialist will be appropriately skilled for undertaking site supervision and species relocations where required.	x	x	x	Cr – implement during construction Co-implement in operation	Monitoring report, Maps

Biodiversity Management Plan

Focus	Specifics	Location	Requirement (Collecting mode/treatment/evacuation/final disposal)	Pre-construction	Construction	Operation	Responsibility	Verification process
Biodiversity - General	Mitigation for sensitive habitats and species.	Sensitive Habitats Important species	Where any such habitats or species is present impacts will be mitigated through compensation, as outlined in the specific management actions (below). For example, by scheduling works to a less sensitive time of year, or the use of appropriate species translocation to nearby suitable habitats. A robust monitoring programme will also be put in place.	x	x		Cr - implement	Monitoring report. maps
Biodiversity – General	Pre-construction checks	Sensitive Habitats	Pre-construction the Biodiversity Specialists, overseen and managed by the Biodiversity Supervisor, will perform a full inventory of the PBF/CH habitats that will be subject to removal (permanent loss) based on final design and identify sites subject to NNL/NG management actions. Additional mitigation will then be put in place to avoid impacts on adjacent habitat patches. The Biodiversity Specialists will then prepare a a full inventory report outlining sites and areas of PBF/CH habitats under permanent loss. The inventory will provide a baseline to plan and manage construction and post-construction habitat reinstatement as part of the Landscape Management Plan prepared and implemented by the contractor, approved by the Supervision Authority/PIU including Biodiversity Specialists.	x			Cr - implement	Inventory report, Maps
Biodiversity – General	Pre-construction checks	Important species	Before commencement of vegetation stripping the Biodiversity Specialists, overseen and managed by the Biodiversity Supervisor, will conduct pre-construction checks, to identify if any species of conservation concern are present on site. Additional mitigation will then be put in place to avoid impacts on such species. Checks will include for example: hollow trees and other places of shelter, including tunnels, in which bats may be found. The Biodiversity Specialists will then prepare a monthly report showing sensitive locations. This will be shared with workers in an appropriate manner (e.g. Toolbox talks) so that sensitive areas can be avoided and mitigation implemented.	x			Cr - implement	Monitoring report, Maps

Biodiversity Management Plan

Focus	Specifics	Location	Requirement (Collecting mode/treatment/evacuation/final disposal)	Pre-construction	Construction	Operation	Responsibility	Verification process
Biodiversity – General	Training	All	<p>The company will train internal staff or engage consultant support to provide suitable advice to contractors with input from biodiversity specialists where required.</p> <p>The Contractor will make their workers will be made aware of the ecological sensitivities of areas outlined to be of conservational importance and will be trained in mitigation for unforeseen events through the use of tool box talks. Health and safety recommendations regarding dangerous animals will also be provided. Emergency numbers will be provided to contact the Biodiversity Supervisor should protected species be found on site in the absence of site supervision.</p>	x	x		Co - implement Cr - implement	Field verification , monitoring reports, record
Biodiversity - General	Road signs	Roads	During construction, where potential for vehicle/wildlife collision exists, a speed limit of 20 km/h should be enforced for access roads that are not public. Along public access roads appropriate signage should be installed.		x		Cr - implement	Field verification
Biodiversity - General	Biodiversity Specialist	Forests, riparian habitats	Where works in forests, riparian habitats or in water are unavoidable, the Biodiversity Specialist will be present on site during clearance to identify sensitive habitats and species present on site, in particular nests with eggs/chicks, dens, burrows, hibernacula and other places of shelter to prevent direct mortality; ensure protection of sites with active otter holts.	x	x		Cr - implement	Field verification , monitoring reports, record
Biodiversity - General	Escape ramps	All	<p>Pits and excavations will be filled in as soon as possible following works. Any that need to remain open over night will have appropriate ramps to allow fauna to escape should they fall in. The Biodiversity Specialist will conduct morning checks for fauna in and adjacent to excavations left open overnight.</p> <p>Landfills and pits should not be planned and in use where representative patches of riparian woodlands and belts are found.</p>		x		Cr - implement	Field verification , monitoring reports, record

Biodiversity Management Plan

Focus	Specifics	Location	Requirement (Collecting mode/treatment/evacuation/final disposal)	Pre-construction	Construction	Operation	Responsibility	Verification process
Biodiversity - General	Nesting birds	All	Damage to active bird nests will be avoided and should tree and scrub clearance take place in the period from March to August then a pre- clearance nesting bird check of the vegetation to be cleared, will be undertaken by the Biodiversity Specialists and a decision on whether to move the nest or defer the clearance will be made by the Biodiversity Supervisor.	x	x		Cr - implement	Field verification, monitoring reports, photo record
Biodiversity - General	Translocation	All	In the unlikely event that a species is found within the project footprint, it will be moved to a near-by place of safety. Location will vary depending on the species but should be set within a safe environment in a close proximity to the area of occurrence, in a habitat that is appropriate for the species and has the capacity to support the species. Translocation will be carried out in presence of Biodiversity Specialist in close coordination with the Biodiversity Supervisor and in accordance with a species-specific Translocation Protocol developed by the Biodiversity Specialist	x	x		Cr - implement	Field verification, monitoring reports, photo record
Biodiversity - General	Tree conservation	All	Wherever possible the felling of significant/mature trees will be avoided and connectivity between areas of forest habitats will be maintained. No trees over 1m in diameter will be felled without a pre-felling check for nests, bat roosts by a Biodiversity Specialist. In the unlikely event that a species is found within the project footprint, it will be moved to a near-by place of safety. Location will vary depending on the species but should be set within a safe environment in a close proximity to the area of occurrence, in a habitat that is appropriate for the species and has the capacity to support the species. Translocation will be carried out in presence of Biodiversity Specialist in close coordination with the Biodiversity Supervisor and in accordance with a species-specific Translocation Protocol developed by the Biodiversity Specialist		x		Cr - implement	Field verification, monitoring reports, photo record

Biodiversity Management Plan

Focus	Specifics	Location	Requirement (Collecting mode/treatment/evacuation/final disposal)	Pre-construction	Construction	Operation	Responsibility	Verification process
Biodiversity - General	Laydown areas	All	Laydown areas and compounds will be sited to avoid unnecessary clearance of vegetation, particularly when working in close proximity or within mesophilous oak and beech forests and riparian woodlands.		x		Cr - implement	Field verification, monitoring reports, photo to record
Biodiversity - General	Barriers and crossing points	All	Regular wildlife crossing points will be installed to enable wildlife to cross excavations, berms and drainage channels. Fencing during construction will be minimized, except where necessary to prevent intrusions of animals and possible fatalities of animals on the railway. For areas vital for wildlife temporary barriers will be used to prevent wildlife from accessing waste disposal areas. Temporary fencing should preferably include curvy mesh fence & palisade with fork entry points for easy site lifting and movement allowing for fast installation and adjustments.		x		Cr - implement	Field verification, monitoring reports, photo to record
Biodiversity - General	Monitoring and management regimes	All	<p>Habitat reinstatement will be carried out by the Contractor in accordance with the Landscape Management Plan. Restored and revegetated areas will be monitored and if required, mowing regimes used to control growth of invasive species.</p> <p>The success of ecological restoration measures (where appointed) will be monitored by the Company's PIU for a period of minimum 36 months so that they can validate the effectiveness of the solutions adopted, but with a review on year five.</p>		x	x	Cr – implement and maintain during construction Co – monitor and maintain post construction	Field verification, monitoring reports, photo to record

Biodiversity Management Plan

Focus	Specifics	Location	Requirement (Collecting mode/treatment/evacuation/final disposal)	Pre-construction	Construction	Operation	Responsibility	Verification process
Biodiversity - General	Mitigation for sensitive habitats and species.	All	Careful management of networks of ditches and bolders so as to provide alternative habitats for species, particularly amphibians and reptiles;		x	x	Cr - implement	Field verification, monitoring reports, photo record
Biodiversity - General	Mitigation for sensitive habitats and species.	Entire Project	Maintain vegetated buffers wherever possible along known wildlife travel corridors (i.e., watercourses).		x	x	Cr – implement in construction Co-implement in operation	Field verification, monitoring reports, photo record
Biodiversity - General	Lighting	All	The site will not be lit except in exceptional circumstances. Where lighting is required it will be directional (pointing away from forest habitats) and the lighting strategy will be designed with the input of a Biodiversity Specialist. This way, the potential impact on the species of bats is reduced. Also, strong lighting sources shall be avoided, since they may disturb migration of certain species.		x		Cr - implement	Field verification, monitoring reports, photo record
Biodiversity - General	Dead wood, boulders	forested areas	At least 20 temporary hosting structures made of naturally occurring materials (branches, logs, barks, rocks and mud) will be installed during longterm construction works in close proximity of riparian woodlands, grasslands, meadows and forests to ensure no net loss for insects, amphibian and reptiles species which utilize these features. To minimise effects on long horn beetle and other insects inhabiting tree logs and barks, a minimum of 23 logs of cut wood will be left along the railway line (one per kilometer of alignment);		x		Cr - implement	Field verification, monitoring reports, photo record

Biodiversity Management Plan

Focus	Specifics	Location	Requirement (Collecting mode/treatment/evacuation/final disposal)	Pre-construction	Construction	Operation	Responsibility	Verification process
			where feasible, even more frequently particularly during ongoing construction works in close proximity or inside forests)					
Biodiversity - General	Replanting	Forests and woodlands	During the ecological restoration phase, a series of measures will be taken in order to mitigate the impact of permanent habitat loss and fragmentation by replanting to achieve no net loss/net gain for habitats assessed as PBF (8.6 ha minimum)/CH (1.5 ha minimum) (see Table 3).		x	x	Cr implement and maintain during construction Co monitor and maintain post construction	Field verification, monitoring reports, photo to record
Biodiversity - General	Replanting	Forest vegetation	During the restoration phase, a series of measures will be taken in order to mitigate the impact of fragmentation by replanting the forest plantations with accacia (<i>Robinia pseudoaccacia</i>) and pine (<i>Pinus nigra</i>) accordingly so that disruption to species habitience is mitigated. Replanting with seedlings of local species of oak (<i>Quercus pubescens</i> , <i>Quercus frainetto</i>) can also be considered, although the rate of success is expected to be lower and the time for revegetating will be longer, since the Accacia and pine plantations are well established and more appropriate to the narrow slopes/		x		Cr - - implement Co-maintain during operation	Field verification, monitoring reports, photo to record

Biodiversity Management Plan

Focus	Specifics	Location	Requirement (Collecting mode/treatment/evacuation/final disposal)	Pre-construction	Construction	Operation	Responsibility	Verification process
			erosive soil)					
Biodiversity - General	Mitigation for sensitive habitats and species.	Access Roads	Existing roads should be used as a priority. Construction of new access roads should be avoided unless necessary. Any new access roads proposed by the Contractor whether temporary or permanent shall be subject to E&S assessment, including biodiversity.		x		Cr - implement	
Biodiversity - General	Vehicles	Sensitive Habitats and species	Use of low-impact vehicles (in terms of emissions and load bearing) where applicable. Consider the use of biofuels, or electric vehicles.		x		Cr	Field verification, monitoring reports
Invasive species	Removal	All	A site wide ban on workers bringing vegetation or soil from outside the site area to prevent dispersion of non-native invasive species. All vehicles and equipment will be washed down before entering the sensitive sites (see specific mitigation with regards to tree of heaven (<i>Ailanthus altissima</i>) and False indigo bush (<i>Amorpha fruticosa</i>). The method of control / to eliminate invasive species can also be decided by the Biodiversity Specialists involved, according to best practices. However, physical methods i.e. manual and mechanical ground clearance and mowing are recommended over chemical methods that although applied in line with application procedures and related regulations might affect soil chemistry and harm the surrounding natural vegetation.		x	x	Cr – implement during construction Co-implement during operation	Field verification, monitoring reports

Biodiversity Management Plan

Focus	Specifics	Location	Requirement (Collecting mode/treatment/evacuation/final disposal)	Pre-construction	Construction	Operation	Responsibility	Verification process
Water bodies	Waste and vehicle management	All	Take necessary actions to prevent leakage of oils to avoid contamination of water and adverse impacts to aquatic species (installation of drainage structures and oil separators). Avoid movement of heavy machinery in watercourses wherever possible to prevent adverse impacts on aquatic species.		x		Cr - implement	Field verification, monitoring

5.2 Specific mitigation measures and management actions for sensitive habitats and notable species

Construction and post-construction habitat reinstatement will be carried in accordance with the Landscape Management Plan (LMP) prepared and implemented by the Contractor, approved by the Supervising Engineer/PIU including Biodiversity Specialists. LMP will integrate an Offset Planting Plan based on the findings of the SBA and outlined in the BMP, chapters 5.2 and 5.3. Post-construction monitoring of implemented management actions will be performed by the PE PERI's Project Implementation Unit (PIU) with initial support from the Biodiversity expert from the PIU consultant.

Table 3 Specific mitigation measures and management actions for sensitive habitats

ID	Habitat type and location	Impact	Mitigation/management action	Frequency of action	Responsibility
<p>MI01</p>	<p>G1.691 Southwestern Moesian Beech Forests</p> <p>HD ref.: 91W0 Moesian Beech Forests</p> <p>Assessed as PBF</p> <p>Found in: -the are of Uzem-village Kostur from km 81 to 82+685</p>	<p>Habitat loss/degradation resulting from clearing and permanent removal of the vegetation in the process of construction of the railway line, as well as clearing vegetation to secure access to locations.</p> <p>Railway construction will affect the edge of the beech forest near the village of Kostur. The remaining portion of this habitat will not be affected as the railway enters into a tunnel at km 82+865. However, possible impacts on these habitats will be mitigated and no net loss will apply</p>	<p>Felling of large trees will be should be undertaken in the presence of a Biodiversity Supervisor in close coordination with the Biodiversity Specialist to ensure to species of to ensure that no harm is done to any nests, bat roosts.</p> <p>In sensitive areas (Figure 4 and Figure 5) and species specific, minimise noise during excavation and construction works (i.e. demolition, earth moving or vehicle disturbance) from October to June. Where this is not possible, use auger drilling rigs rather than percussion rigs (reduces vibrations); and when working in sensitive areas, the presence of Biodiversity Supervisor/Specialist is obligatory.</p> <p>During the design of the construction works, the use of existing access roads and other existing works related facilities will always be preferred.</p> <p>Contracts with contractors should include monetary sanctions to be applied in case their vehicles or staff penetrate forests more than necessary to carry construction work</p> <p>Dead-wood should be retained on site. See mitigation for invertebrates.</p> <p>These are natural beech forests; hence although replanting with seedlings is feasible, replanting will take areas of natural grasslands and hence, it is not recommended.</p> <p>Instead, due to biodiversity disturbance, induced habitat loss and the length of time for natural regrowth and regeneration of the forest biodiversity offset is proposed.</p>	<p>Construction</p>	<p>Cr to implement in consultation with PE "National forests", conservational NGO</p> <p>Co – to monitor and maintain during operation</p>

Biodiversity Management Plan

ID	Habitat type and location	Impact	Mitigation/management action	Frequency of action	Responsibility
			<p>As 2.5 ha of beech forests will be permanently loss, and with further consideration of the importance of this habitat for supporting species of importance for conservation, the area loss will have to be compensated by an area of 4.4 ha. Biodiversity offsets will take the form of upgrade and restore beech forest degraded by impacts unrelated to the project. In the area of Ljuti Rid and Straovica, apply active management to beech forests to improve integrity and forest quality. In cooperation with PE "National Forests".</p> <p>Continuous monitoring from biodiversity supervisor/biodiversity specialist assigned as part of Company PIU during first year of finishing construction activities and once a year for the consecutive 5 years of operation of the railway.</p>		
<p>MI02</p>	<p>G1.11 Riverine [<i>Salix</i>] woodland; G1.112 Mediterranean tall [<i>Salix</i>] galleries (G1.1121 Mediterranean white willow galleries) HD ref: 92A0* <i>Salix alba</i> and <i>Populus alba</i> galleries</p> <p>Assessed as CH</p> <p>Locations for replanting: Drenje from km 74+160 to 74+290 and Zhidilovo 79+820 to 79+900 Allow recolonization and avoid excess impact on Zhidilovo from 81+170 to 81+770 and take precation at village Kostur from 84+082 to 84+235</p> <p>Same impacts and mitigation measures should apply to riparian belts which have linear interspaced distribution along Kriva Reka river:</p>	<p>Considering their limited coverage in the area of interest, riverine and riparian woodlands are considered as sensitive habitats.</p> <p>Most of these habitats will be bridged, however, habitat loss/degradation resulting from clearing and permanent removal of the vegetation in the process of construction of the railway line, as well as clearing vegetation to secure access to locations during the construction of the bridges</p> <p>Possible impacts on these habitats are assessed as not-significant taking into account the degradation from construction activities in the process of implementation of other infrastructural projects in the area, however care should be taken to avoid any additional negative impacts during construction of the railway line.</p>	<p>The method of crossing has been determined by considering the width of the river, the composition of the riverbed and the volume and the flow of the river.</p> <p>Crossings will either be directionally drilled avoiding the need to dig up the riverbed or open cut (wet or dry depending on the status of the watercourse).</p> <p>Silt fences will be used in areas of wet open cut, strategically positioned to prevent sedimentation downstream.</p> <p>Banks would be restored using either gabion cages or wooden revetments to ensure soil/integrity before vegetation matures to provide soil stability.</p> <p>Randomly disposed waste (concrete, iron, rocks and stones etc.) should be removed immediately from the aforementioned habitats on a daily base</p> <p>There would be re-planting of native <i>Salix</i> species (<i>Salix alba</i>, <i>Salix purpurea</i> and <i>Salix triandra</i>) and Poplar (<i>Populus alba</i>) in as appropriate. Bearing in mind that the project implementation is estimated to affect a total area of 0.2 ha replanting should be applied on an area of at least 0.4 h. Presuming that the revitalization of riparian forests is not affected by other disturbances (natural disasters, trampled by humans, cattle etc.) the success of revegetation is expected to be high. The AOI is characterised by continental climate and riparian zones are characterised by high underground water; hence re-vegetated areas should be allowed to re-establish naturally i.e. no irrigation is necessary. On other sites, vegetation would be allowed to colonise naturally.</p> <p>Replanting with native <i>Salix</i> species (<i>Salix alba</i>, <i>Salix purpurea</i> and <i>Salix triandra</i>) and Poplar (<i>Populus alba</i>) in as appropriate should take</p>	<p>Construction and post-construction</p>	<p>Cr to implement in cooperation with PE "National forests" and/or a conservational NGO Co – to monitor and maintain during operation</p>

Biodiversity Management Plan

ID	Habitat type and location	Impact	Mitigation/management action	Frequency of action	Responsibility
	<p>F9.12 Lowland and collinear riverine [Salix] scrub - F9.123 Balkan riverine willow scrub; F9.3133 East Mediterranean tamarisk thickets:</p> <p>HD ref: 3230 Alpine rivers and their ligneous vegetation with <i>Myricaria germanica</i> and 3240 Alpine rivers and their ligneous vegetation with <i>Salix elaeagnos</i></p> <p>Assessed as PBF</p> <p>Riparian willow and poplar belts: at km 74+200; from km74+800 to km 75+000; at km 75+760; at km 76+500;</p>		<p>at points of bridge construction in an area adequate to achieve net gain. In collaboration with environmental NGO, PE "National Forests".</p> <p>Monitoring from biodiversity expert and species experts engaged to support Company PIU during first year of finishing construction activities. Experts to be engaged directly by PE ZRSMI thereafter to conduct monitoring and once a year for the consecutive 5 years of operation of the railway.</p>		
<p>MI03</p>	<p>C3.62: Unvegetated river gravel banks; C3.61: Unvegetated river sand banks</p> <p>HD ref: 3270 Rivers with muddy banks with <i>Chenopodium rubri</i> p.p. and <i>Bidention</i> p.p. vegetation</p> <p>Assessed as PBF</p> <p>Location from km 74 + 750 to km 75 + 000 and km 76 + 500</p>	<p>Most significant negative impacts on this habitat types is expected during the construction of bridges. However, this habitat type, in the area of interest, is already severely degraded and not-representative. Possible added impacts on these habitats were assessed as not-significant and reversible.</p>	<p>Randomly disposed waste (concrete, iron, rocks and stones etc.) should be removed immediately from the aforementioned habitats on a daily base</p> <p>Avoid disposal of excavated material by the riverbeds,</p> <p>Do not use the gravel and sand from the riverbed and the alluvial plain,</p> <p>During construction, regular supervision from the Biodiversity Supervisor in close cooperation with the Biodiversity Specialist is recommended.</p> <p>Effects on streams are assessed as temporary. Accounting for the disturbance due to ongoing construction activities of other infrastructural projects implemented in the area of interest, the Company should aim to restore banks of affected streams to compensate impacts. Restoration should include removing any hydromorphological alterations made to the banks, to equate the affected area in order to achieve no net loss.</p> <p>Actions proposed for achieving net gain for the G1.11: Riverine [Salix] woodland incl. riparian [<i>Salix</i>] scrub apply as revegetating banks</p>	<p>Construction</p>	<p>Cr to implement in during construction Co – to monitor and maintain during operation</p>

Biodiversity Management Plan

ID	Habitat type and location	Impact	Mitigation/management action	Frequency of action	Responsibility
			<p>subjected to disturbance would largely contribute to restoring the ecological integrity of the streams in the area of interest.</p> <p>Monitoring from biodiversity expert and species experts engaged to support Company PIU during first year of finishing construction activities. Experts to be engaged directly by PE ZRSMI thereafter to conduct monitoring and once a year for the consecutive 5 years of operation of the railway.</p>		
MI04	<p>C2.31 Epipotamal streams</p> <p>C2.22 Hiporhithral streams</p> <p>HD ref: 3260 Water courses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitricho-Batrachion</i> vegetation</p> <p>C2.5 Temporary running waters</p> <p>HD ref.: 3290 Intermittently flowing Mediterranean rivers of the <i>Paspalo-Agrostidion</i></p> <p>Assessed as PBF</p> <p>km 74 + 250; km 74 + 870; km 75 + 770; km 76 + 500; km 79 + 850; km 81 + 060 to km 81 + 170; km 81 + 760 to km 82 + 170; km 84 + 100.</p>	<p>Construction of the railway can cause a double negative effect on rivers and streams as a result of partial destruction of habitats (due to similar reasons as in coastal vegetation and gravel banks) and pollution caused by incidental spillage of pollutants (for example, lubricating oils and Fuel from construction mechanization, eroded soil, etc.).</p>	<p>Avoid the disturbance of natural habitats as well as the input of pollution substances</p> <p>The material resulting from the construction of haulage roads, bridges and tunnels (rocks, pebbles, cobbles, soil, plants) should not be thrown into rivers</p> <p>The haulage roads should not be traced along the riverbed and sufficient areas with riparian vegetation should be left in order to prevent the direct input of dust, sand and other materials during the use of the haulage roads</p> <p>To prevent any kind of storage of construction materials near the rivers, the waste materials from construction activities should be properly disposed and removed from the rivers or their vicinity</p> <p>Barrels or tanks where hazardous materials are being stored (oil, fuel, dyes) must be placed on appropriate and marked sites which are distanced from rivers. All tanks will be located within a double bunded area, so that any leaks would be contained. These materials should be handled carefully to avoid leaks of hazardous materials into rivers,</p> <p>Handling of wet cement must be done in a careful and controlled manner to avoid contamination with the river ecosystems. During the construction of bridge piers, the leak of cement into rivers should be prevented</p> <p>Avoid disposal of excavated material by the riverbeds</p> <p>Do not use the gravel and sand from the riverbed and the alluvial plain</p>	<p>Construction and operation</p>	<p>Cr to implement in during construction Co – to monitor and maintain during operation</p>

Biodiversity Management Plan

ID	Habitat type and location	Impact	Mitigation/management action	Frequency of action	Responsibility
			<p>During construction, regular supervision from the Biodiversity Supervisor in close cooperation with the Biodiversity Specialist is recommended.</p> <p>Effects on streams are assessed as temporary. Accounting for the disturbance due to ongoing construction activities of other infrastructural projects implemented in the area of interest, the Company should aim to restore banks of affected streams to compensate impacts. Restoration should include removing any hydromorphological alterations made to the banks, to equate the affected area in order to achieve no net loss.</p> <p>Actions proposed for achieving net gain for the G1.11: Riverine [<i>Salix</i>] woodland incl. riparian [<i>Salix</i>] scrub apply as revegetating banks subjected to disturbance would largely contribute to restoring the ecological integrity of the streams in the area of interest.</p> <p>Monitoring from biodiversity expert and species experts engaged to support Company PIU during first year of finishing construction activities. Experts to be engaged directly by PE ZRSMI thereafter to conduct monitoring and once a year for the consecutive 5 years of operation of the railway.</p>		
<p>MI05</p>	<p>G1.76 Balkano-Anatolian thermophilous [<i>Quercus</i>] forests - G1.762 Helleno-Moesian [<i>Quercus frainetto</i>] forests</p> <p>HD ref.: 9280 <i>Quercus frainetto</i> woods</p> <p>Assessed as PBF</p> <p>Representative patches area found in: -the gorge of Kiselichka Reka river from km 76+040 to 76+450</p> <p>Also G1.7641: Helleno-Moesian <i>Quercus petraea</i> forests;</p>	<p>Habitat loss/degradation resulting from clearing and permanent removal of the vegetation in the process of construction of the railway line, as well as clearing vegetation to secure access to locations.</p> <p>Although, taking into consideration already existing access roads and the habitat degradation in place occurring due to the construction of other infrastructural projects in implementation in some areas habitat loss might be even less significant. The habitat losses will largely be of secondary degraded forests and/or edge habitat, therefore the loss of forest habitats is considered non-significant.</p> <p>Nonetheless, mitigation for habitat loss should be impended.</p>	<p>Vegetation removal i.e. felling of trees will only be permitted if a nesting bird check or bat roosting check has been undertaken by the Biodiversity Specialist, and found to be free of nests and roosts.</p> <p>Minimise noisy work (i.e. demolition, mining or vehicle disturbance) from October to June</p> <p>In the design of the construction works, existing access roads and other works related facilities will always be preferred.</p> <p>Contracts with contractors will include monetary sanctions to be applied in case their vehicles or staff penetrate forests more than necessary to carry construction work</p> <p>Dead wood should be retained on site.</p> <p>Although replanting with seedlings is feasible, replanting will take areas of natural grasslands and hence, it is not recommended. With added consideration to success rates and length of time for regrowth of planted seedlings, a biodiversity offset is advised to compensate the induced habitat loss. Biodiversity offset will take form of active forest management of coppice forests to improve forest</p>	<p>Construction and operation</p>	<p>Cr to implement in during construction in co-operation with PE "National forests", conservational NGO</p> <p>Co – to monitor and maintain during operation</p>

Biodiversity Management Plan

ID	Habitat type and location	Impact	Mitigation/management action	Frequency of action	Responsibility
	<p>G1.761: Helleno-Moesian <i>Quercus cerris</i> forests</p> <p>HD ref.: 91M0 Pannonian-Balkan turkey oak-sessile oak forest</p> <p>Assessed as PBF</p> <p>Uzem, from 86+246 to 87+210</p>		<p>integrity and restore oak forests degraded by impacts unrelated to the project. Planting with seeds and seedlings harvested locally from the same forests is recommended in areas of project related forest cut, where feasible. There should be no habitat conversion due to restoration.</p> <p>Active management should take place in an area occupied by G5.61: Deciduous scrub woodland; for G1.76 in the area of Momica (Kiselcihka Reka gorge) in an area of 1.3 ha and for the G1.7641/G1.761 in the area between Vitanovci and Janchevci (km 85 to 86) where the railway line goes through a tunnel in an area of 4.3 ha.</p> <p>Considering that active management of degraded coppice oak forests in the area is proposed to offset the loss, restoration area is increased by 30% (indicated in brackets): 1.3 (1.7) ha of <i>Quercus frainetto</i> forests i.e. 4.3 (5.6) ha of <i>Quercus cerris</i> forests. This accounts for losses and increased the feasibility of achieving no net loss/net gain. The AOI is characterised by continental climate; hence re-vegetated areas should be allowed to re-establish naturally i.e. no irrigation is necessary.</p> <p>In cooperation with PE "National Forests".</p> <p>Monitoring from biodiversity expert and species experts engaged to support Company PIU during first year of finishing construction activities. Experts to be engaged directly by PE ZRSMI thereafter to conduct monitoring and once a year for the consecutive 5 years of operation of the railway.</p>		
MI06	<p>E2.238 Southwestern Moesian submontane hay meadows</p> <p>HD ref: 6510 Lowland hay meadows (<i>Alopecurus pratensis</i>, <i>Sanguisorba officinalis</i>)</p> <p>Assessed as CH</p> <p>Care should be taken at km 82 to 82+678 and</p>	<p>Meadows are managed and/or semi intensively managed, whereas a minor part of them are extensively managed or have been abandoned a number of years before. Most representative meadows are found near village Kostur where the railway will pass through a tunnel. Hence, impacts are assessed as non-significant.</p> <p>However, this habitat type is noted as important for supporting the populations of conservationally important insects (primarily butterflies) and where possible, care should be taken to avoid or minimize impact</p>	<p>Disposed waste (concrete, iron, rocks and stones etc.) should be removed immediately from the aforementioned habitats on a daily base</p> <p>Avoid disposal of excavated material in the meadows</p> <p>Subsidise traditional management and mowing activities on an area of 0.5 ha of abandoned meadows in the area of Uzem/v. Kostur to achieve net gain. To account for the possible low to medium success rate in replanting oak forests from seedlings it is advised to double the recommended area for restoration to achieve no net loss/net gain. In coordination with Municipality of Kriva Palanka and the Ministry of agriculture, forestry and waters (MAFWE)</p>	Construction and operation	Cr to implement in during construction in co-operation with, Municipality of Kriva Palanka; MAFWE Co – to monitor and maintain during operation

Biodiversity Management Plan

ID	Habitat type and location	Impact	Mitigation/management action	Frequency of action	Responsibility
	km 84+060 to 84+260 at village Kostur	Impacts will result from construction works, site clearing, increased noise level and the presence of workers			
MI07	<p>E1.33 East Mediterranean xeric grassland (E1.332 Heleno-Balkan shrot grass and therophyte communities); E1.A22 Helleno-Balkan supra Mediterranean siliceous grasslands</p> <p>HD ref: 6220* Pseudo-steppe with grasses and annuals of the Thero-Brachypodietea</p> <p>Assessed as CH</p>	<p>Impact include habitat loss and disturbance from construction work i.e. Performance of construction activities, presence of workers, increased level of noise and emissions in the air / Harvesting of fauna and covering of vegetation with dust</p> <p>Possible impacts on these habitats are assessed as non-significant and reversible. However, mitigation measures that will further reduce the impacts on this habitat are proposed</p>	<p>In the design of the construction works, existing access roads and other works related facilities will always be preferred.</p> <p>Contracts with contractors will include monetary sanctions to be applied in case their vehicles or staff penetrate grasslands more than necessary to carry construction work</p> <p>Performance of construction activities in areas with steep slopes or where cuts and fills with high angle are envisaged will be monitored by Biodiversity specialist</p> <p>Avoid sharp incisions in the foothills of slopes and blasting on a larger scape</p> <p>Slope netting using a wire mesh or similar measures should be applied to assure stabilization of steep slopes in sediments and shales before vegetation matures to provide soil stability.</p> <p>Actions proposed to achieve net gain of grasslands on an area of 1.6 ha shall focus on improving the representativeness of grasslands under succession on an area of 2.6 ha. In coordination with PE "Pastures" remove shrubs in the area of Prisojarci km 69 to km 70.</p> <p>Continuous monitoring from biodiversity supervisor/biodiversity specialist assigned as part of Company PIU during first year of finishing construction activities and once a year for the consecutive 5 years of operation of the railway.</p>	Pre-construction where appropriate and construction	Cr - to implement during construction Co – to monitor and maintain during operation

Other specific mitigation measures and management actions for habitats include:

Following a review of the locations for proposed borrow pits²⁰ and landfills²¹ abandon any landfill and/or borrow pit site that intersects with habitats assessed as PBF/CH.

²⁰ Review of borrow pits along the project corridor. Info provided in Report on Materials, Borrow Pits and Landfills Version B, 30th October 2017 EuropeAid/136050/IH/SER/MK

²¹ Review of landfills in need of review along the project corridor (from 35 in total). Info provided in Report on Materials, Borrow Pits and Landfills Version B, 30th October 2017 EuropeAid/136050/IH/SER/MK

Biodiversity Management Plan

Hence, alternative borrow pit site should be provided for the one assigned to exploit alluvial and sediments between T-19 and T-20, that is located in the immediate vicinity of C3.62: Unvegetated river gravel banks; C3.61: Unvegetated river sand banks and F9.12 Lowland and collinear riverine [*Salix*] scrub (22°26'13.08"E; 42°12'49.91"N) in the area of Uzem. Alternatively, materials should be procured from outside of the area of interest.

Alternative disposal sites should be provided for the ones affecting habitats assessed as PBF/CH. These are:

- Disposal site No 18 (22°21'1.64"E; 42°13'0.90"N) affecting G1.11: Riverine [*Salix*] woodland and C2.22: Hiporhithral streams
- Disposal site No 26 (22°24'2.40"E; 42°13'26.68"N) affecting representative C2.22: Hiporhithral streams; E2.2: Low and medium altitude hay meadows and mesophillous oak forests
- Disposal site No 28 (22°25'4.19"E; 42°13'24.67"N) affecting G1.11: Riverine [*Salix*] woodland
- Disposal site No 29 (22°25'43.79"E; 42°13'9.24"N) affecting E2.2: Low and medium altitude hay meadows and mesophillous oak forests and G1.69: Moesian [*Fagus*] forests
- If feasible, Disposal site No 30 (22°25'4.19"E; 42°13'24.67"N) affecting the edge of mesophillous oak forest

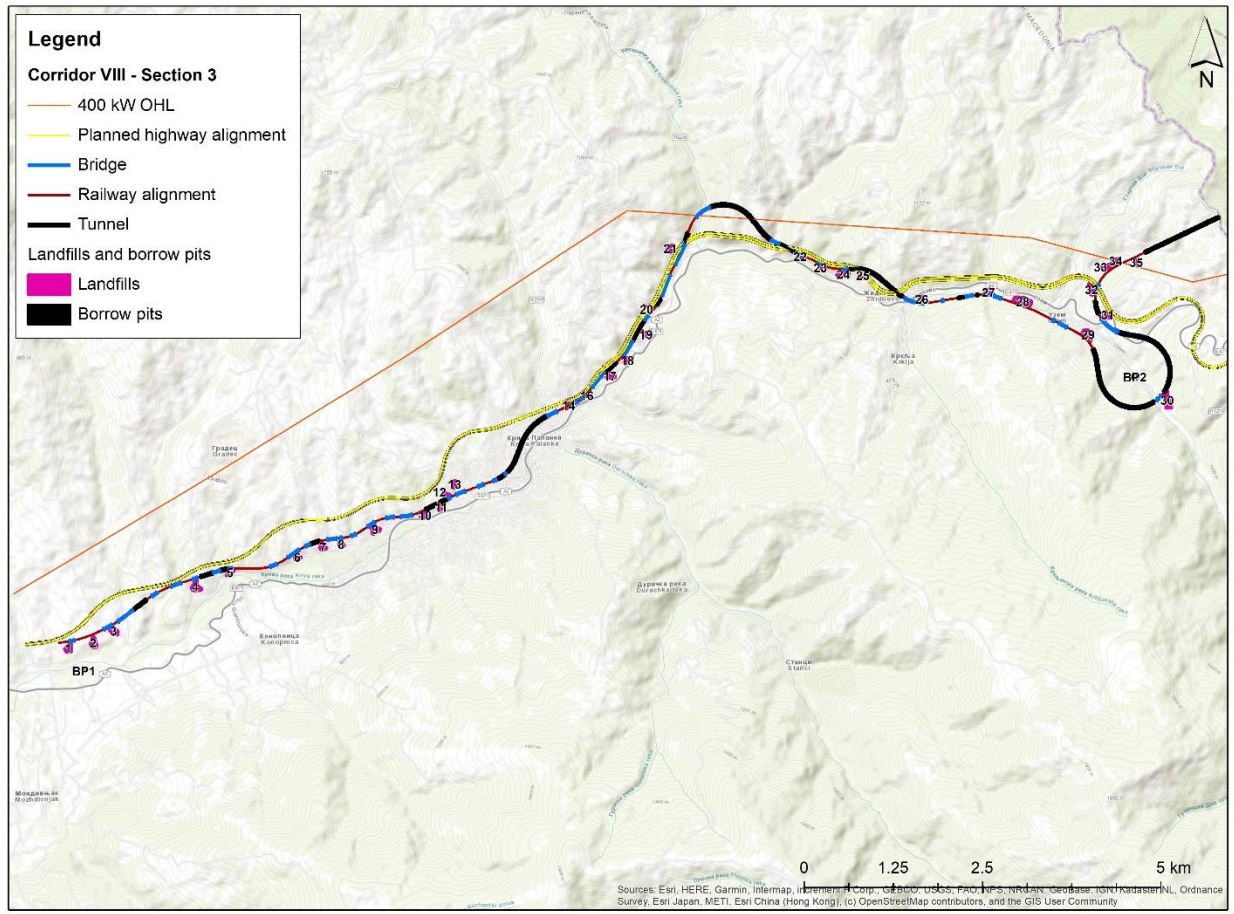


Figure 4 Planned locations of landfills and borrow pits along the railway alignment

Table 4 Specific mitigation measures and management actions for species

ID	Species/Species group	Impact	Mitigation/management action	Frequency of action	Responsibility
MI08	Otter (<i>Lutra lutra</i>)	<p>From the aspect of the fauna, the impact of the railway in the operational phase, on the "population" of otters in the Kiselicka Reka, should be emphasized in particular. The construction of the bridge will cause degradation of some of the riparian vegetation as well as changes in the riverbed;</p> <p>During the construction work, in the absence of mitigation, otter population might be impacted by increased presence of workers, construction machinery and vehicles and subsequent increased level of noise and vibration in the area which may cause disturbance and their migration in the neighbouring areas;</p> <p>Risk of pollution of the habitats due to solid waste and dust from construction works and pollution from construction machinery and vehicles (motor oils and lubricants in particular) could interfere with the biodiversity of the local rivers and streams and hence have a significant impact on otter (if present) through loss of suitable foraging habitat.</p>	<p>There are two bridges that are significant from this aspect, and special attention should be given to the big bridge no. 32 at km 76 + 402 to 76 + 611.5. The base of the bridge pillars ought to be out of the river bed and at least 5-10 m from the river banks. Reinstatement of riparian vegetation as outlined in the LMP should be prioritised and initiated as soon as construction is concluded.</p> <p>Biodiversity specialist should be present on site during the construction of the bridge at Kiselichka Reka gorge to undertake site supervision. Should presence of otters, otter holts or lie-ups be confirmed, then halt construction, advice biodiversity supervisor and resolve as per recommendation.</p> <p>Areas where bridge crossings are to be sited should be checked for the presence of otter, prior to works commencing. Should an otter presence (direct sighting, prints, halt or lie-up) be confirmed on site during construction, halt construction until appropriate advice has been sought from a biodiversity specialist.</p> <p>If feasible, minimize the time for construction works close to the river and away from known otter habitat, particularly at the crossing of Kiselichka Reka gorge.</p> <p>The area of habitats affected by the construction should be minimized during the construction works; Promote restoration of native habitats in accordance with MI02;</p> <p>Control the pollution of the area through proper waste disposal; and undertake preventive measures to avoid accidental pollution;</p> <p>Avoid construction work during night;</p>	Pre-construction, construction, operation	Cr to implement prior to and during construction Co – to implement during operation

Biodiversity Management Plan

ID	Species/Species group	Impact	Mitigation/management action	Frequency of action	Responsibility
			<p>Prohibition of illegal hunting from workers/visitors;</p> <p>Mandatory monitoring for presence of otters during the construction and at least 24 months of operational of the railway</p>		
<p>MI09</p>	<p>Bats:</p> <p>Miniopterus schreibersii Rhinolophus ferrumequinum Rhinolophus hipposideros Pipistrellus pygmaeus Myotis myotis Myotis blythii Nyctalus noctula Pipistrellus kuhlii Pipistrellus nathusii Pipistrellus pipistrellus Hypsugo savii Eptesicus serotinus Myotis mystacinus</p> <p>(with specific attention to:</p> <p><i>Rhinolophus ferrumequinum</i>; <i>Miniopterus schreibersii</i>; Location 42.172617 22.223033</p> <p><i>Rhinolophus hipposideros</i>; Location 42.229196 22.438624</p> <p><i>Myotis blythii</i> and <i>Myotis myotis</i>): Location 42.224935 22.359037</p>	<p>The bat population within the project area uses the leftover tunnels and excavation sites as habitat. Hence, continuation of the railway construction work, in the absence of mitigation, will have significant effect on the bat population. Increased level of noise and vibration in the area resulting from increased presence of workers, construction machinery and vehicles may cause disturbance and their migration in the neighboring areas;</p>	<p>Bats were found to roost in the railway tunnels constructed during construction operations that took place in previous phases of the implementation of this project (tunnels before T'Iminci that fall under Section 2 of the railway line (Beljakovce-T'Iminci, and the tunnel entry to the border crossing with Bulgaria).</p> <p>It is considered unlikely that bats would hibernate in these features, however, to take the precautionary method, during the summer season pre-construction, tunnel entries should be blocked to prevent bats roosting. Prior installing a blockage, tunnels should be checked for summer roost (used by males and non-breeding females) by a suitably qualified ecologist. Should a roost be found, they will be transported to another appropriate location away from the railway construction area. The ecologist can also advise on the remedial actions required.</p> <p>Avoid construction work during night; Mandatory monitoring for presence of bats during the construction and at least 12 months of operational of the railway</p>	<p>Pre-construction, construction, operation</p>	<p>Cr to implement prior to and during construction Co – to implement during operation</p>

Biodiversity Management Plan

ID	Species/Species group	Impact	Mitigation/management action	Frequency of action	Responsibility
M110	Mammals (general) (with specific attention to wolf (<i>Canis lupus</i>) and wildcat (<i>Felis sylvestrus</i>))	Other mammals of conservation concern are common in the area of interest and widespread in the Country. Nonetheless, the Company and the Contractor (s) should abide to the general mitigation measures and management actions (as specified in 4.1) to minimize disturbance and avoid negative impacts, particularly during construction, but also during operation.	<p>Area and habitats affected by the construction should be minimized during the construction works; Promoting practices for restoration of native habitats when needed;</p> <p>Appropriate construction and maintenance of wildlife passages (tunnels, viaducts etc.); Use appropriate preventive equipment (fences, signalization etc.) in order to avoid endangering the important habitats and mammal species; Abide to waste management plan and avoid waste disposal at habitats noted as sensitive and/or important for conservation (particularly <i>Quercus frainetto</i> forests, beech forests, riparian forests); Undertake preventive measures to avoid accidental pollution;</p> <p>Biodiversity specialist should perform checks for the presence of large mammals in areas where bridge crossings are sited, prior to works commencing. Avoid construction work during night;</p> <p>During operation: Mandatory monitoring for presence of large mammals subjected to critical habitat assessment (wolf (<i>Canis lupus</i>); European wildcat (<i>Felis sylvestrus</i>)) Presence of other large mammals (ungulates) should also be recorded where confirmed. Monitoring should be carried post-construction and continue at least 12 months of operational of the railway</p> <p>Maintenance of installed fences along each side of the railway to prevent intrusions of animals and possible fatalities. All damage to the fence are to be promptly repaired, therefore regular inspections are required.</p>	Pre-construction, construction, operation	Cr to implement prior to and during construction Co – to implement during operation

Biodiversity Management Plan

ID	Species/Species group	Impact	Mitigation/management action	Frequency of action	Responsibility
			<p>The railway maintenance service is obliged to record such injuries and collision cases in order to respond timely with additional protection measures.</p> <p>Locations for Wildlife crossings (crossings, underpasses, overpasses) are already determined and detailed in the project design. Considering the terrain and hydrography specifics of the area, as well as species field data it is considered that projected crossings, underpasses and overpasses can adequately facilitate movement of animals. Still, should the pre-construction surveys and monitoring outline a the need for additional wildlife passages in the area of Uzem from km 81.4 to km 82; km 82.4 to km 82.8 and km 86.6 to km 87.3, then the project design should be adapted accordingly.</p>		
<p>MI11</p>	<p>Birds (general) (with specific attention to:</p> <p>Black Stork (<i>Ciconia nigra</i>); the Peregrine falcon (<i>Falco peregrinus</i>) should it be observed; While taking into consideration other notable bird species:</p> <p><i>Falco tinnunculus</i> <i>Buteo buteo</i> <i>Ciconia ciconia</i> <i>Dryocopus martius</i> <i>Dendrocopos syriacus</i> <i>Lullula arborea</i> <i>Lanius collurio</i></p> <p>with further reference to: <i>Caprimulgus europaeus</i> <i>Alcedo atthis</i> <i>Picus canus</i> <i>Dendrocopos medius</i></p>	<p>Felling of trees and effects on roosting bats and nesting birds</p>	<p>The Company and the Contractor (s) should abide to the general mitigation measures and management actions (as specified in 4.1) to minimize disturbance and avoid negative impacts, particularly during construction, but also during operation.</p> <p>Conduct walkthrough (rapid assessment) surveys immediately prior to works commencing (tree removal; tunnel construction in the bird nesting season.</p> <p>Should bird nests be found, halt construction and in consultation with an experienced ornithologist/biodiversity expert decide whether to move the nest with minimum disturbance caused or defer the clearance until young have fledged.</p> <p>Overhead power lines and catenary shall be signalled to avoid bird collisions. There are a number of devices used to signal ground wires and conductors in transmission lines of electricity, which could be used in the railway, including balls of aluminum, colored spheres, colored plastic spirals, colored plastic bands, luminous markers, colored</p>	<p>Pre-construction, construction</p>	<p>Cr to implement prior to and during construction Co – to monitor during operation</p>

Biodiversity Management Plan

ID	Species/Species group	Impact	Mitigation/management action	Frequency of action	Responsibility
	<p><i>Melanocorypha calandra</i> <i>Calandrella brachydactyla</i> <i>Anthus campestris</i> <i>Ficedula albicollis</i> <i>Lanius minor</i> <i>Curruca (Sylvia) nisoria</i> <i>Ficedula semitorquata</i> <i>Lanius collurio</i> <i>Lullula arborea</i> <i>Pernis apivorus</i></p>		<p>polyethylene pipes, silhouettes of birds of prey, signaling metal plates etc.</p> <p>To minimise electrocution from overhead transmission lines and pole tops often used as perching sites isolate those stretches of the overhead power line where the catenary is double to avoid the death of birds by electrocution upon contact with the catenary. To further reduce risk of electrocution avoid the use of rigid insulators in the towers supporting the catenary and use suspended insulators instead. Strongly recommended in open areas, particularly from km 65.1 to km 66.1, then km 69.1 to km 70.3, then km 73 to km 74, then bridge over Kiselichka Reka from km 76.5 to km 76.77 and bridge over Kriva Reka at Uzem from km 84.3 to km 84.4.</p> <p>As detailed in the project design and outlined in the ESIA 2017, the barriers should be made from transparent materials (polycarbonate) 20 mm thick. Considering that most of the barriers are on bridges, full concrete fence with thickness of 10 cm can be part of the barrier, and the difference to the required height should be supplemented by the polycarbonate elements.</p> <p>In Kiselichka Reka gorge, avoid demolition, blasting or vehicle disturbance in the period February to April.</p> <p>If a Peregrine Falcon nesting territory/territories are discovered in future, artificial nest on adjacent cliffy structure should be considered.</p>		
MI12	<p>Amphibians and reptiles (with focus on <i>Testudo hermani</i>) considering:</p> <p>Dahl's whip snake (<i>Platyceps najadum</i>)</p> <p>Aesculapian snake (<i>Zamenis longissimus</i>)</p>	<p>A certain danger of reducing the permeability of the landscape in terms of seasonal migrations of smaller animals (amphibians and reptiles) exists, especially near permanent and seasonal watercourses (ponds and streams in particular) that serve as breeding habitats for frogs.</p>	<p>The construction phase in high risk areas of tortoise nests (dry grasslands; grasslands with shrubs, forests and forest edges) in the area of T'Iminci, Drenje and Uzem-Kostur should take place after the spring months (late June, the earliest), when activity is lower, at least one successful clutch has likely hatched, and when the vegetation is not as lush and high, so individuals, particularly juveniles (30-70mm</p>	<p>Pre-construction, construction, operation</p>	<p>Cr to implement prior to and during construction Co – to implement during operation</p>

Biodiversity Management Plan

ID	Species/Species group	Impact	Mitigation/management action	Frequency of action	Responsibility
	<p>with further reference to: <i>Dolichophis caspius</i> <i>Natrix tessellata</i> <i>Coronella austriaca</i> <i>Vypera ammodites</i> <i>Podarcis muralis</i> <i>Lacerta viridis</i></p> <p>with further reference to: <i>Podarcis erhardii</i> <i>Podarcis tauricus</i> <i>Lacerta trilineata</i></p> <p>Amphibians: <i>Pelophylax ridibundus</i> <i>Bombina variegata</i> <i>Rana graeca</i> <i>Rana dalmatina</i> <i>Bufo viridis</i> <i>Hyla arborea</i></p>	<p>In the absence of mitigation, the highest impact pertains to tortoise nests. Adult individuals are likely to escape disturbances (as long as there is no burning of habitats), but lightly burrowed tortoise nests are extremely prone to destruction. Young individuals, up to five years of age are also likely to suffer as they are still small, less capable of managing their environments successfully, have a softer shell, and still experience lower annual survival probabilities than adults.</p> <p>Mortality caused by excavations and direct killing of amphibians and reptiles by workers, due to unfounded fear, aversion to certain species</p>	<p>long) can be spotted more easily and transported before construction activities cause them harm.</p> <p>In high risk areas (dry grasslands; grasslands with shrubs, forests and forest edges) in the area of T'Iminci and Uzem-Kostur construction should not take place during the hibernation period (October-March) as individuals often burry themselves and can easily fall victims to land alterations. If not feasible pre-construction checks and presence of Biodiversity Specialist are mandatory during construction.</p> <p>Collision mortality has been identified as one of the dominant threats to tortoises in the country, all infrastructure that could pose additional threats to this species, should be minimised. Hence, installation and use of appropriate preventive equipment (exclusion fences, olfactory repellents, sound signals and sound barriers) that prevent the crossing of railways is recommended to minimise mortality in the operation phase of the railway. Locations and specifications on best preventive solutions should be refined based on pre-construction surveys.</p> <p>Summer season pre-construction, tunnel entries should be blocked to prevent bats roosting. Prior installing a blockage, tunnels should be checked for summer roost (used by males and non-breeding females) by a suitably qualified ecologist.</p> <p>Transects should be defined in suitable habitats around T'Iminci area and Zhidilovo-Uzem, where the effects of road mortality will be monitored during the active spring season for the first year of operation in order to make sure that mitigation measures are effective</p> <p>Wildlife passages including box-culverts should be constructed and maintained, as they benefit, not only tortoises, but also a significant portion of biodiversity. Locations for crossings, underpasses, overpasses,</p>		

Biodiversity Management Plan

ID	Species/Species group	Impact	Mitigation/management action	Frequency of action	Responsibility
			<p>culverts are already determined and detailed in the project design. Considering the terrain and hydrography specifics of the area, as well as species field data it is considered that projected crossings, underpasses and overpasses can adequately facilitate movement of animals. Still, should the pre-construction surveys and monitoring outline a the need for additional wildlife passages in the area of Uzem from km 81.4 to km 82; km 82.4 to km 82.8 and km 86.6 to km 87.3, then the project design should be adapted accordingly.</p> <p>Do not kill and pose serious injuries to the native fauna during clearing of vegetation. This especially goes for mammals, birds, reptiles, amphibians and fish</p> <p>To inform and educate the workers, through the use of tool box talks, that killing of animals is prohibited within the project area during construction (amphibians, reptiles, birds, mammals). Information materials to be prepared for this purpose</p> <p>Prohibition of illegal hunting from workers/visitors; Inform hunting societies for the timeframe of construction works. Hunt should be prohibited within the project area</p>		
MI13	Insects and Aquatic fauna		<p>Prevent leakage of oils to avoid contamination of water and adverse impacts to aquatic species</p> <p>Implement mitigation measures related to preservation of good water quality (installation of drainage structures and oil separators)</p>		Cr to implement prior to and during construction

Biodiversity Management Plan

ID	Species/Species group	Impact	Mitigation/management action	Frequency of action	Responsibility
			<p>Ensure watercourses are not blocked during construction and natural fish pass during construction (e.g. during construction of bridges) is maintained.</p> <p>Avoid movement of heavy machinery in water courses wherever possible to prevent adverse impacts on aquatic species.</p> <p>Prevent chemical leakage to avoid contamination of water and adverse impacts to macroinvertebrates. Implement pollution prevention control measures.</p> <p>Sediment control can also be achieved through construction phasing to minimise activities which cause disturbance and the greatest impact e.g. during the wettest periods of the year.</p> <p>Use extant or/and carefully and adequately plan the construction of temporary access roads, formation of borrow pits and disposal areas in order to avoid degradation of hay meadows patches assessed as representative, particularly in the area of Uzem – Kostur.</p> <p>Prevention against uncontrolled disposal of construction material nearby rivers and prevention against sloughing of construction material down the slope on hillsides</p> <p>The ends of the bridges should be embanked and secured against erosion during construction phase.</p> <p>Installation of drainage infrastructure to prevent erosion should be undertaken. Open cuts near the</p>		

Biodiversity Management Plan

ID	Species/Species group	Impact	Mitigation/management action	Frequency of action	Responsibility
			river will need to be re-vegetated as soon as possible to prevent soil erosion. Revegetation should be undertaken as soon as possible.		

5.3 Monitoring and evaluation plan

The implementation of the mitigation measures for biodiversity and their effectiveness is the main concern of the Biodiversity Monitoring and Evaluation Plan (BMEP). This plan will also help in improving the mitigation and avoidance strategy by adaptive management.

BMEP will continue to be developed as an integral element of the project, to provide information on whether project interventions are successful in achieving project objectives and on how social, economic, political and institutional factors are affecting project performance. Monitoring and evaluation for biodiversity projects involves two kinds of indicators: implementation performance indicators (project implementation monitoring) and project impact biodiversity indicators (biodiversity monitoring).

Table 5 Monitoring activities

ID	Monitoring activity/indicator	Objectives	Where?	How?	Period and frequency	Performed by	Responsibility
	PROJECT IMPLEMENTATION MONITORING						
MON01	Biodiversity documentation compliance	Effective project implementation	Deskwork	Checking the prepared project and technical documentation, plans and checklists, permits, consents, approvals, etc. and perform screening to assure that all pre-construction actions and measures have been implemented	Prior to the start of construction activities	Biodiversity Supervisor with support from Biodiversity Expert	Company; Contractor
MON02	Monitoring of the implementation of all mitigation measures	Proper implementation of mitigation measures	Whole alignment	Daily visual inspection of the construction activities and their compliance with BMP (in connection to MON01)	During the whole construction period. Daily inspections.	Biodiversity Specialist(s) Biodiversity Supervisor	Contractor Company;
MON03	Monitoring of the bridges construction	Avoid degradation of critical habitats	In the area of the following habitats: willow and poplar woodlands, stands and belts; beech	Daily visual inspection of the construction activities and their compliance with BMP (in connection to MON01)	During the whole construction period. Daily inspections.	Biodiversity Specialist(s) Biodiversity Supervisor	Contractor Company;

Biodiversity Management Plan

ID	Monitoring activity/indicator	Objectives	Where?	How?	Period and frequency	Performed by	Responsibility
			forests, hilly pastures; rivers and streams				
MON04	Monitoring of presence of animals during construction works (amphibians, reptiles, bird nests, chicks, etc.)	Avoid killing of animals	Whole alignment	Daily visual inspection of the construction sites. Communication and education of workers.	During the whole construction period. Daily inspections.	Biodiversity Specialist(s) Biodiversity Supervisor	Contractor Company;
MON05	Monitoring of hay meadows by <i>Parnassius mnemosyne</i> (Clouded apollo) as indicator	Prevent species population decline and preservation of hay meadows)	Hay meadows in the area of the village of Kostur	Observe the integrity of hay meadows, construction of access roads, deposition of waste (construction waste, communal waste)	During the whole construction period: from May to July. Weekly inspections.	Biodiversity Specialist(s) Biodiversity Supervisor	Contractor Company;
MON06	Monitoring of animal collisions / deaths by electrocution	Obtain data on animal collisions, detect risk sites, improve management	Whole alignment	Visual inspection of dead animals due to collision with trains. Establish database (species, data, coordinates, comments)	Operation phase - year round monitoring during first year of operation and seasonal monitoring for the first 5 years of operation. Operation phase – when feasible, during railway maintenance perform checks for birds victims of electrocution	Biodiversity Specialist(s) Biodiversity Supervisor	Contractor Company;
	BIODIVERSITY MONITORING						
MON07	Monitoring of Eurasian otter	To follow changes in occurrence and movement of the species.	Valleys of Kriva Reka (Mozdivnjak-Konopnica and Kriva Palanka-	Visiting sampling points at every 1,5-2 km, approximately, searching for signs of otter presence (spraints, holts etc.).	Operation phase - Year round monitoring during first year of operation and	Mammal expert	Company;

Biodiversity Management Plan

ID	Monitoring activity/indicator	Objectives	Where?	How?	Period and frequency	Performed by	Responsibility
			Uzem) and Kiselicka Reka	Opportunistically use camera traps.	seasonal monitoring for the first 5 years of operation		
MON08	Wolf (and eventually wild cat)	To follow changes in occurrence and movement of the species, and usage of the wildlife passages	Whole alignment	Sign survey and camera-trapping (5-8 camera traps depending on the field conditions and security) at 5-8 different spots.	Seasonally, during railway operation (5 years)	Mammal expert	Company;
MON09	Monitoring of bats	To follow changes in occurrence and important roosting and feeding sites	Whole alignment, especially near the tunnel at the border (km87+200)	Echolocation and roost inspection.	Seasonally, during railway operation (5 years)	Mammal expert	Company;
MON10	Monitoring of other noted species important for conservation (amphibians, reptiles, birds, mammals)	To follow changes in occurrence and movement of the species, and usage of the wildlife passages	Whole alignment	Point counting method, but also transect method, not excluding "free method"	Year-round during first year of operation and then seasonally, during railway operation (5 years)	Biodiversity expert with support from amphibian and mammal expert and expert on avifauna	Company;
MON11	Monitoring of revegetation/replanting to achieve NNL/NG	To follow pace of revegetation/success of replanting	Whole alignment	Visual inspection	Seasonally during the first year, then yearly (10years) during railway operation	Biodiversity expert with support from species experts in first year Species experts thereafter	Company

Appendices

Appendix 1 Locations of focus monitoring sites

Appendix 2 Locations of sensitive habitats

Appendix 3 Construction timeline and seasonal restrictions on construction activities

Appendix 4 Pre-construction and Pre-Clearance Surveys

Appendix 1: Locations of focus monitoring sites

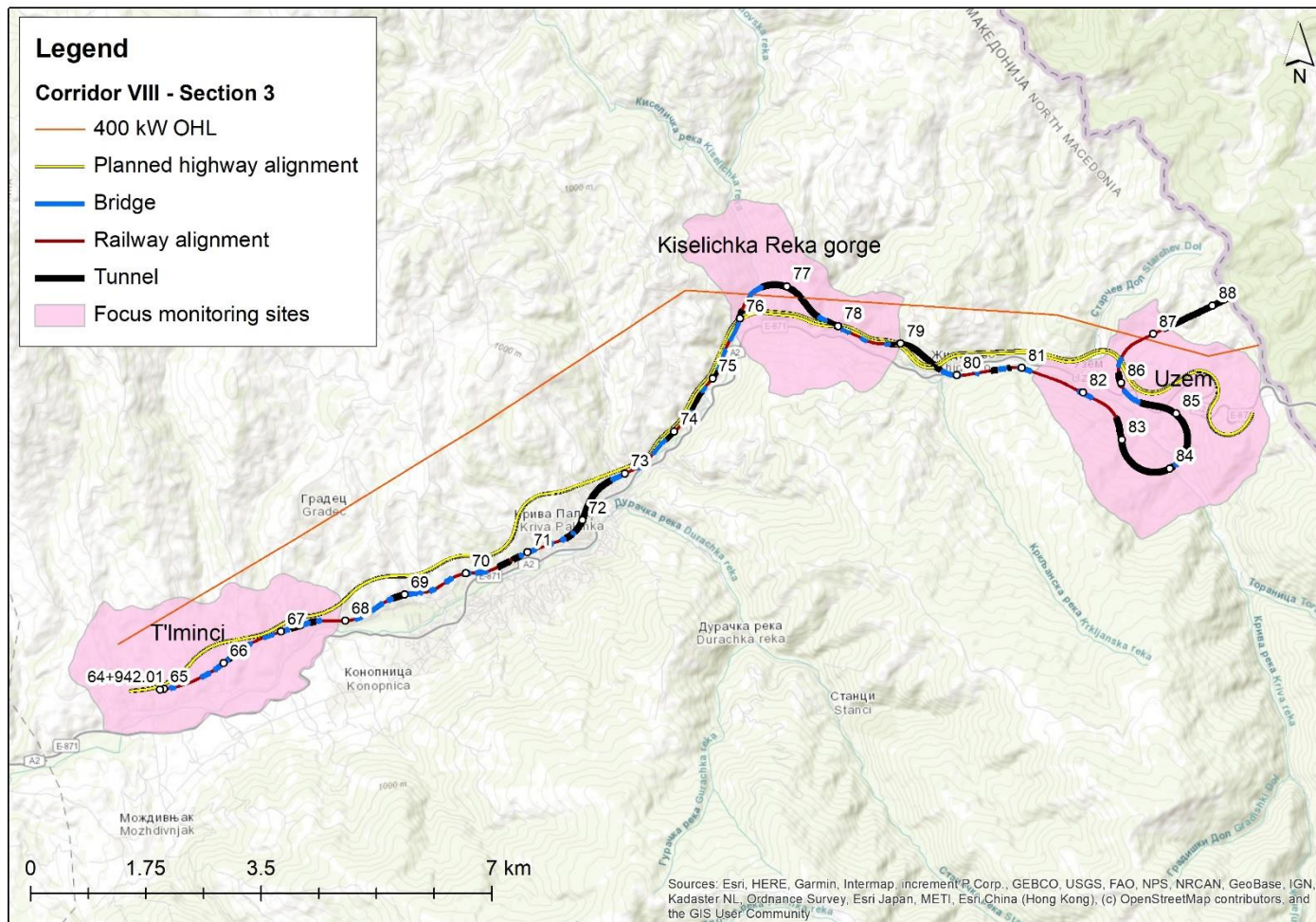


Figure 4 Overview of focus areas for monitoring of conservationally important species. Sites were outlined using GPS field data findings as a reference

Appendix 2: Locations of sensitive habitats

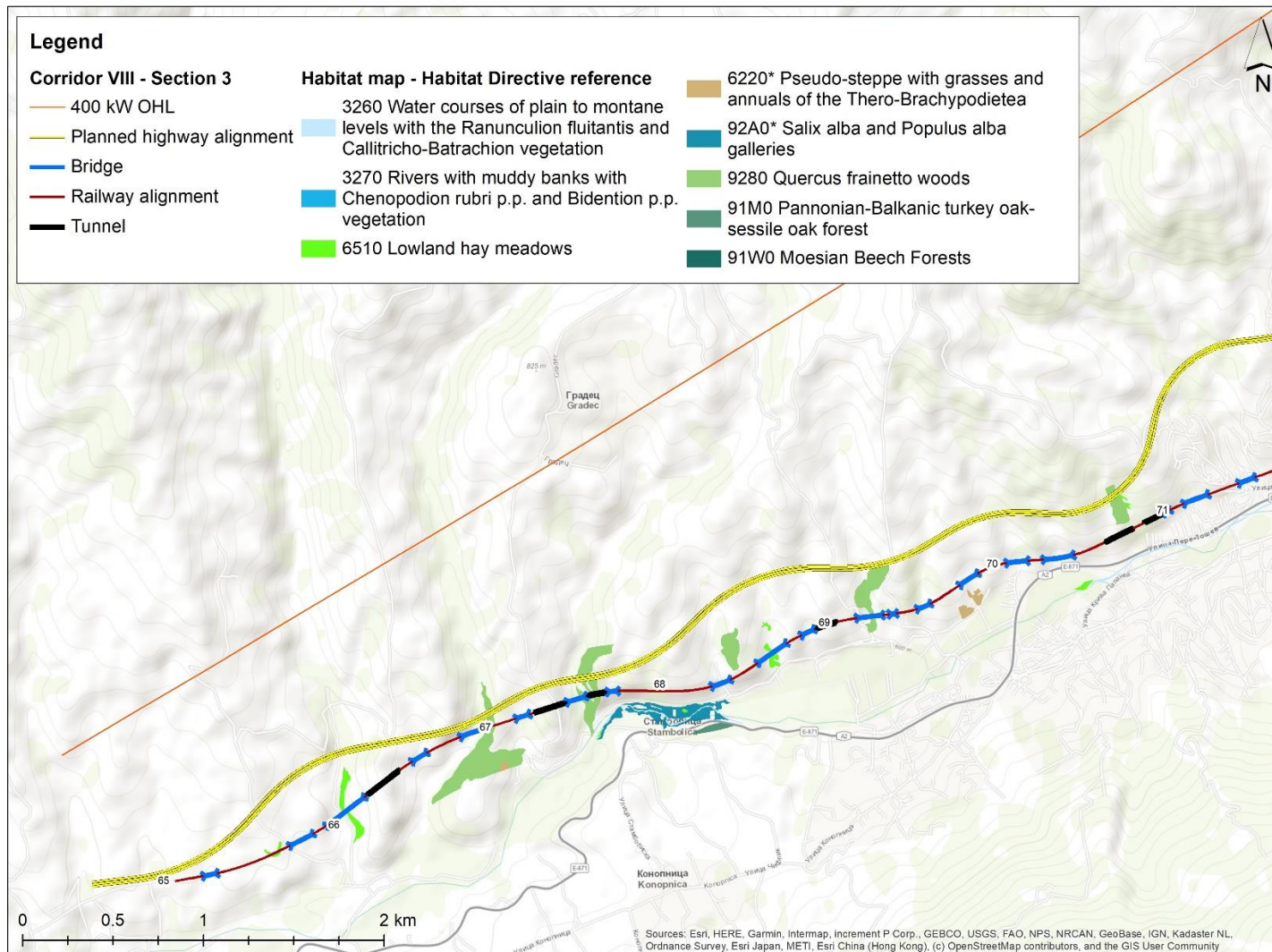


Figure 5 Overview of sensitive habitats along Kumanovo-Deve Bair railway line, Section 3 – Kriva Palanka (T’Iminci) to Deve Bair: part 1 – T’Iminci to Kriva Palanka

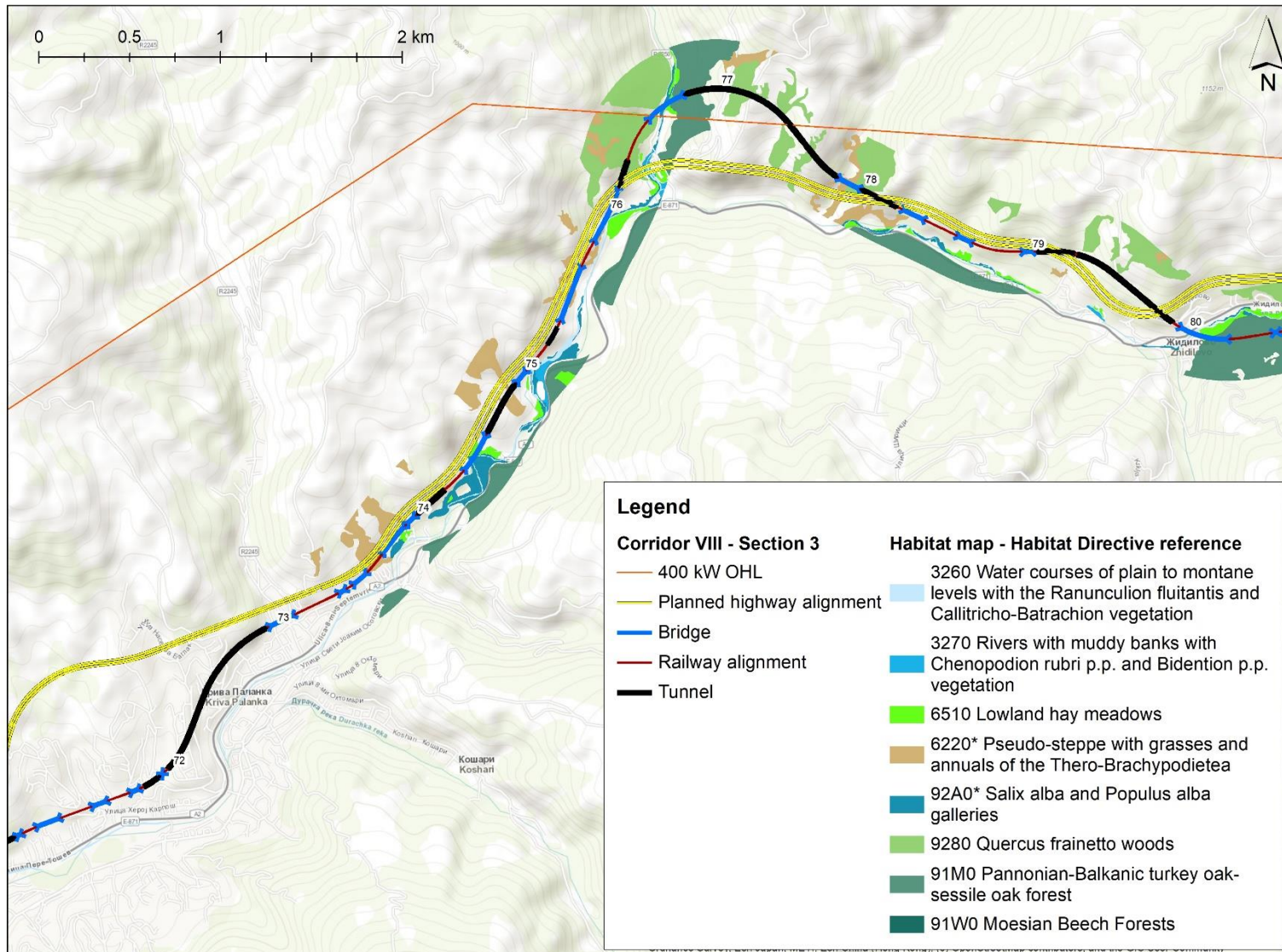


Figure 6 Overview of sensitive habitats along Kumanovo-Deve Bair railway line, Section 3 – Kriva Palanka (T’Iminci) to Deve Bair: part 2 –KRiva Palanka to Zhidilovo

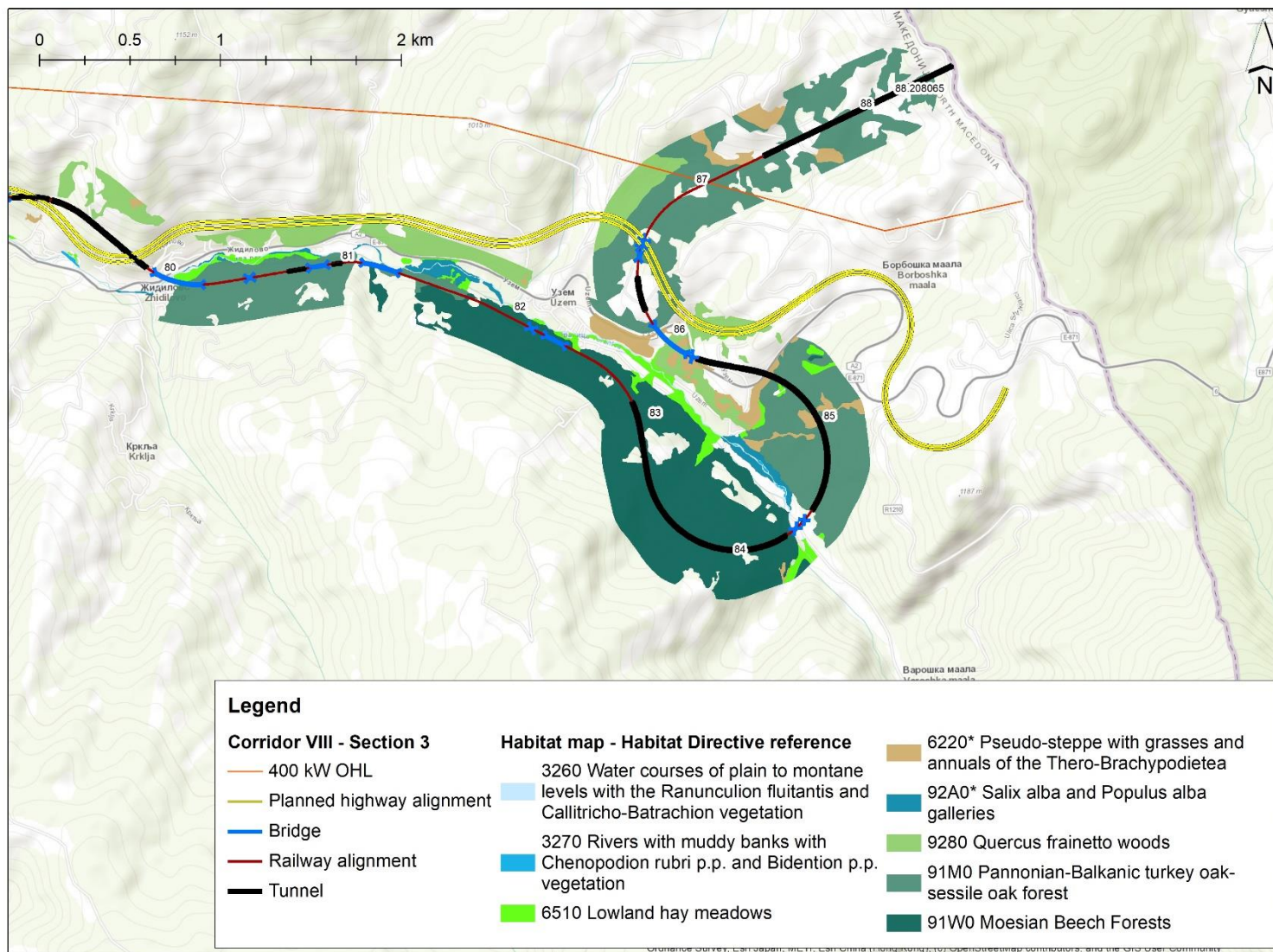


Figure 7 Overview of sensitive habitats along Kumanovo-Deve Bair railway line, Section 3 – Kriva Palanka (T’Iminci) to Deve Bair: part 2 –KRiva Palanka to Zhidilovo

Appendix 3: Construction timeline and seasonal restrictions on construction activities

Table 6 Construction timeline to minimise disturbance during railway construction. Limitations are species specific and will be imposed with particular reference to sensitive sites (Figure 4).

<i>Species group</i>	<i>Species</i>	<i>Jan</i>	<i>Feb</i>	<i>Mar</i>	<i>Apr</i>	<i>May</i>	<i>Jun</i>	<i>Jul</i>	<i>Aug</i>	<i>Sept</i>	<i>Oct</i>	<i>Nov</i>	<i>Dec</i>
<i>Mammals</i>													
	Otter												
	Wolf												
	European wildcat												
	Bats												
<i>Reptiles</i>													
<i>Birds</i>	Raptors and falcons with consideration to all other birds												

- Minimise construction activities in preserved forests with presence of large tree trunks to avoid disturbance during hibernation; if vegetation clearance is to take place during the bird nesting season, then first with presence of Biodiversity Supervisor/Specialist perform a survey for nesting birds. Halt construction, if nests/bats roosts are noted and following consultation with the Biodiversity Supervisor/Specialist resolve as per recommendation.
- No demolition, blasting, borrow pit quarrying or vehicle disturbance with emphasis to Kiselichka Reka valley and T'Iminci
- Throughout the year, should any nesting sites, holts or roosts be found, halt construction and following consultation with the Biodiversity Supervisor/Specialist resolve as per recommendation

Appendix 4: Pre-construction and Pre-Clearance Surveys

With further reference to minimizing disturbance and mitigating negative impacts of railway construction, pre-construction the Contractor will perform:

- ✓ Inventory of the PBF/CH habitats subject to removal (permanent loss) based on final design. Whole alignment, including access roads and tunnel entries
- ✓ Pre-construction checks for species presence. Whole alignment, with focus on hollow trees and other places of shelter.
- ✓ Pre-construction surveys to determine locations and specifications on best preventive solutions for installing equipment that prevent the crossing of railways (exclusion fences, olfactory repellents, sound signals and sound barriers) to minimise mortality in the operation phase of the railway. Most relevant for the area of Uzem (Ljuti Rid) from km 81.4 to km 82 and km 82.4 to km 82.8.
- ✓ Pre-construction surveys to determine the need for additional wildlife passages to adequately facilitate movement of animals. Particularly relevant for the area of Uzem (Ljuti Rid) from km 81.4 to km 82; km 82.4 to km 82.8 and km 86.6 to km 87.3

Summer season pre-construction, existing tunnel entries should be blocked to prevent bats roosting. Prior installing a blockage, tunnels should be checked for summer roost (used by males and non-breeding females) by a suitably qualified ecologist.

- ✓ Pre-clearance check for nesting bird. Whole alignment
- ✓ Pre-construction checks for the presence of mammals (otter holts or lie-ups) in areas where bridge crossings are sited. Performed on bridge crossings, with focus on Kiselichka Reka gorge