



ДЕКОНС-ЕМА | Друштво за Еколошки Консалтинг



Road Corridor VIII – Phase I – Bukojchani – Kichevo – North Macedonia Biodiversity management plan



Skopje, April 2026

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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
Cr	Constructor
Co	Company (Public Enterprise for State Roads)
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
NNL	No-net loss
NG	Net gain
PBA	Prime butterfly areas

Abbreviation	Meaning
PBF	Priority biodiversity feature
PESR	Public Enterprise for State Roads
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
NNL/NG	No-net loss/ net gain
MAFWE	Ministry of Agriculture, Forestry and Water Economy
MoEPP	Ministry of Environment and Physical Planning
PCC HYDRO	Private company managing a 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	Hectare
NGO	Non-Governmental Organisation
SDC	Swiss Agency for Development and Cooperation

1. Introduction

The project constitutes part of Corridor VIII, which runs through the territory of the Republic of North Macedonia, and it is approximately 305 km in length, from the border with Bulgaria (Deve Bair Border Crossing) to the border with Albania (Kjafasan Border Crossing).

The current project connects Bukojchani and Kichevo, and it will be a 10.7 km subsection of the M2 motorway. It starts at the Strogomishte interchange in the north, and it connects with the A2 Kichevo to Ohrid scheme in the south.

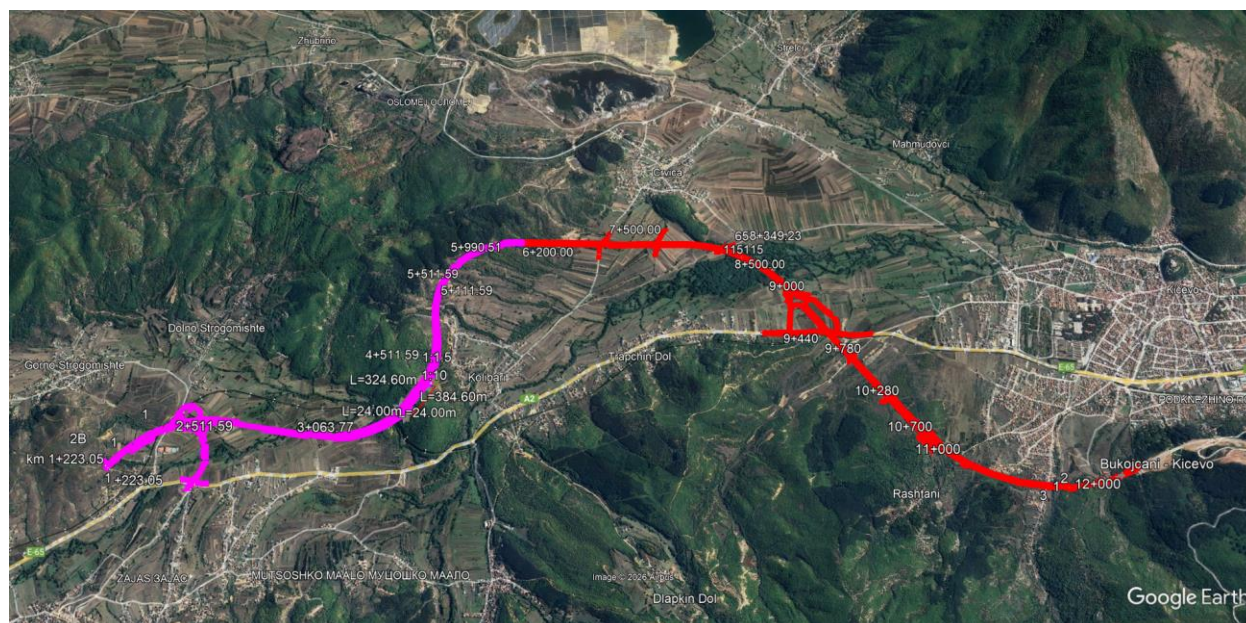


Figure 1 Satellite view of Bukojchani – Kichevo subsection.

The project is located in the western part of the Republic of North Macedonia, approximately 61 km southwest of Skopje, in the region of Kichevo. The Kichevo region is situated in the Kichevo Valley, and it is surrounded by hills and mountainous terrain on all sides. The region is chiefly agricultural, with several large settlements, including Kichevo at the southern end of the alignment, and Zajas near the northern end. There are existing transport links in close proximity to the project, including the current A2 state road as well as the Bukojchani to Kichevo highway.

The project covers the construction of the 10.7 km long ‘Bukojchani – Kichevo’ subsection of M2 motorway. The northern end of the alignment commences at the Strogomishte intersection, which provides connection to the villages of Dolno and Gorno Strogomishte. The southern end of the alignment, both horizontally and vertically, corresponds to the A2 Kichevo – Ohrid, which is currently under construction.

The motorway will be designed in accordance with Macedonian road design standards. It will have a design speed of 100 km/hour, as higher design speeds are not possible due to the hilly terrain and some tight horizontal curves.

The project is developed in alignment with EBRD Environmental and Social Policy, 2014 and the Associated Performance Requirements, including Performance Requirement 6 (PR6) on Biodiversity Conservation and Sustainable Management of Living Natural Resources¹. In order to meet PR6, a Framework Biodiversity Management Plan (FBMP) was prepared as part of the original ESIA to demonstrate how the delivery of subsequent detailed mitigation proposals will be feasible from a technical viewpoint. These measures will be elaborated and elucidated within the framework of the present Biodiversity Management Plan, to be implemented as part of the overall project.

The Biodiversity Management Plan is compliant with EBRD PR6. This BMP provides mitigation and monitoring commitments to be delivered within the BMP to ensure the project remains compliant with PR6 and international good practice on biodiversity. These commitments are derived from the outcomes of the Environmental and Social Impact Assessment (ESIA) and the Critical Habitat Assessment (CHA). The BMP must be prepared in draft form and reviewed and approved by EBRD. If necessary periodical updates must be made to the BMP (one-year intervals) and these must be approved by EBRD prior to being considered as changes to the original document.

The BMP also constitutes an instructional working document for management of biodiversity impacts during project implementation, and it will be utilised by PESR and its contractors to ensure that necessary measures are enforced in order to adhere to 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; it identifies the parties responsible for their implementation (e.g., company, contractor, government), and it specifies the timing for implementation of tasks as well as mandatory monitoring and monitoring schedule. The Plan should inform the BoQ and should be included in the Contractor's tender documents.

This BMP is a "live" document, and it is envisaged to evolve and be enhanced as necessary throughout the project's detailed design, construction, and operation phases, as part of project monitoring. It should be noted that any changes to this plan must be approved by EBRD prior to changing this BMP. Appendix 6 will be updated within 12 months after the start of construction to include details of the confirmed offset locations and the planned actions, once this information becomes available.

1.1. Objectives of the BMP

All infrastructural projects ought to aim to avoid impacts, but where impacts cannot be avoided, they should be minimised. If an impact cannot be minimised so that it becomes insignificant 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. The goal of the current BMP is to set out a detailed plan of how the recommendations

arising from the ESIA and CHA will be implemented over time, and it identifies the actions to be undertaken by the Company and its Contractor/s.

Although North Macedonia is not an EU member state, the EBRD-funded projects are required 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. Likewise, given that North Macedonia is an EU candidate since 2014, it has adopted the legislative directives and ratified the conventions triggered by the project. Thus, the project is obliged to comply with national and European legal requirements including those contained within the EU Habitats and EU Birds Directives, by ensuring that species protected at the EU level are maintained at a favourable conservation status, and that Annex I, and Annex I Priority Habitats are maintained in a favourable condition.

The BMP is also crucial in ensuring that any conditions imposed by the Republic of North Macedonia's Ministry of Environment and Physical Planning are addressed via appropriate interventions. The primary goal of this BMP is that all actions obligatory 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 effectively and in a fitting timeframe to minimise residual risks and impacts on biodiversity and natural resources.

1.2. Scope

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

The BMP shall outline specific mitigation and management measures, comprising the following:

- Application of the mitigation hierarchy, with an emphasis on avoidance and minimization, as required by EBRD Environmental and Social Policy;
- Measures to prevent introduction or spread of invasive species;
- Adaptive management provisions to tackle unforeseen impacts or design changes;
- Compensation measures for residual impacts on natural and critical habitats, including habitat restoration and replacement ratios, to warrant compliance with PR6 requirements for No Net Loss (NNL) and Net Gain (NG);
- The BMP must clearly identify the spatial and temporal aspects of sensitive resources and the avoidance, mitigation and minimization actions given that these will be variable.

The BMP will monitor the aforementioned measures through monitoring of the following indicators:

- Flora: status of critical alluvial forests;
- Fauna: populations of otter, Macedonian trout, and protected bird species;
- Habitats: spatial extent and condition of natural and critical habitats;

- Invasive species: presence, spread, and effectiveness of control;
- Ecosystem services.

1.3. Interaction with Other Management Plans

In light of the established impacts on biodiversity, the identified affected parties, and the identified mitigation measures to be implemented during the project construction phase, the Biodiversity Management Plan interacts with the following management plans:

- Waste and Materials Management Plan (WMMP), counting the Asbestos Disposal Management Plan;
- Soil Management Plan, entailing Spoil Disposal Plan;
- Water Resources Management Plan, including Ground Water Management and Waste Water Management;
- Landscape and Visual Management Plan;
- Construction Traffic Management Plan (CTMP);
- Emergency Response Plan, containing measures for Natural Disaster Response, Tunnel Emergency Response Plan and Spill Management;
- Blasting 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, the Law on Environment, and in international agreements signed or ratified by the country, coupled by other laws governing the usage of certain natural resources.

The Law on Environment (OGRM No. 53/05, 81/05, 24/07, 159/08, 83/09, 47/10, 124/10, 51/11, 123/12, 93/13, 187/13, 42/14, 44/15, 129/15, 192/15, 39/16, 28/18; 65/18; 99/18; 176/21, 216/21, 89/22, 99/22, 171/22, 3/25, 124/25 and 191/25) transposes various EU requirements,

including those of Directive 2003/35/EC¹; Council Directive 96/61/EC²; Directive 2001/42/EC³; and Council Directive 82/501/EEC⁴.

The Law on Nature Protection (O.G. Nos. 67/04, 14/06, 84/07, 35/10, 47/11, 148/11, 59/12, 13/13, 163/13, 41/14, 146/15, 39/16, 63/16, 113/18 и 151/21) transposes the following Directives: Council Directive 92/43/EEC⁵, Council Directive 79/409/EEC⁶, Council Regulation (EC) No 338/97⁷ etc. The cited law stipulates the principles of protection, restrictions regarding use of nature and natural resources, impact assessment, planning, compensation measures, biodiversity protection, protection of internationally important species, wildlife conservation, genetic diversity, habitats and ecosystems, ecological networks, minimum environmental release¹⁰, restrictions on construction activities in riparian habitats and littoral areas, restriction on fishing in certain conditions, protected areas, management plans on 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 development of 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 establish a national ecological network, (as part of the Pan-European Ecological Network - PEEN) stems from the fact that Macedonia is a signatory party to the Pan - European Biological and Landscape Diversity Strategy (PEBLDS, 1996).

In addition, a range of international environmental and conventions are relevant, listed below:

- Convention on Biological Diversity (CBD);
- Bern Convention on Conservation of European Wildlife and Natural Habitats;
- 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).

¹ 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 environment and amending with regard to public participation and access to justice Council Directives 85/337/EEC and 96/61/EC.

² Council Directive 96/61/EC concerning integrated pollution prevention and control.

³ 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.

⁴ Council Directive 82/501/EEC on the major-accident hazards of certain industrial activities.

⁵ Reference is made to the Law on Water, which needs to set a methodology for minimum environmental release.

⁶ Council Directive 92/43/EEC on conservation of natural habitats and of wild fauna and flora.

⁷ Council Directive 79/409/EEC on conservation of wild birds.

2.2. 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 employed at the project level, notwithstanding 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 avoid and 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 pertaining to ecosystem services (PR6 paragraphs 9-10, along with relevant sections of PR5 and PR7), priority biodiversity features (PR6 paragraphs 13, footnote 77), and critical habitat (PR6 paragraphs 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, as follows.

- *Avoidance*: actions undertaken to fully prevent impacts, such as relocating a project or altering its spatial layout to prevent impacts in specific locations.
- *Minimization*: actions executed to reduce the duration, alleviate intensity and/or extent of impacts that cannot be completely avoided;
- *Restoration*: actions performed 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 enforced. Not every type of impact can be offset, as discussed below.

The client, in this case PESR, 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, once these measures are considered, may in certain cases be compensated by a biodiversity offset or other means of compensation in the case of impacts to ecosystem services.

The core principles of biodiversity offsets are as follows: 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 than⁸ those impacted by the planned development, and c) generate conservation benefits that endure as long as the residual impact of

⁸ Offset design should secure broad stakeholder support when seeking to conserve features different from those impacted.

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 development⁹.

3. Biodiversity Baseline

3.1. Biodiversity

3.1.1. Habitats

The habitats in the area of the road corridor are divided into two main categories according to their origin, namely, natural (5) and anthropogenic habitats (7). Natural habitats include forests and shrublands, grasslands and water habitats. The area is situated within a belt of typical Italian and Turkey oak forest. This is the dominant natural type of vegetation of the hilly forested landscape throughout the motorway corridor. Riparian habitats are found along the watercourses, represented by willow and alder woodlands occurring in small forests or belts along rivers and streams. All of the three habitat types have been under intense anthropogenic pressure for centuries, the reason being the acquiring of larger areas of arable land. They are in different stages of degradation. The other main habitat types represented here are various types of grassland and hill pastures with shrubs. A large portion of the study area is modified, and it is either agricultural, abandoned agricultural, or otherwise planted and/or urbanised.

None of the habitats have been identified as being of high priority for conservation by national systematic conservation planning, and no high natural-value forests have been identified in the area of interest¹⁰.

North Macedonia has no reference to the IUCN Red List of Threatened Ecosystems.

The Critical Habitat assessment has taken into consideration 5 habitat types which, based on the lenders' requirements, qualify for PBF/CH. Four of these habitat types have been assessed as PBF, and one has been assessed as CH.

Table 1 Summary of CH/PBF's Habitats

Natural Habitats	EUNIS	HD	CH/ PBF
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⁹ EBRD Performance Requirement 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources (v. September, 2022).

¹⁰ Macedonian Ecological Society (2022). Identification of high natural value forests at the national level and development of guidelines for management of two selected pilot HNVFs sites (Bukovic and Belasica). STAR 5 – Achieving biodiversity conservation through creation and effective management of protected areas and mainstreaming biodiversity into land use planning. UNEP, MoEPP.

Italian and Turkey oak forests and patches	G1.762 Helleno-Moesian [<i>Quercus frainetto</i>] forests	91M0 Pannonian-Balkan turkey oak – sessile oak forests	PBF
Riparian black alder woodland and belts	G1.12 Mixed riparian floodplain and gallery woodland	91E0 *Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (Alno-Padion, Alnion incanae, Salicion albae)	CH
Riparian willow belts	G1.1121 Mediterranean white willow galleries	92A0 <i>Salix alba</i> and <i>Populus alba</i> galleries	PBF
Rivers	C2.31 Epipotamal streams	3260 Water courses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitricho-Batrachion</i> vegetation	PBF
Intermittent streams	C2.5 Temporary running waters	3290 Intermittently flowing Mediterranean rivers of the Paspalo-Agrostidion	PBF



Figure 2 Italian and Turkey oak forests and patches (Kolibari vill.).



Figure 3 Riparian black alder woodland and belts (the Zajaska Reka river, Crvivci vill.).

3.1.2. Species

From 139 species in total listed in the ESIA, 2021 and found during the field visits, the Critical Habitat assessment has taken into consideration 24 species that qualify for PBF/CH (see Table 2.). Of these, 9 species have been assessed as PBF i.e. 7 birds (*Streptopelia turtur*, *Caprimulgus europaeus*, *Dryocopus martius*, *Dendrocopos medius*, *Ficedula albicollis*, *Lanius collurio* and *Picus canus*), and two fish species (*Barbus balcanicus* and *Salmo macedonicus*). Fifteen species have been assessed as CH i.e. one mammal (*Lutra lutra*), 9 reptiles (*Testudo hermanni*, *Coronella austriaca*, *Dolichophis caspius*, *Lacerta trilineata*, *Lacerta viridis*, *Natrix tessellata*, *Podarcis muralis*, *Vipera ammodytes* and *Zamenis longissimus*) and 5 amphibians (*Bombina variegata*, *Bufo viridis*, *Hyla arborea*, *Rana dalmatina* and *Rana graeca*). None of the recorded plant species qualify for the PBF/CH. There had not been prior records of bats along the road section; yet, no important species or important roosting sites have been observed in the area, based on literature and experts' opinions. Thus, they have not been incorporated into the analysis. All recorded species are deemed relatively widespread and common both in the region and countrywide.

Nonetheless, to avoid and minimise any potential negative impacts on biodiversity, mitigation measures and management actions will be applied to all species important for conservation, recorded along the Bukojchani - Kichevo road section. Specifics germane to the potential impacts on

species important for conservation are provided alongside mitigation measures and management actions elaborated in Section V.

Table 2 Summary of CH/PBF's Species.

TRIGGER	HABITATS/SITES/SPECIES	STATUS
Mammals	<i>European otter (Lutra lutra)</i>	CH
Birds	<i>European turtle dove (Streptopelia turtur)</i>	PBF
	<i>European nightjar (Caprimulgus europaeus)</i>	PBF
	<i>Grey-headed woodpecker (Picus canus)</i>	PBF
	<i>Black woodpecker (Dryocopus martius)</i>	PBF
	<i>Middle spotted woodpecker (Dendrocopos medius)</i>	PBF
	<i>Red-backed shrike (Lanius collurio)</i>	PBF
	<i>Collared flycatcher (Ficedula albicollis)</i>	PBF
Amphibians	<i>Yellow-bellied toad (Bombina variegata)</i>	CH
	<i>Greek stream frog (Rana graeca)</i>	CH
	<i>European tree frog (Hyla arborea)</i>	CH
	<i>Green toad (Bufotes viridis)</i>	CH
	<i>Agile frog (Rana dalmatina)</i>	CH
Reptiles	<i>Herman's turtle (Testudo hermanni)</i>	CH
	<i>Balkan green lizard (Lacerta trilineata)</i>	CH
	<i>Green lizard (Lacerta viridis)</i>	CH
	<i>Common wall lizard (Podarcis muralis)</i>	CH
	<i>Large whip snake (Dolichophis caspius)</i>	CH
	<i>Smooth snake (Coronella austriaca)</i>	CH
	<i>Aesculapian snake (Zamenis longissimus)</i>	CH
	<i>Nose-horned viper (Vipera ammodytes)</i>	CH
	<i>Dice snake (Natrix tessellata)</i>	CH
Fishes	<i>Macedonian trout (Salmo macedonicus)</i>	PBF
	<i>Danube barbel (Barbus balcanicus)</i>	PBF

3.1.2.1. Mammals

The **Eurasian otter (*Lutra lutra*)** is a semi-aquatic mammal that inhabits most of the standing major water bodies in N. Macedonia. The population size is estimated to range between 350 and 400 individuals. It is near-threatened (NT) on the IUCN Global Red List and vulnerable (VU) on the National Red List of Mammals. It is also a Habitat Directive Annex II and IV species. Otters are largely dependent on riparian vegetation and the availability of denning sites (holts). Most otter activity occurs in a narrow strip along the water's edge but they may be spotted up to 1 km away from the water body. Otters occur in several comparatively undisturbed and vegetated areas along the rivers of the project Aol. They are also likely to breed here, using holes in the river bank, cavities among tree roots, piles of rock, wood or debris. During the biodiversity surveys in the project Aol, otter evidence has been ascertained at one location of the Zajaska River.

3.1.2.2. Birds

The **European turtle-dove** (*Streptopelia turtur*) is a breeding migratory bird found at many locations throughout the country. It is a vulnerable (VU) species on the IUCN GRL, and it is listed in Annex I to the EU Bird Directive. The species prefers open woodlands, forest boundaries, and areas with tree clumps, often avoiding dense, unbroken forests. It is a migratory species, spending the breeding season in the country and wintering in sub-Saharan Africa. The species is globally threatened due to habitat loss and hunting along their migratory routes. During the biodiversity surveys in the project Aol, the species has been recorded in the vicinity of the villages of Crvici and Strogomishte.

The **European nightjar** (*Caprimulgus europaeus*) is a nocturnal species, common in most scrub and shrub habitats, and also present in young oak forests. It is widely distributed across the country, though its cryptic plumage and secretive behavior make it difficult to detect during the day. The species is migratory, breeding locally and wintering in sub-Saharan Africa. The national population is estimated at 2,000-4,000, but the species is considered relatively common and stable in appropriate habitats. Within the Aol, the species has been recorded in close proximity to Crvivci village.

The **grey-headed woodpecker** (*Picus canus*) occurs in a range of forest habitats, but it is rare and elusive everywhere. The national population is estimated at 200 to 500 pairs, which is probably an underestimation, as targeted surveys are essential to confirm the species, and even those are known to underestimate the population size. It can be spotted in floodplain alder forests, but it is also likely present in preserved oak forests. During the surveys, it has been spotted at the Strogomiska Reka stream, near Strogomiste village.

The **black woodpecker** (*Dryocopus martius*) has recently amplified its numbers throughout the wider region, and it is now residing even in less preserved forests. The national population is guesstimated at 1,500 – 5,000 pairs, with one pair occupying a few square km for foraging. It has usually inhabiting beech forests, but unexpectedly in fragmented poplar galleries in the studied area (a family with a young individual). It is present in the floodplain alder forests where signs of excavations are noticeable on dead trunks. Within the Aol, the species has been recorded at the Zajaska Reka stream, in the vicinity of Crvivci village.

The **middle spotted woodpecker** (*Dendrocopos medius*) prefers oak and other types of forest at a lower altitude, but it has also been spotted breeding in the beech forest of Bukovik Mt. It is normally present in all rather preserved forests, and the national population is estimated at 3,000 to 6,000 pairs. Within the Aol, the species has been recorded at the Zajaska Reka stream, and in the vicinity of Crvivci village.

The **red-backed shrike** (*Lanius collurio*) is a common and abundant species in all open areas with bushes, from lowlands up to 1,600 m altitude. Locally, it reaches densities of up to 4 pa/km², and the

national population is estimated to range between 15,000 and 50,000 pairs. During the surveys, the species has been sighted at the Strogomiska Reka stream, near Strogomiste village.

The collared flycatcher (*Ficedula albicollis*). Although more abundant than the semi-collared one on a European scale, the collared flycatcher is very rare in North Macedonia (100 – 1,000 pairs), seemingly connected with lowland riparian forests. Within the Aol, the species has been spotted at the Zajaska Reka stream, in the vicinity of Crvivci village.

3.1.2.3. Reptiles

Herman's tortoise (*Testudo hermanni*). The species is listed in Annex II and IV to the EU HD, and it is categorized as vulnerable (VU) on the National Red List of Reptiles of N. Macedonia. It prefers shrubs or openings in thermophilic forests; in N. Macedonia, most often oak or degraded forests of predominantly Jerusalem spine (*Paliurus spina-christi*) and/or false acacia (*Robinia pseudoacacia*). It favours habitats with preserved mosaic structures with both open patches and dense bush where it can hide during the hottest part of summer days. It can sometimes venture into arable land, particularly vineyards and occasionally orchards, or even urban parks. In the project area, it occurs at lower altitudes (up to 800 m), in hilly and open forest sites. During the biodiversity surveys in the project Aol, evidence of species occurrence has been established in the vicinity of the villages of Crvici and Strogomishte.

The Balkan green lizard (*Lacerta trilineata*) occurs in a broad range of habitats, usually with plenty of vegetation, such as forest edges, open woods, hedgerows along roads and paths, scrubland, overgrown fields, and gardens. The species is listed in Annex IV to the EU HD, and it is categorized as least concern (LC) on the National Red List of Reptiles of N. Macedonia. It is widely dispersed in the country as well as in the Aol, at lower altitudes (up to 1,200 meters) on hilly and open forest sites. Records of the species originate from the area of Crvici and Osoj villages, coupled with the Zajaska and Strogomiska rivers, close to Strogomiste village.

The green lizard (*Lacerta viridis*) is an omnipresent species in the country, inhabiting a myriad of habitats and localities, and it can be found within the boundaries of or around man-made habitats. It is very common in the country and in the Aol, at lower altitudes (up to 1,200 meters) at hilly and open forest locations. It has been observed near Crvici village and at the Strogomiska River, near Strogomiste village. The species is listed in Annex IV to the EU HD, and it is categorized as least concern (LC) on the National Red List of Reptiles of N. Macedonia.

The common wall lizard (*Podarcis muralis*) is a ubiquitous species in the country, present in scores of habitats and localities. It is one of the most successful species in man-made habitats, with a wide distribution, tolerance of a broad range of habitats, and presumed large population. The species is listed in Annex IV to the EU HD, and it is categorized as least concern (LC) on the National Red List of Reptiles of N. Macedonia. It has been spotted in the area of the villages of Osoj, Crvici, Kolibari and Strogomishte, but, in all likelihood, it is widely distributed in the Aol.

The large whip snake (*Dolichophis caspius*) inhabits dry areas of open scrubland and woodland, steppes and other grasslands, rocky hillsides, overgrown areas, vineyards, rural gardens, stone walls, and ruins. It is extensively distributed in the country as well as in the Aol, at lower altitudes (up to 900 m) in meadows and on hilly sites. The species has been found at the Zajaska River, near Crvivci village. The species is listed in Annex IV to the EU HD, and it is categorized as least concern (LC) on the National Red List of Reptiles of N. Macedonia.

The smooth snake (*Coronella austriaca*) has a wide distribution and tolerance of a broad spectrum of habitats. It is the most common in upland or montane areas, and overall, in hilly terrain. In the project area, it occupies various habitats, from plains to forest areas, and it has been sighted near Crvici village. The species is listed in Annex IV to the EU HD, and it is categorized as least concern (LC) on the National Red List of Reptiles of N. Macedonia.

The aesculapian ratsnake (*Zamenis longissimus*) is extensively distributed in the country. It is by and large found in arid, open woodlands, forested ravines, rocky outcrops, field edges, orchards, stone walls, and old buildings. The species is listed in Annex IV to the EU HD, and it is categorized as least concern (LC) on the National Red List of Reptiles of N. Macedonia. In the project area, it occurs in forest and riparian belts. Evidence of species occurrence has been established at the Zajaska River, near Crvivci village and the Strogomiska River, near Strogomiste village.

The nose-horned viper (*Vipera ammodytes*) is very widespread in the country. This species is associated with rocky areas but it tends to be opportunistic in other habitats. It occurs in dry, often rocky habitats, including open woodland and scrub, sand dunes, hillsides, scree, stone walls, traditionally cultivated land, etc. It equally favours man-made or natural rock formations. The species is listed in Annex IV to the EU HD, and it is categorized as least concern (LC) on the National Red List of Reptiles of N. Macedonia. Within the boundaries of the Aol, it has been recorded in the area of Crvici village.

The dice snake (*Natrix tessellata*) is commonly distributed in the country. It is highly aquatic, nearly always found close to or in bodies of water. It tends to occupy larger water bodies where it coexists with the grass snake. The species is listed in Annex IV to the EU HD, and it is categorized as near threatened (NT) on the National Red List of Reptiles of N. Macedonia. Within the Aol, it is habitually connected to greater rivers, such as the Zajaska river.

3.1.2.4. Amphibians

The fire belly toad (*Bombina variegata*). This species is considered abundant in N. Macedonia, with a patchy, fragmented distribution pattern. It may occur in coniferous, deciduous, and mixed forests, scrubland and meadows, floodplains, and grasslands. At low elevations, this species lives in deciduous forests; at higher altitudes, it is more often found in deciduous as well as coniferous forests and highland glades. The species inhabits various types of wetlands, including lakes, ponds, swamps, rivers, stream pools, springs (including mineral and thermal springs), puddles, reservoirs,

gravel and clay pits, ditches, and even water-filled wheel ruts. The species is listed in Annex II and IV to the EU HD, and it is categorized as least concern (LC) on the National Red List of Amphibians of N. Macedonia. Within the Aol, it has been spotted in suitable habitats along the Zajaska River.

The Greek stream frog (*Rana graeca*) is an Annex IV species, widespread in the country. Nevertheless, it is limited to appropriate habitats of forest and high-mountain streams and rivers. The species is listed in Annex IV to the EU HD, and it is categorized as near threatened (NT) on the National Red List of Amphibians of N. Macedonia. Within the project area, it is normally related to major rivers, such as the Zajaska and Strogomishka rivers.

The European tree frog (*Hyla arborea*) has a wide distribution and it is common in favourable habitats in the country. It is listed in Annex IV to the EU HD, and it is categorized as near threatened (NT) on the National Red List of Amphibians of N. Macedonia. The species is not so common in the area of interest, and its distribution is associated with major rivers (the Zajaska River).

The green toad (*Bufo viridis*) is considered moderately abundant to common over large portions of its range in the country. A couple of monitoring studies from the last four years hint that the species population trends across the country are stable. The species is listed in Annex IV to the EU HD, and it is categorized as least concern (LC) on the National Red List of Amphibians of N. Macedonia. It is abundant throughout the Aol.

The agile frog (*Rana dalmatina*) occurs in glades and open sites within light deciduous woodland (oak, willow, alder, hornbeam, etc.), and it is less frequent in meadows and thickets. It is listed in Annex IV to the EU HD, and it is categorized as near threatened (NT) on the National Red List of Amphibians of N. Macedonia. This species may inhabit meadows near the noteworthy water bodies such as the rivers of Zajaska and Strogomishka.

3.1.2.5. Fish

The Macedonian trout (*Salmo macedonicus*) is endemic to the upper Vardar river basin in North Macedonia. It is a restricted-range species with an EOO < 500 linear km. The species is threatened by habitat loss. The taxonomic status of this fish is controversial. In the Aol, Macedonian trout has been recorded at two locations of the Zajaska River.

The Danube barbel (*Barbus balcanicus*) is categorised both in Annex II and Annex V. In addition to the European and Mediterranean Red Lists, in the Global Red List (IUCN) the Danube barbel is categorised as a least concern species (LC). Evidence of species occurrence has been established at one location of the Zajaska River.

3.2. Protected Areas and Areas Proposed for Protection

3.2.1. Protected Areas and Features

This section renders a description of the natural areas in the vicinity of the project corridor that are of interest due to the value of their natural resources. Except for already declared protected natural areas, none of these areas have a legal status under the Macedonian legislation yet, which would entirely warrant their protection. These areas comprise the following:

- Protected natural areas declared (or anticipated to be declared) under the Macedonian law;
- Proposed areas for management of species;
- Other areas of natural interest without protection coverage (IBAs, IPAs); and
- Natural areas covered under the protection regime of European Union legislation or international conventions (Emerald sites);

3.2.1.1. Protected Areas and Proposed Protected Areas under Macedonian legislation

According to the Law on Nature Protection 67/2004, there are six categories of protected areas in Macedonia: Strict Natural Reserve, National Park, Monument of Nature, Nature Park, Protected Landscape, and Multi-Purpose Area. Categorisation of protected areas has been done in accordance with the International Union for Conservation of Nature.

There are three areas in the wider project area, which have been proposed for protection under the 2010 UNDP/GEF project *Development of a Representative Protected Areas' Network in the Republic of Macedonia*, which has not officially been accepted by the Ministry of Environment and Physical Planning yet. These are portrayed and listed in Table 3 below:

Table 3 Protected areas and proposed protected areas in the project area.

Code	Name of the Area	Protected / Proposed Protection Category	Surface Area (ha)
185	Mavrovo	National Park	73,463.51
378	Ubavica Cave	Monument of Nature	121
265	Studenchica	Monument of Nature (proposed)	864.69
215	The Bachishka Reka river	Nature Park (proposed)	101.51
550	The River Treska - Kichevo	Area for Species Management (European otter) - proposed	1,154.35

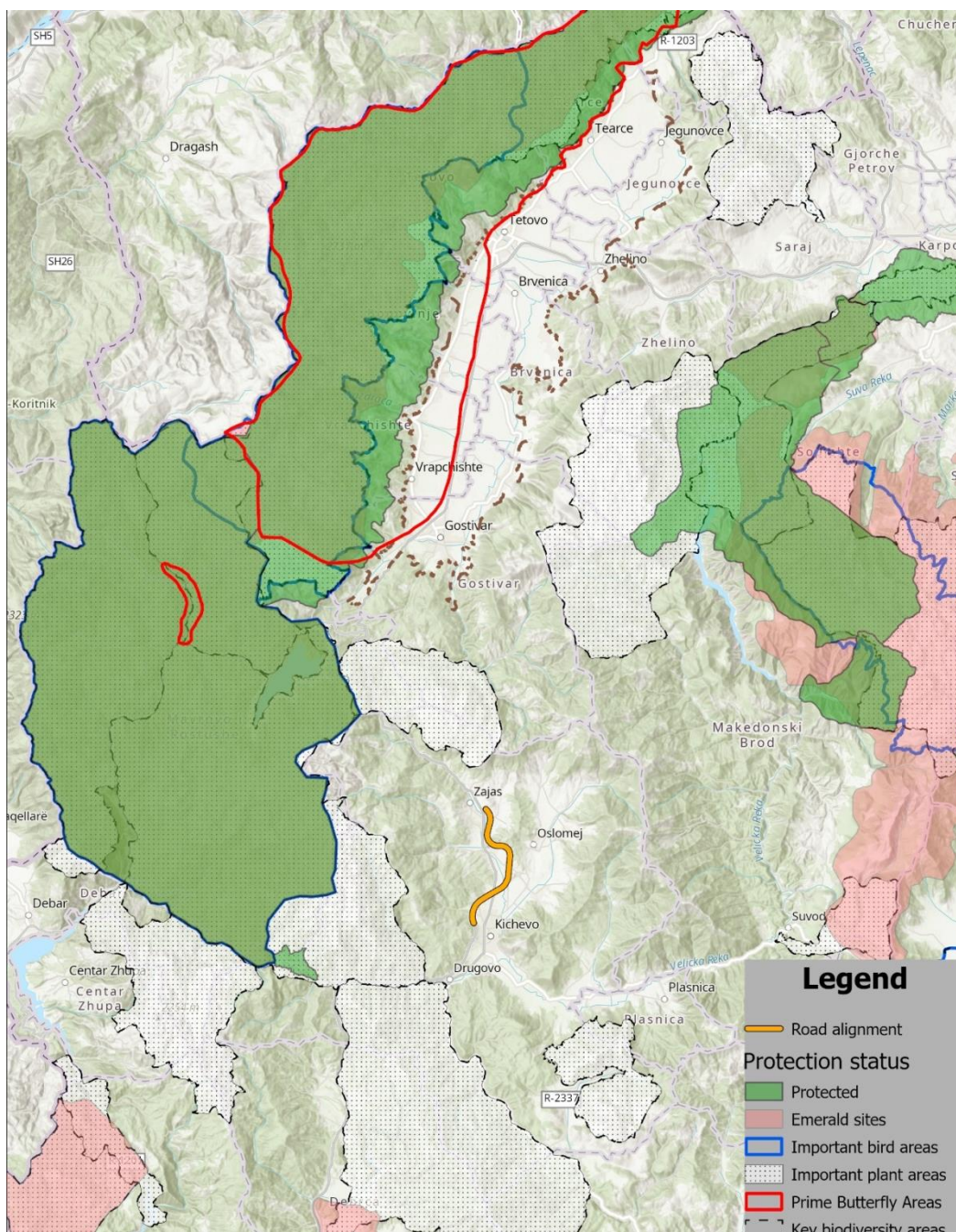


Figure 4 Protected areas and proposed protected areas in the project area.

3.2.1.2. Important Plant Areas (IPA)

The designation of Important Plant Areas (IPAs) is an initiative of Plantlife International aimed at identification of areas important for the diversity of wild plants based on the presence of endangered plant species, endangered habitats, and species richness.

Fact-sheets for the Macedonian IPAs are available on <http://www.plantlifeipa.org>

IPA Bukovik – Straza is located near the project area. It comprises important habitats at the European level related to EUNIS Classification E4.34 (C2) and G1.69 (C2). There are also three important plant species that meet A(iv) criterion: *Solenanthus scardicus*, *Centaurea grbavacensis* and *Erodium guicciardii*. The motorway corridor does not intersect the localities of the species mentioned above.

3.2.1.3. Important Bird Areas (IBAs)

The Macedonian IBA list counts 24 sites, covering 6,907 km² or 26.9% of the entire country's territory. All identified IBAs are far from the motorway corridor area. See Figure 4.

3.2.1.4. Emerald Sites

With the intention of promoting a European system of protected areas, in 2002, the Republic of Macedonia initiated the development of the EMERALD network. Fig. 4 displays the Emerald sites in Macedonia. There is one Emerald site (Mavrovo) in the central-western region of the country, which is situated far from the road alignment, and outside the area where the project is likely to have an impact.

Emerald sites are yet to be officially approved by the Council of Europe. The Macedonian legislation has neither incorporated the obligations arising from Article 6.4 of Habitats Directive 92/43 /EC concerning assessment of plans and projects significantly affecting Natura 2000 sites nor do similar requirements exist for Emerald network sites or ecological corridors.

3.2.2. Bio-Corridors

Bio-corridors connect different parts of a habitat, allowing movement of animals and/or plants between them. This movement can be a major survival factor for plenty of species in terms of modifications brought about by changes in land use, development and climate change. One function of bio-corridors is to preserve vital ecological processes and relations by sustaining the connection between habitats and species populations. Bio-corridors provide daily, periodical and/or seasonal movements and migrations of different animal species, accompanied by facilitation of plants propagation. They are of exceptional significance for normal progress of the life cycle of a plethora of animal species, such as the lynx, gray wolf, bear, ungulates etc.

A landscape corridor - Bukovik (Kolari) has been identified in the vicinity of the road corridor, via the MAK-NEN project implemented by the Macedonian Ecological Society¹¹, see Fig. 5. The corridor extends from the eastern slopes of Bistra Mt., close to the eastern boundary of Mavrovo National Park, via the southern slopes of Bukovik Mt., up to the western slopes of Suva Gora Mt (the southern

¹¹ Project on Development of the National Ecological Network in the Republic of Macedonia (MAK–NEN), implemented by the Macedonian Ecological Society and the European Centre for Nature Conservation (ECNC); in collaboration with the MoEPP, 2008 – 2011.

section of Suva Gora is known as Cheloica or Dobra Voda). It is vital for movement and seasonal migration of large carnivores and ungulates. The bottleneck Strazha (Kolari) is a key mountain passageway. It is the main transportation line from Skopje to Ohrid and Albania, which leads to fragmentation of substantial areas for crossing of animals.

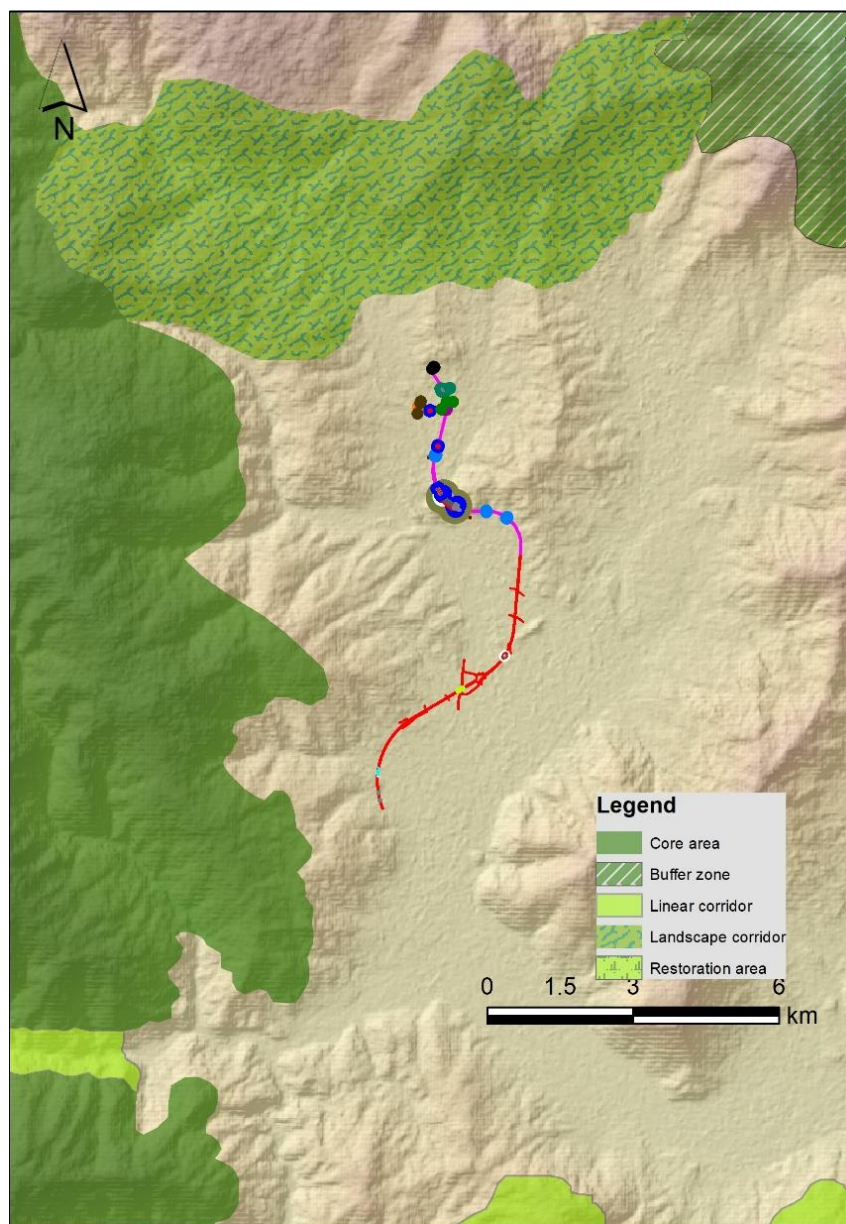


Figure 5 Location of landscape corridor Bukovik (Kolari), with the bottleneck Strazha – Kolari (the proposed road depicted in red).

4. Roles and Responsibilities

The PESR has the ultimate responsibility for ensuring that the CHA's commitments are met, and that the BMP is implemented correctly. Nevertheless, much of the day-to-day responsibility for ensuring implementation of management and mitigation measures outlined in this BMP will be undertaken by the contractor or contractors engaged in the on-site works.

PESR management roles and responsibilities include but are not limited to the following:

- Development of procurement conditions regarding biodiversity management;
- On-site professional training of their representative;
- Surveillance and control;
- Management of cooperation in case of environmental accident;
- Management of pollution derived from its own operations;
- Ensuring that all contractors and subcontractors working on this project are aware of the environmental and social protection measures to be implemented during the project, and verifying that such contractors implement the protection measures required, including those set forth in this BMP;
- Updating and implementation of the BMP during the operational phase.

Additional PIU Assistance Support for Bukojchani – Kichevo Road Section: A project implementation unit (PIU) consultant will assist in fulfilment of the above mentioned PESR responsibilities. The consultant will include a biodiversity expert with responsibilities as outlined below (4.1 Biodiversity expert).

The Supervision consultant will include a Supervisor Engineer with responsibilities, as outlined below (4.2 Supervisor Engineer).

The contractor will include biodiversity specialist, as outlined below (4.3 Biodiversity specialist) and they will be supervised by the supervising engineer.

4.1. Biodiversity Expert

On behalf of the Additional PIU Assistance Support for Bukojchani – Kichevo Road Section¹², the biodiversity expert will be in charge of the following:

- Training and capacity building of PESR staff;

¹² The PIU/PESR Technical Assistance Consultant, through its environmental expert, will engage a biodiversity expert, if necessary.

- As required, providing recommendations, guidance and training to the Supervisor Engineer and biodiversity specialist(s) a propos 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 reviewing delivery of the BMP with regard to the overall compliance with lender requirements, national legislation, etc.;
- Updating the BMP prior to operation;
- On behalf of the PIU, development of operational phase biodiversity monitoring plans.

The biodiversity expert will be an experienced in the field of: biodiversity mitigation, habitat restoration and monitoring in line with the lender's standards during construction and operation, and in linear projects inclusively.

4.1. Supervisor Engineer

The primary role of the Supervisor Engineer is to conduct supervision of implementation of mitigation measures charted in the BMP throughout construction. Specific responsibilities of the Supervisor Engineer and the supervision engineer entail the following:

- Warranting biodiversity documentation compliance and regular coordination with the contractor, PESR, PIU biodiversity expert, and the responsible units within the Ministry of Environment and Physical Planning and other stakeholders;
- Monitoring of the contractor's biodiversity monitoring activities during project's construction phase;
- Ensuring that the contractor undertakes planning of pre-construction mitigation measures seeking to ensure that environmental measures are streamlined into the planning process, including any seasonal constraints;
- Safeguarding that pre-construction surveys by the contractor are incorporated into the project planning and schedule, and that the results are used to revise the schedule, BMP, method statements and other documentation, as required, and
- Monitoring of contractor's implementation and observance of the BMPs via daily field notes and photographs, as follows:
 - Supervision essential for effective implementation of all mitigation measures, and ensuring compliance with general mitigation and management actions, as outlined in Section V.1;
 - Daily visits to the works during construction to verify compliance with MI02 to MI04, in particular whilst considering mitigation and management actions for MI05

to MI08;

- Supervision of on-going works, communications with worksite personnel, communications with the local population and stakeholder groups;
 - Monitoring of dump sites and borrow pits to guarantee effective implementation of all mitigation measures, and to ensure conformity with general mitigation and management actions during construction, as delineated in Section V.1;
 - Assembling data, information, and evaluations that will be used to report on actual work phase impacts and residual impacts (if any) following mitigation measures.
- Presentations on project environmental risk and mitigation to increase staff/worker environmental awareness and promote best practices;
 - Upon completion of construction works, generating a final report summarizing the employed impact reduction measures, their relative strengths, success, and weaknesses. This report will offer 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 prompt solutions to ecological issues, by gathering all interested parties together and agreeing on BMPs amendments, as necessary.

Attention shall to be paid to areas outlined in Appendix 1 & 2 – Locations of sensitive habitats.

If need arises, the Supervisor Engineer shall have the authority to contract a qualified ecologist / species specialist to support the implementation of the aforementioned responsibilities. The Supervisor Engineer shall have experience in implementation of lender's biodiversity requirements during construction and habitat restoration planning and implementation.

4.2. Biodiversity Specialist

The contractor shall appoint a biodiversity specialist to coordinate and ensure implementation of the BMP. The biodiversity specialist shall work in coordination with the Supervisor Engineer.

The overarching goal of a biodiversity specialist is the following:

- Translation of mitigation requirements written in BMP and other management plans into practical measures on the ground;
- Ensuring construction personnel are aware of seasonal constraints;
- Ensuring that all staff are fully aware of the site environmental sensitivities and their responsibilities thereof, as defined in the BMPs. This shall be conducted via practical talks ahead of construction phase.
- Warranting completion of all pre-construction surveys and pre-clearance surveys by

engagement of experienced experts in relevant biodiversity areas (e.g. amphibians; mammals etc.).

➤ Document Management & Review

- Maintenance of the BMP and its updating upon completion of pre-construction surveys. As a minimum, the BMP should be reviewed annually.
- Drafting biodiversity constraint maps to underpin location of sensitive areas, drafting of biodiversity protocols and method statements, such as tortoise rescue and relocation, including biosecurity protocols.
- Review and approval of method statements to ensure biodiversity risks have been accordingly considered, and that adequate management measures are specified.

➤ On-Site Activity

- Safeguarding that pre-construction surveys are planned, integrated into the project schedule, and implemented in adequate seasons in advance of the construction activities;
- Conducting walkthrough (rapid assessment) surveys right before launching of works in an area to identify features such as sensitive locations and species, including the presence of bird nesting areas and occurrence 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.
- Supervision of the site clearance works and providing advice to the workforce, as required; advising on the limits of the construction site when natural habitats may be affected to ensure compliance with general mitigation and management actions outlined in Section V.1.1: and Section V.1.2: MI01 to MI04;
- If clearance work occurs in multiple locations at any one time, the project ecologist may require additional assistance. If this is the case, additional field ecologists shall be recruited by the contractor for the sake of complete coverage of the sites.

➤ Training and Worker Awareness

- Organising worker awareness and training sessions on the subject of BMP requirements, the necessity of local fauna protection, and the code of conduct that forbids poaching or deliberate murder of animals;
- Contribution 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 detail on the site ecology, coupled with identification charts for species observed on the site.

- Preparation and implementation of biodiversity management and control measures as part of the Toolbox Talks (TBT), which should include protocols for recording of incidental sightings and any road casualties.
- Organization and training of personnel on animal rescue and relocation protocol.

➤ Checking and Reporting¹³

- Monitoring and reporting on adherence to the current BMP;
- Conducting daily / weekly checks of the site during construction, such as working areas for cleaning operations, and ensuring the requirements of the BMP are observed, and compiling of daily field notes;
- Monitoring of works and warranting that any species discovered are moved away from the work areas in accordance with the BMP;
- Maintenance of species database and weekly updating thereof based on site observations;
- Execution of biodiversity monitoring, data analysis and reporting throughout the project construction phase;
- Submission of all data and related assessments in a timely manner, and guaranteeing that field findings are reported back to relevant stakeholders at regular intervals (full reports to be submitted at least on a quarterly basis).
- Reporting to the Supervisor Engineer about any issues whatsoever of non-compliance or incidents that demand immediate action.

This individual may also ask for additional support when multiple contractors are included within the overall project work. At least one biodiversity specialist shall be recruited; yet, in some locations, additional biodiversity specialists may be required. For instance, at times of high intensity of 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 shall 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 possess working knowledge of broader environmental issues and of the construction/engineering process. If these skills are difficult to obtain in the country of implementation, training exercises to 'upskill' biodiversity specialists shall be organised by the contractor.

¹³ When the construction phase of 48 months is completed and the road is put into use, then the operational phase begins and lasts 24 months, i.e. 2 years designated according to the agreement as the DLP period. (2 years in the DLP period)

The biodiversity specialists shall have the following training and experience:

- Previous experience in construction projects, in particular linear projects (roads, railway lines, 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 implementation of lender's biodiversity standards during project construction, who can provide training on the afore-stated issues and support the specialist in updating the BMP, monitoring and reporting.

Monitoring should be focused in areas outlined in Appendix 3 – Locations of Sensitive Habitats.

4.2.1. Mammal Monitoring Specialist

The mammal monitoring specialist's principal task is to implement monitoring of notable mammal species, generate monitoring reports, and devise recommendations for supplementary mitigation measures or correct the existing ones. In the Aol, the monitoring should be focused on incidence and distribution of the Eurasian otter (*Lutra lutra*), and any changes whatsoever affecting the otter and its crucial habitats that may arise during road construction and operation. Prior to the beginning of the monitoring (after construction), the mammal monitoring specialist shall review the obtainable pertinent documentation (ESIA, BMP, etc.), and prepare detailed monitoring protocols for each of the monitoring activities. The specialist shall be recruited and monitored by the PESR.

The mammal monitoring specialist shall be in charge of data collection, information, and evaluation that will be used to report on actual impact during construction and residual impact following mitigation measures. The specialist shall also be accountable for contributing towards compiling of a final report recapitulating any changes in presence and distribution of the target species, the implemented impact reduction measures, their relative strengths, success, weaknesses. This report will render quantitative evaluations of total areas of critical and natural habitat areas lost, degraded, and protected during the construction phase period. Monitoring frequency will typically be monthly during construction, with increased supervision during periods of intensive work near aquatic habitats.

Post-construction monitoring will evaluate the effectiveness of mitigation measures and confirm continued use of suitable aquatic and riparian habitats by otters. Monitoring will continue for two years following construction, with longer monitoring periods recommended where Critical Habitat conditions are present or where significant habitat alterations occurred. Monitoring surveys should typically be conducted annually or biannually during the post-construction period.

Monitoring should be focused in areas noted for the occurrence of sensitive habitats and species, as drawn in Appendix 3 – Locations of Focus Monitoring Sites.

4.2.2. Birds Monitoring Specialist

The bird monitoring specialist shall be responsible for implementing long-term monitoring of priority bird species along the corridor, including the European turtle-dove, the European nightjar, the grey-headed, black and middle spotted woodpeckers, the red-backed shrike, and the collared flycatcher. Monitoring should be of duration of no less than two years, covering both breeding and migratory periods. Before monitoring begins, the specialist will review relevant documentation such as the ESIA and BMP, and prepare detailed protocols tailored to each species and habitat type.

Monitoring will focus on sensitive habitats identified in Appendix 2 & 3, such as open woodlands, scrub and shrub areas, oak forests, and floodplain alder stands. The specialist will collect and evaluate data on species abundance, breeding success, and habitat use, providing a clear picture of impacts during and after construction.

Finally, the specialist will prepare reports that assess the effectiveness of mitigation measures, highlight strengths and weaknesses, and recommend adjustments where necessary. A comprehensive final report will summarize habitat loss, degradation, and protection, offering quantitative evaluations and species-specific conservation recommendations.

Monitoring should be focused in areas prominent for occurrence of sensitive habitats and species, as stipulated in Appendix 3 – Locations of Focus Monitoring Sites.

4.2.3. Amphibians and Reptiles Monitoring Specialist

The amphibian and reptile monitoring specialist shall be in charge of surveying and monitoring of the identified CH amphibian and reptile species, generating monitoring reports, assessment of project impact, development of mitigation strategies, and monitoring their implementation to ensure development projects do not harm sensitive species or ecosystems. The specialist shall ensure that project activities adhere to the environmental standards required by the European Bank for Reconstruction and Development and integrated into the Environmental and Social Management Plan (ESMP), coupled with biodiversity conservation requirements under the Habitats Directive (Council Directive 92/43/EEC).

Within the Aol, species of particular conservation concern include the Hermann's tortoise (*Testudo hermanni*) and the yellow-bellied toad (*Bombina variegata*), both listed under Annex II and Annex IV to the Habitat Directive, and which may trigger Critical Habitat considerations where significant populations occur. Prior to the beginning of the monitoring (after construction), the herpetofauna monitoring specialist shall review the obtainable pertinent documentation (ESIA, BMP, etc.), and prepare detailed monitoring protocols for each of the monitoring activities. The specialist shall be recruited and monitored by the PESR.

During the construction phase, the herpetofauna specialist shall provide ecological supervision to ensure that mitigation measures are implemented effectively. The individual shall be in charge of data collection, information, and evaluation that will be used to report on actual impact during construction and residual impact following mitigation measures. The specialist shall also be accountable for contributing towards preparation of a final report recapitulating any changes in occurrence and distribution of the target species, the implemented impact reduction measures, 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 will mostly be conducted on a weekly basis or every second week during active construction, with amplified supervision during the spring breeding season.

Post-construction monitoring aims to assess the effectiveness of mitigation measures, and the recovery of amphibian and reptile populations. Monitoring will proceed for a minimum of two years following construction, with longer monitoring periods recommended where Critical Habitat conditions are present or where population recovery is indeterminate.

Monitoring should be focused in areas noted for the occurrence of sensitive habitats and species, as stipulated in Appendix 3 – Locations of Focus Monitoring Sites.

4.2.4. Fish Monitoring Specialist

The main task of the fish specialist is to implement monitoring of notable fish species, generate monitoring reports, and devise recommendations for supplementary mitigation measures or correct the existing ones. In the Aol, one shall be responsible for monitoring and protecting populations of *Salmo macedonicus* and *Barbus balcanicus* during road construction projects affecting river ecosystems, following environmental standards required by the European Bank for Reconstruction and Development, and integrated into the Environmental and Social Management Plan (ESMP). Prior to the beginning of the monitoring (after construction), the fish monitoring specialist shall review the obtainable pertinent documentation (ESIA, BMP, etc.), and prepare detailed monitoring protocols for each of the monitoring activities. The specialist shall be recruited and monitored by the PESR.

During the construction phase, the fish specialist will provide ecological supervision to ensure that mitigation measures are implemented effectively, and that construction activities do not significantly affect fish populations or the aquatic habitats. One shall be in charge of data collection, information, and evaluation that will be used to report on actual impact during construction, and residual impact following mitigation measures. The specialist shall also be accountable for contributing towards production of a final report recapitulating any changes in occurrence and distribution of the target species, the implemented impact reduction measures, their relative strengths, success, weaknesses. This report will render quantitative evaluations of any changes related to fish populations, accompanied by total areas of critical and natural habitat areas lost,

degraded, and protected during the construction phase period. Monitoring frequency will generally be weekly or every second week during active construction, with increased supervision during river crossing works.

Post-construction monitoring will assess the effectiveness of mitigation measures and the recovery of fish populations. Monitoring will continue for a minimum of two years following construction.

Monitoring should be focused in areas noted for the occurrence of sensitive habitats and species, as drawn in Appendix 3 – Locations of Focus Monitoring Sites.

4.3. Contractor Roles and Responsibilities

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

The overall responsibility for implementation of the current 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 a biodiversity consultant. In addition, short-term contracts will be signed between contractors and external specialists e.g. with specific expertise in a particular biodiversity area to ensure that the work is accomplished consistent with the current BMP.

5. Biodiversity Management Plan

The BMP is a "live" document, meant to be adapted and reinforced as the project progresses. In the event that impacts not anticipated by the ESIA emerge in the course of the project, and they necessitate mitigation, they will be added to the BMP and will be subject to EBRD approval. Mitigation should always be devised along the lines of the mitigation hierarchy with 'avoidance' as key, followed by 'reduce/minimise', 'restore', 'offset'.

It is worth underscoring that a fundamental assumption of the BMP is that during construction, properly qualified and trained staff (under the supervision and management of the Supervisor Engineer) will be in attendance on site, and engaged in inspection and verification that the various mitigation measures are implemented correctly.

5.1. General Mitigation Measures and Management Actions

Table 4: General mitigation measures and management actions; Co-Company¹⁴; Cr-Contractor

Focus	Specifics	Location	Requirement (Collection 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 I.3 of this BMP.	x	x	x	Cr – implement during construction. Co - implement in construction and operation.	Internal audit program and records.
Biodiversity - General	Engagement of biodiversity specialists.	All	The project will aim to minimize impact on notable species, along with loss, fragmentation, alteration, disturbance and disruption of habitats assessed as PBF and conservationally-important sensitive habitats. The major management tool in this respect will be the recruitment of biodiversity specialists. A minimum of one biodiversity specialist will be employed by the contractor in the construction phase who will work in close coordination with the Supervisor Engineer. The biodiversity specialist will be fittingly skilled for undertaking site supervision and species relocations as required.	x	x	x	Cr – implement during construction Co- implement in operation	Monitoring report, maps.

¹⁴ The Company (JPDP) will be represented by the selected Supervising Engineer.

Focus	Specifics	Location	Requirement (Collection mode / treatment / evacuation / final disposal)	Pre-construction	Construction	Operation	Responsibility	Verification Process
Biodiversity - General	Mitigation for sensitive habitats and species.	Sensitive habitats; important species.	Wherever such habitats or species occur, impacts will be mitigated through compensation, as outlined in the specific management actions (below). E.g. by scheduling works to a less sensitive time of the year, or application 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.	The biodiversity specialists, overseen and managed by the Supervisor Engineer, will perform a full inventory of the PBF/CH habitats that will be subject to removal (permanent loss) based on the final design, and identify sites subject to NNL/NG management actions. Additional mitigation will then be implemented so as to avoid impacts on the adjacent habitat patches. The biodiversity specialists will then generate 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 the biodiversity specialists.	x			Cr - implement	Inventory report, maps.

Focus	Specifics	Location	Requirement (Collection mode / treatment / evacuation / final disposal)	Pre-construction	Construction	Operation	Responsibility	Verification Process
Biodiversity – General	Pre-construction checks.	Important species.	Prior to the launch of vegetation stripping, the biodiversity specialists, overseen and managed by the Supervisor Engineer, will conduct pre-construction checks, to identify if any species of conservation concern inhabit the site. Additional mitigation will then be put in place to avoid impact upon such species. Checks will entail hollow trees and other places of shelter, roosting sites for birds, ponds for amphibians, etc. The biodiversity specialists will subsequently compile a monthly report pinpointing the sensitive locations. This will be shared with workers in a proper manner (e.g. toolbox talks) to ensure that sensitive areas are avoided and mitigation implemented.	x			Cr - implement	Monitoring report, maps.
Biodiversity – General	Training	All	The company will train internal staff or engage consultant support to offer suitable advice to contractors with an input from biodiversity specialists as necessary. The contractor will make their workers cognizant of the ecological sensitivities of the areas highlighted as being of conservational importance. The workers will also be trained in mitigation of 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 Supervisor Engineer should protected species be spotted on site in the absence of site supervision.	x	x		Co - implement Cr - implement	Field verification, monitoring reports, records.

Focus	Specifics	Location	Requirement (Collection mode / treatment / evacuation / final disposal)	Pre-construction	Construction	Operation	Responsibility	Verification Process
Biodiversity - General	Road signs.	Roads.	During construction, where there is potential for vehicle / wildlife collision, a speed limit of 20 km/h will be enforced for access roads that are not public. Along public access roads, proper signage shall to be installed.		x		Cr - implement	Field verification.
Biodiversity - General	Biodiversity specialist.	Forests, riparian habitats.	Where works in forests, riparian habitats or in water are inevitable, the biodiversity specialist will be in attendance on site during clearance to identify sensitive habitats and species present on site, especially nests with eggs/chicks, dens, burrows, hibernacula and other places of shelter to prevent direct mortality; ensure protection of sites with active otter holts. Mitigation measures shall be implemented in-the-field in relation to the specific biodiversity feature (time ban for construction, translocation of specimens to surrounding habitats, etc.).	x	x		Cr - implement	Field verification, monitoring reports, records.
Biodiversity - General	Escape ramps.	All	Pits and excavations will be filled in as soon as possible following works. Any pits that need to remain open overnight will have appropriate ramps to allow fauna to escape should they fall into them. The biodiversity specialists will conduct morning checks for fauna inside and in the immediate vicinity of excavations left open overnight. Landfills and pits should not be planned and should not be used where representative patches of riparian woodlands and belts		x		Cr - implement	Field verification, monitoring reports, records.

Focus	Specifics	Location	Requirement (Collection mode / treatment / evacuation / final disposal)	Pre-construction	Construction	Operation	Responsibility	Verification Process
			have been identified.					
Biodiversity - General	Nesting birds.	All	Damage to active bird nests will be avoided, and in case tree and scrub clearance occurs in the period from March to August, a pre-clearance nesting bird check of the vegetation will be undertaken by the biodiversity specialist (see Appendix 4). A decision on whether to move the nest or adjourn the clearance will be made by the Supervisor Engineer.	x	x		Cr - implement	Field verification, monitoring reports, photo records.
Biodiversity - General	Translocation.	All	In the unlikely event that a CH or PBF species is sighted within the project footprint, it will be moved to a nearby safe location. The location will vary dependent on the species but it should be within a safe environment in close proximity to the area of occurrence, in a suitable habitat for the species. Translocation will be carried out in the presence of a biodiversity specialist, in close coordination with the Supervisor Engineer, and in accordance with a species-specific Translocation Protocol developed by the biodiversity specialist.	x	x		Cr - implement	Field verification, monitoring reports, photo records.
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 spotted within the project footprint, it will be relocated to a nearby safe site.		x		Cr - implement	Field verification, monitoring reports, photo records.

Focus	Specifics	Location	Requirement (Collection mode / treatment / evacuation / final disposal)	Pre-construction	Construction	Operation	Responsibility	Verification Process
			The location will vary dependent on the species but it should be within a safe environment in close proximity to the area of occurrence, in a suitable habitat for the species. Translocation will be carried out in the presence of a biodiversity specialist, in close coordination with the Supervisor Engineer, and compliant with a species-specific Translocation Protocol developed by the biodiversity specialist.					
Biodiversity - General	Laydown areas.	All	Laydown areas and compounds will be selected to avoid unnecessary clearance of vegetation, particularly when working in close proximity to or within the boundaries of oak forests and riparian woodlands.		x		Cr - implement	Field verification, monitoring reports, photo record
Biodiversity - General	Barriers and crossing points.	All	Regular wildlife crossing points will be established to enable wildlife to cross excavations, berms and drainage channels. Fencing during construction will be minimized, bar where necessary to avert animal intrusion and potential animal fatalities on the road. For areas vital for wildlife, temporary barriers will be set up to discourage 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 rapid installation and adjustments.		x		Cr - implement	Field verification, monitoring reports, photo records.

Focus	Specifics	Location	Requirement (Collection mode / treatment / evacuation / final disposal)	Pre-construction	Construction	Operation	Responsibility	Verification Process
Biodiversity - General	Monitoring and management regimes.	All	Habitat reinstatement will be conducted by the contractor consistent with the Vegetation Management Plan. Restored and revegetated areas will be monitored, and, if necessary, mowing regimes will be employed to control growth of invasive species. The success of ecological restoration measures (where applied) will be monitored by the company's PIU for a minimum 24 months so that the effect of the adopted solutions can be validated.		x	x	Cr – implement and maintain during construction. Co – monitor and maintain post – construction.	Field verification, monitoring reports, photo records.
Biodiversity - General	Mitigation for sensitive habitats and species.	All	Vigilant management of networks of ditches and boulders so as to provide alternative habitats for species, predominantly amphibians and reptiles.		x	x	Cr - mplement.	Field verification, monitoring reports, photo Records.
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 Records.

Focus	Specifics	Location	Requirement (Collection mode / treatment / evacuation / final disposal)	Pre-construction	Construction	Operation	Responsibility	Verification Process
Biodiversity - General	Lighting.	All	The site will not be illuminated apart from extraordinary circumstances. Where lighting is required, it will be directional (pointing away from forest habitats), and the lighting strategy will be designed with an input by the biodiversity specialist. Thus, potential impact upon nocturnal species will be diminished. Furthermore, strong lighting sources shall be avoided since they may disturb migration of certain species.		x		Cr - implement	Field verification, monitoring reports, photo records.
Biodiversity - General	Dead wood, boulders.	Forested areas.	During long-term construction works, no less than 20 temporary hosting structures made of naturally occurring materials (branches, logs, barks, rocks and mud) will be installed in the vicinity of riparian woodlands, grasslands, meadows and forests to ensure no net loss for insects, amphibian and reptiles species, which utilize these features.		x		Cr - implement	Field verification, monitoring reports, photo records.
Biodiversity - General	Replanting.	Forests and woodlands	In the course of the ecological restoration phase, a series of measures will be implemented 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 (12.6 ha minimum) (see Table 5).		x	x	Cr - implement and maintain during construction Co - monitor and maintain post construction	Field verification, monitoring reports, photo records.

Focus	Specifics	Location	Requirement (Collection mode / treatment / evacuation / final disposal)	Pre-construction	Construction	Operation	Responsibility	Verification Process
Biodiversity - General	Replanting.	Forest vegetation.	Throughout the restoration phase, an array of measures will be implemented to mitigate the impact of fragmentation by replanting of forest plantations with fitting species (e.g. alder, willow, poplar, oak) aimed at mitigation of disruption to species habitats. Replanting with seedlings of local oak species (<i>Quercus cerris</i> , <i>Quercus frainetto</i>) can also be considered despite the fact that the success rate is anticipated to be lower and re-vegetation will take longer.		x		Cr - implement Co - maintain during operation	Field verification, monitoring reports, photo records.
Biodiversity - General	Mitigation for sensitive habitats and species.	Access roads.	Existing roads shall be utilized as a priority. Construction of new access roads will be avoided unless essential. 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.	Resorting to low-impact vehicles (in terms of emissions and load bearing) where applicable. Consideration of biofuels or electric vehicles usage.		x		Cr	Field verification, monitoring reports.
Biodiversity - General	Landfill.	There is one landfill at km 5+350 to km 5+530	Confinement of the material to the proposed landfill site. Prevention of dispersal of waste material to the surrounding area. The landfill shall be used for deposition of excavated soil and stones.		x		Cr	Field verification.

Focus	Specifics	Location	Requirement (Collection mode / treatment / evacuation / final disposal)	Pre-construction	Construction	Operation	Responsibility	Verification Process
		located in an agricultural area.						
Invasive species	Removal.	All	A site-wide ban on workers bringing vegetation or soil from outside the confines of the site seeking to preclude dispersion of non-native invasive species (<i>Robinia pseudacacia</i>). All vehicles and equipment will be washed down before entry to the sensitive sites. Monitoring of implementation in the forested areas with road cuts will be performed by a biodiversity specialist, especially in the following sections: from start to km 1.750; entry to and exit from the tunnel; km 4+400 to km km 6+600; km 9+800 to km 12+728).		x	x	Cr – implement during construction. Co- implement during operation.	Field verification, monitoring reports.
Water bodies	Waste and vehicle management.	All	Implementation of obligatory actions to prevent oil leakage to avoid water contamination and adverse impact to aquatic species (installation of drainage structures and oil separators). Evade movement of heavy machinery in watercourses wherever possible to preclude 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 conducted pursuant to the Landscape Management Plan (LMP), generated 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 delineated in the BMP, chapters 5.2 and 5.3. Post-construction monitoring of implemented management actions will be executed by the PE PERI's Project Implementation Unit (PIU), with initial support by the biodiversity expert from the PIU consultant.

Table 5: Specific mitigation measures and management actions for sensitive habitats.

ID	Habitat Type and Location	Impact	Mitigation / Management Action	Frequency of Action	Responsibility
MI01	G1.762 Helleno-Moesian [<i>Quercus frainetto</i>] forests. HD ref.: 91M0 Pannonian-Balkan turkey oak – sessile oak forests. Assessed as PBF. Position of the chainage: km 7-950 km 3+510 to km 4+700 km 4+800 to km 4+950 Locations for replanting: KO Knezhino, kp. 1/1; Drenovo forestry unit.	Habitat loss / degradation resulting from clearing and permanent removal of vegetation in the process of motorway construction, accompanied by clearing vegetation to secure access to locations. Motorway construction will affect the edges of the largest oak forest near the village of Kolibari, on Guri I Mad hill. The other portion of this habitat patch will not be affected as the motorway enters a tunnel (starting at Km 3+991; 334m in length). Nonetheless, potential impact upon these habitats will be mitigated and no net loss will apply.	Felling of large trees (diameter over 1m) shall be undertaken in the presence of the Supervisor Engineer, in coordination with the biodiversity specialist, to ensure that no harm is done to any nests, bat roosts. In sensitive (Fig.6 and Fig. 7) and species-specific areas, minimisation of noise during excavation and construction works (i.e. demolition, earth moving or vehicle disturbance) between April and June. Where unfeasible, usage of auger drilling rigs rather than percussion rigs (the former reduce vibrations and noise). When working in sensitive areas, the presence of a Supervisor Engineer/specialist is mandatory. During the design of construction works, the usage of current access roads and other current works-related facilities will always be preferred. Contracts with contractors should include monetary sanctions to be applied in case their vehicles or staff penetrate forests more than essential to conduct construction works.	Construction.	Cr - to implement in consultation with PE National Forests, the conservational NGO. Co - to conduct monitoring and maintenance during operation.

ID	Habitat Type and Location	Impact	Mitigation / Management Action	Frequency of Action	Responsibility
			Dead-wood should be retained on site. These are natural oak forests. Hence, although replanting with seedlings is feasible, replanting will take areas of natural grasslands, therefore, it is not recommended. As an alternative, due to biodiversity disturbance, induced habitat loss, and the length of time for natural regrowth and forest regeneration, biodiversity offset is proposed. Given that 4.1 ha of oak forests will permanently be lost, and with further contemplation about the significance of this habitat for supporting species important for conservation, the area loss must be compensated by an area of 8.2 ha. Biodiversity offsets will take the form of upgrading and restoration of oak forest degraded by impact unconnected to the project. Continuous monitoring by a Supervisor Engineer /biodiversity specialist, during the first year of construction activities completion, and once per annum for the following 2 years of motorway operation. In this period the National Forests will be obliged to submit reports on the status, progress and success of the afforestation to the PESR.		
MI02	G1.12 Mixed riparian floodplain and gallery woodland. HD ref: 91E0 *Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (Alno-Padion,	Bearing in mind its coverage in the area of interest, riverine and riparian woodland is deemed a very sensitive habitat. The majority of these habitats will be bridged; yet, there will be habitat loss/degradation resulting from clearing and permanent removal of vegetation in the process of motorway construction, coupled with clearing vegetation to secure access to	Silt fences will be used in areas of wet open cut, strategically positioned to inhibit downstream Sedimentation. Banks would be restored using either gabion cages or wooden revetments to ensure soil/integrity before vegetation matures to provide soil stability.	Construction and operation.	Cr - to implement in cooperation with PE National Forests and/or a conservational NGO.

ID	Habitat Type and Location	Impact	Mitigation / Management Action	Frequency of Action	Responsibility
	<i>Alnion incanae</i>, <i>Salicion albae</i>). [Dominant species in this habitat is Balkan alder <i>Alnus rohlenae</i> and White willow <i>Salix alba</i>. There are no trees of <i>Alnus glutinosa</i> or <i>Fraxinus excelsior</i> in the studied habitats along Zajaska Reka at the highway crossing] Assessed as CH. Replanting locations: Polog, KO Glogji von grad, KP 909. Assessed as CH. Chainage: km 8+170 to km 8+700 Central coordinates of the small patches (narrow belts): 20.954095, 41.594985 20.955881, 41.586938 20.956036, 41.588493	sites during bridges' construction. This is especially noteworthy in terms of the riparian stand along the Zajaska Reka river in the vicinity of Crvivci village. The potential impact upon the aforementioned habitats is assessed as non-significant, in comparison with degradation triggered by construction activities during implementation of other infrastructural projects in the area. Nevertheless, care should be taken to avoid any further negative impacts during the motorway construction.	Randomly disposed waste (concrete, iron, rocks and stones etc.) are to be removed from the aforesaid habitats on a daily basis without delay. Bearing in mind that project implementation is estimated to affect a total area of 4.2 ha, replanting shall be applied in an area of no less than 12.6 h (see Appendix 6). Under the presumption that revitalization of riparian forests is unaffected by other disturbances (natural disasters, trampling by humans, cattle etc.), re-vegetation success is projected to be high. Monitoring is to be conducted by a biodiversity specialist and species experts engaged to support the company PIU during the first year of completion of construction activities. Experts are to be engaged by the Contactor to conduct monitoring on a yearly basis for the next two years of motorway operation. In this period the National Forests will be obliged to submit reports on the status, progress and success of the afforestation to the PESR.		Co – to conduct monitoring and maintenance during operation.

ID	Habitat Type and Location	Impact	Mitigation / Management Action	Frequency of Action	Responsibility
MI03	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. Assessed as PBF. Locations for replanting: Polog, KO Glogji von grad, KP 909 Chainage: km 12+030 to km 12+060	Taking into consideration its limited coverage in the area of interest, riverine and riparian woodland is deemed a sensitive habitat. The majority of these habitats will be bridged; yet, there will be habitat loss/degradation resulting from clearing and permanent removal of vegetation in the process of motorway construction, coupled with clearing vegetation to secure access to sites during bridges' construction. The potential impact upon these habitats is assessed as non-significant, in comparison with degradation triggered by construction activities during implementation of other infrastructural projects in the area. Yet, care should be taken to avoid any further negative impacts during the motorway construction.	The crossing method has been determined by considering the river width, riverbed composition, and river volume and flow. Silt fences will be established in areas of a wet open cut, strategically positioned to prevent downstream sedimentation. Banks would be restored using either gabion cages or wooden revetments to ensure soil/integrity before vegetation matures to provide soil stability. Randomly disposed waste (concrete, iron, rocks and stones etc.) are to be removed from the aforesaid habitats on a daily basis without delay. Re-planting of native <i>Salix</i> species (<i>Salix alba</i>, <i>Salix fragilis</i>) and poplar (<i>Populus alba</i>) will be executed as appropriate. Given that project implementation is estimated to affect a total area of 0.2 ha, replanting should be applied in an area of at least 0.4 h. Under the presumption that revitalization of riparian forests is unaffected by other disturbances (natural disasters, trampling by humans, cattle etc.), re-vegetation success is projected to be high. In collaboration with an environmental NGO, PE National Forests. Monitoring is to be conducted by a biodiversity expert and species experts engaged to support the company PIU during the first year of completion of construction activities. Experts are to be engaged directly by the PESR to conduct monitoring on a yearly basis for the next two years of motorway operation. In this period the National Forests will be obliged to submit reports on the status, progress and success of the afforestation to the PESR.	Construction and post-construction.	Cr - to implement in cooperation with PE National Forests and/or a conservational NGO. Co - to conduct monitoring and maintenance during operation.

ID	Habitat Type and Location	Impact	Mitigation / Management Action	Frequency of Action	Responsibility
M104	C2.31 Epipotamal streams. HD ref: 3260 Water courses of plain to montane levels with the <i>Ranunculus fluitantis</i> and <i>Callitriche-Batrachion</i> vegetation. C2.5 Temporary running waters. HD ref.: 3290 Intermittently flowing Mediterranean rivers of the <i>Paspalo-Agrostidion</i>. Assessed as PBF. River crossings 20.956153 41.588523 20.956587 41.580373 20.972454 41.550199 Crossings of intermittent streams: 20.969015 41.576681 20.969929 41.576602 20.970129 41.576552	Motorway construction can cause a double negative effect on rivers and streams due to partial destruction of habitats (attributable to similar reasons as in coastal vegetation and gravel banks), along with pollution produced by incidental spillage of pollutants (e.g. lubricating oils and fuel from construction mechanization, eroded soil, etc.).	Avoidance of natural habitats disturbance and pollution substances input. The material originating from construction of haulage roads, bridges and tunnels (rocks, pebbles, cobbles, soil, plants) is not to be disposed of into rivers. Haulage roads should not be traced along the riverbed, and sufficient area of riparian vegetation should remain in order to prevent direct input of dust, sand and other material during the usage of haulage roads. For the purpose of prevention of any storage whatsoever of construction material near rivers, waste material from construction activities should be properly disposed of and removed from rivers or their vicinity. Barrels or tanks where hazardous materials are stored (oil, fuel, dyes) must be placed at appropriate and marked sites, at a distance 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. Handling of wet cement must be done in a watchful and controlled mode to avoid contamination of river ecosystems. During construction of bridge piers, leakage of cement into rivers must be prevented. If there are specific batch plants,	Construction and operation.	Cr - to implement in during construction Co - to conduct monitoring and maintenance during operation.

ID	Habitat Type and Location	Impact	Mitigation / Management Action	Frequency of Action	Responsibility
	20.973158 41.575430 20.960856 41.543590 20.945570 41.535855 20.941551 41.528961 20.941564 41.524606		make sure there is no liquid run-off that may enter a waterway with any residual cement or sediments. Avoidance of disposal of excavated material next to riverbeds. Gravel and sand from the riverbed and the alluvial plain should not be utilised. For the period of construction, regular supervision by the Supervisor Engineer is recommended, in close cooperation with the biodiversity specialist. Effects on streams are assessed as temporary. Accounting for 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 for the impact. Restoration should include removing any hydromorphological alterations made to the banks, to equate the affected area in order to achieve no-net loss. Spawning period of Macedonian trout (December-January) and Danube barbel (May-June) shall be avoided. Actions proposed for achieving net-gain for the <i>Alnus</i> woodland apply since revegetating banks subjected to disturbance would generally contribute to restoration of ecological integrity of streams in the area of interest. Monitoring shall be performed by a biodiversity expert and species experts engaged to support the company PIU during the first year of finishing construction activities. Experts are to be engaged directly by the PESR to conduct monitoring on a		

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ID	Habitat Type and Location	Impact	Mitigation / Management Action	Frequency of Action	Responsibility
			yearly basis for the next two years of motorway operation, during the DLP period.		

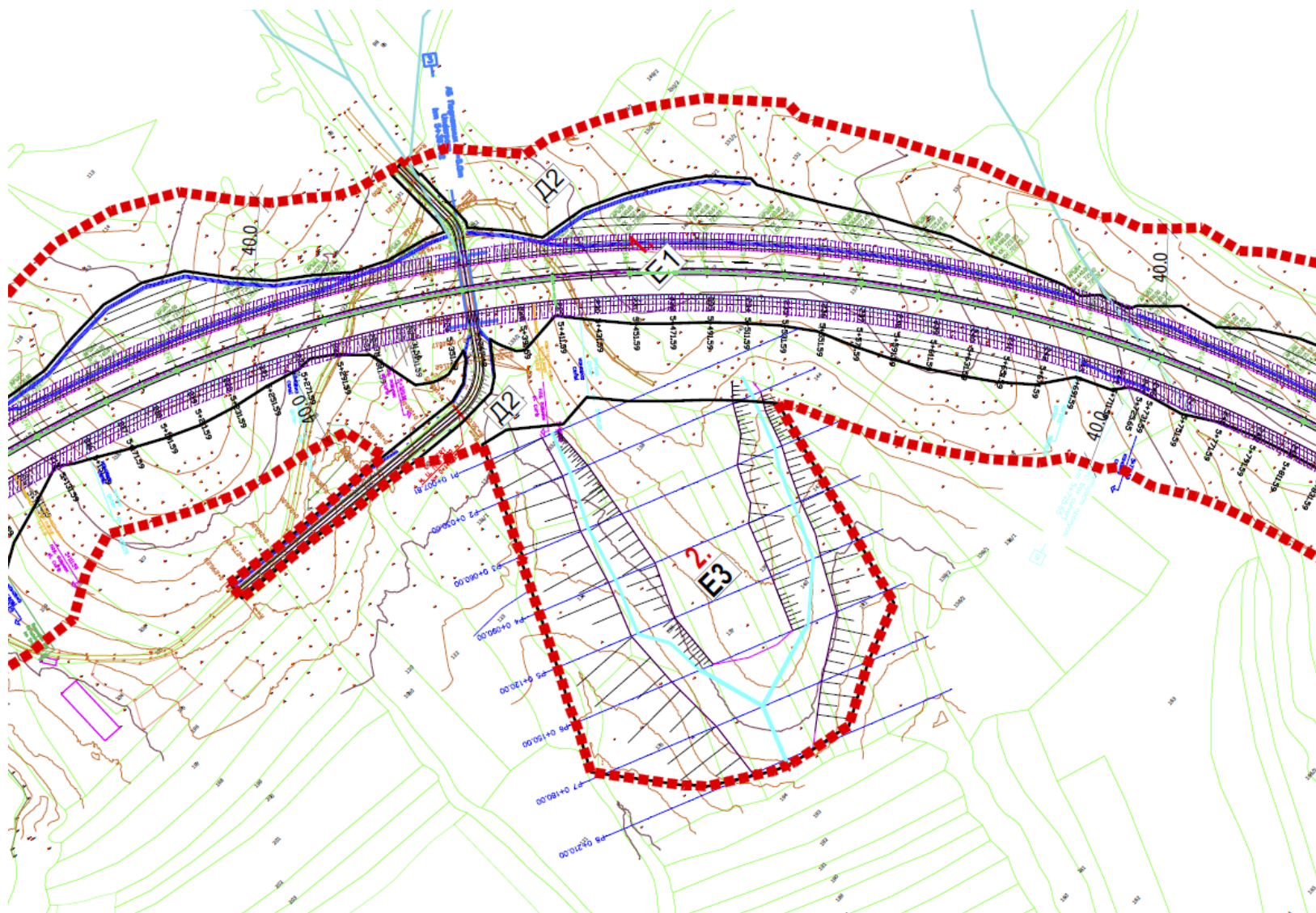


Figure 6 Planned location of the borrow pit along the motorway alignment.

Table 6 Specific mitigation measures and management actions for species.

ID	Species/Species Group	Mitigation / Management Action	Frequency of Action	Responsibility
MIO 8	Eurasian otter (<i>Lutra lutra</i>)	Prior to the works launch, contractors are to be briefed about otter biology and ecology, and the need for being proactive in implementation of measures for protection of otter and its habitats. Areas where bridge crossings are to be set up should be inspected for otter presence prior to the launch of works. If otter presence (direct sighting, prints, a holt or lie-up) is confirmed onsite during construction, halt construction until proper advice has been sought from a biodiversity specialist. Completion of the crossings during the low-flow season (preferably August-October) in order to reduce impact of sediment and pollution dispersal. Securing one side of the river so as to remain intact as long as possible when constructing the bridge crossings to maintain otter safe access to their ranges. Locating activities away from recognized otter habitats, counting the siting of working compounds, storage and disposal of excavated material, construction of embankments, access roads. Promotion of proper and timely restoration of native riparian vegetation along the affected river bank. Controlling of the area pollution by means of proper waste disposal, and undertaking preventive measures to avoid accidental pollution. Avoidance of construction work during the night. Prohibition of illegal hunting for workers/visitors. Mandatory monitoring for otter occurrence during construction and for no less than 24 months during road operation.	Pre-construction, construction, DLP period.	Cr - to implement prior to and during construction. Co - to implement during operation.

ID	Species/Species Group	Mitigation / Management Action	Frequency of Action	Responsibility
MI11	Birds (in general), with particular attention to the following species: European turtle dove (<i>Streptopelia turtur</i>); European nightjar (<i>Caprimulgus europaeus</i>); Black woodpecker (<i>Dryocopus martius</i>); Middle spotted woodpecker (<i>Dendrocopos medius</i>); Collared flycatcher (<i>Ficedula albicollis</i>); Red-backed shrike (<i>Lanius collurio</i>); Grey-headed woodpecker (<i>Picus canus</i>).	Vegetation clearance will be meticulously planned to reduce habitat loss and fragmentation. Wherever viable, removal of mature trees, cavity-bearing trees, hedgerows, and shrub belts will be avoided or minimised because these features provide essential nesting and feeding habitats for woodpeckers, flycatchers, turtle doves, and shrike species. Selective clearance practices will be preferred over large-scale removal, and ecological connectivity between forest patches shall be maintained to allow continued movement and habitat use by bird populations. For the purpose of decreasing the collision risks associated with motorway infrastructure, all overhead structures, including lighting systems, gantries, and associated electrical installations will incorporate bird-visibility measures where relevant. Marking devices, such as coloured spirals, reflective markers, luminous elements, or similar bird flight diverters will be installed to increase visibility and reduce collision risks, particularly for species flying at low or crepuscular heights, such as the European turtle dove and the European nightjar. Where electrical infrastructure is present, measures are to be implemented to minimise electrocution risks. Hazardous sections of electrical components will be insulated, and pole and support structures will be designed to prevent birds from simultaneously contacting energised elements. Suspended insulators will be preferred over rigid insulators with the aim of reducing the electrocution risk on structures utilized by birds as perching sites. Noise and visual disturbance during construction will be limited as much as practicable, particularly near suitable breeding habitats. High-noise activities shall be restricted during sensitive breeding periods, and night-time construction works will be avoided in areas favourable for the European nightjar, a species particularly sensitive to disturbance and artificial lighting. Construction lighting will be directional and shielded to prevent unnecessary illumination of neighbouring habitats. Noise barriers and protective fencing installed along the motorway, principally on bridges, will be designed to minimise bird collisions. Transparent barriers will consist of polycarbonate materials with a minimum thickness of 20 mm and shall include visible markings or patterns to ensure detectability by birds. Where required for structural stability, a concrete base fence of approximately 10 cm thickness may form part of the	Pre-construction, construction.	Cr- to implement prior to and during construction. Co – to monitor during operation.

ID	Species/Species Group	Mitigation / Management Action	Frequency of Action	Responsibility
		barrier, with the remaining height achieved using marked polycarbonate elements to maintain visibility while ensuring safety performance. Where habitat loss cannot be fully avoided, habitat restoration and enhancement measures will be implemented alongside the motorway corridor. This may include planting native shrubs suitable for the red-backed shrike and turtle dove, maintenance of woodland edge structures, and installation of nest boxes for cavity-nesting species where appropriate. Such measures aim to compensate for habitat disturbance as well as maintain ecological functionality within the landscape.		
MI12	Amphibians and reptiles (with an emphasis on <i>Testudo hermanni</i>) considering the following: Reptiles: <i>Herman's turtle (Testudo hermanni)</i>; <i>Balkan green lizard (Lacerta trilineata)</i>; <i>Green lizard (Lacerta viridis)</i>; <i>Common wall lizard (Podarcis muralis)</i>; <i>Caspian whip snake (Dolichophis caspius)</i>; <i>Smooth snake (Coronella austriaca)</i>;	The road working corridor and temporary construction compound footprint should be surveyed before launch of works in order to identify any inhabiting amphibian and reptile individuals. This will be executed in keeping with the vegetation clearance method statement (including the check survey methods). Via the use of tool box talks, informing and educating the workers, that killing of animals is prohibited within the project area during construction (amphibians, reptiles, birds, mammals). Piling crushed rock (resulting from construction) near abutments to create a reptile habitat. Construction of at least 25 rock piles (start to km 1+600; km 5+100 to km 6+500). Creation of at least 3 small ponds (cca 50m²) in the area of alder woodland, close to the Zajaska Reka river (km 8+170 to km 8+700). Removal of solid waste from the alder woodland at the Zajaska Reka river (km 8+170 to km 8+700). Usage of heavy machinery will be restricted to the project RoW to avoid additional habitat fragmentation and degradation and soil subsidence. Avoidance of killing and posing serious injuries to the native herpetofauna during clearing of vegetation.	Pre-construction, construction, DLP period .	Cr - to implement prior to and during construction. Co - to implement during operation.

ID	Species/Species Group	Mitigation / Management Action	Frequency of Action	Responsibility
	<i>Aesculapian snake (Zamenis longissimus);</i> <i>Nose-horned viper (Vipera ammodytes);</i> <i>Dice snake (Natrix tessellata).</i> Amphibians: <i>Yellow-bellied toad (Bombina variegata);</i> <i>Greek stream frog (Rana graeca);</i> <i>European tree frog (Hyla arborea);</i> <i>Green toad (Bufotes viridis);</i> <i>Agile frog (Rana dalmatina).</i>	Found individuals will be relocated to a suitable receptor site outside the project footprint in accordance with the fauna relocation method statement. Pits and excavations will be filled in as soon as possible following works. Those that must remain open for longer than 48 hours will have proper ramps installed to enable fauna to escape should they fall inside the pits. Morning checks for fauna will be conducted for excavations left open overnight. Accidental pollution of aquatic habitats is to be prevented, ensuring that maintenance and repairing machinery, changing oil, refuelling, etc. are not conducted in the vicinity of watercourses and wetland habitats. The construction phase in high risk areas of tortoise nests (forests and forest edges, Appendix 2) 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 vegetation is not as abundant and high, so individuals, particularly juveniles (30-70mm long) can be spotted more easily and transported before construction activities cause them harm. Installation and usage of appropriate preventive equipment (exclusion fences, olfactory repellents, sound signals and sound barriers) that prevent crossing of roads is recommended so as to minimise mortality in the road operation phase. Locations and specifications on the best preventive solutions should be refined based on pre-construction surveys. Transects shall be defined in suitable habitats, where the effects of road mortality will be monitored during the active spring season for the two year of operation to ensure that mitigation measures are effective. Wildlife passages, including box-culverts, should be constructed and maintained, as they are beneficial not only for tortoises, but also for a significant portion of biodiversity. Locations for crossings, underpasses, overpasses, culverts are to be determined and detailed during preconstruction checks and included in the project design.		
MI13	Fish: Macedonian trout (<i>Salmo macedonicus</i>)	Before the start of project activity, construction workers will be trained on the natural values of the area, especially on the life cycle of trout and barbel, accompanied by the need to be proactive in implementation of measures for protection of aquatic habitats.	Pre-construction,	Cr - to implement prior

ID	Species/Species Group	Mitigation / Management Action	Frequency of Action	Responsibility
	Danube barbel (<i>Barbus balkanicus</i>)	Implementation of the best practice for sedimentation management of river downstream and in the riverbed where constructions will occur (e.g. silt mat, silt net etc.; vegetation cover should be maintained to provide necessary roughness). Implementation of the best management practice to prevent erosion during work on the riverbank or during the activities related to road widening (e.g. straw bales barriers and / or silt fences). Limit machinery traversing of the watercourse to a one-time event (i.e., over and back), and only if no alternative crossing method is available. If repeated crossings of the watercourse are required, construct a temporary crossing structure. Avoidance of construction activities in the proximity of the river Zajaska Reka during the spawning period for Macedonian trout (November-January) and Danube barbel (May-June). The work for the bridges should occur in a manner that minimises disturbance to the watercourse banks. Relocation of the river should be conducted consistent with the Agency protocols and permit requirements; therefore, the impact will be minimised. Avoidance of destruction of riparian vegetation along the river course. When construction linked to installation of bridges is rounded up, the stored bed material is to be used to restore the river bed. Restoration of any affected banks by re-establishing the native riparian vegetation. Cleaning of debris and other waste from the construction activities on a daily basis. After finishing the daily work, the part of the mechanization that remains should be at least 15 m away from the river, thereby preventing washing of the machine with rainwater and pouring it into the river. Caution is to be taken not to introduce toxic substances into the water.	construction and DLP period .	to and during construction. Co – to implement during operation.

5.3. Monitoring and Evaluation Plan

Implementation of mitigation measures for biodiversity and their effectiveness is the main concern of the Biodiversity Monitoring and Evaluation Plan (BMEP). The current plan will also assist in improvement of mitigation and avoidance strategy by adaptive management.

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

Table 7 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.	Desktop work.	Inspection of the prepared project and technical documentation, plans and checklists, permits, consents, approvals, etc. and performing screening to ensure that all pre-construction actions and measures have been implemented.	Prior to the start of construction activities.	Supervisor Engineer, with support from the biodiversity expert.	Company. Contractor.
MON02	Monitoring of implementation of all mitigation measures.	Proper implementation of mitigation measures.	The entire alignment.	Daily visual inspection of construction activities, and their adherence to BMP (in connection to MON01).	During the entire construction period. Daily inspections.	Biodiversity specialists. Supervisor Engineer.	Contractor. Company.

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ID	Monitoring activity / Indicator	Objectives	Where?	How?	Period and Frequency	Performed by	Responsibility
MON03	Monitoring of bridges construction and motorway sections close to the rivers.	Avoidance of critical habitats degradation.	In the area of the following habitats: riparian belts, rivers and streams.	Daily visual inspection of construction activities and their compliance with BMP (in connection with MON01).	During the entire construction period. Daily inspections.	Biodiversity specialists. Supervisor Engineer.	Contractor. Company.
MON04	Monitoring of animal occurrence during construction works (amphibians, reptiles, bird nests, chicks, etc.).	Avoidance of animal killing.	The entire alignment.	Daily visual inspection of construction sites. Communication and education of workers.	During the entire construction period. Daily inspections.	Biodiversity specialists. Supervisor Engineer.	Contractor. Company.
	BIODIVERSITY MONITORING						
MON05	Monitoring of Eurasian otter.	Follow changes in occurrence and movement of species.	The valley of the Zajaska Reka river.	Visiting sampling points at every 1.5-2 km, approximately, searching for signs of otter presence (spraints, holts etc.). Opportunistically, usage of camera traps.	A pre-construction survey to define the baseline conditions. Seasonal monitoring during construction works, and seasonal monitoring for the first 2 years of operation	Mammal expert.	Company.
MON06	Monitoring of other noted species important for conservation (amphibians, reptiles, birds, mammals).	Follow changes in occurrence and movement of species, and usage of wildlife passages.	The whole alignment.	The point counting method, but also the transect method, not excluding the "free method".	Pre-construction survey to obtain the baseline data. Seasonal surveys during construction works, and afterwards seasonally, during road operation (2 years).	Biodiversity expert, with support from the amphibian and reptile expert, and the expert on avifauna.	Company.
MON07	Monitoring of fish fauna.	Follow changes in fish populations, the focus being on Macedonian	Crossings of the motorway alignment	Electrofishing.	Pre-construction survey to obtain the baseline data. Seasonal surveys during construction works and	Biodiversity expert, with	Company.

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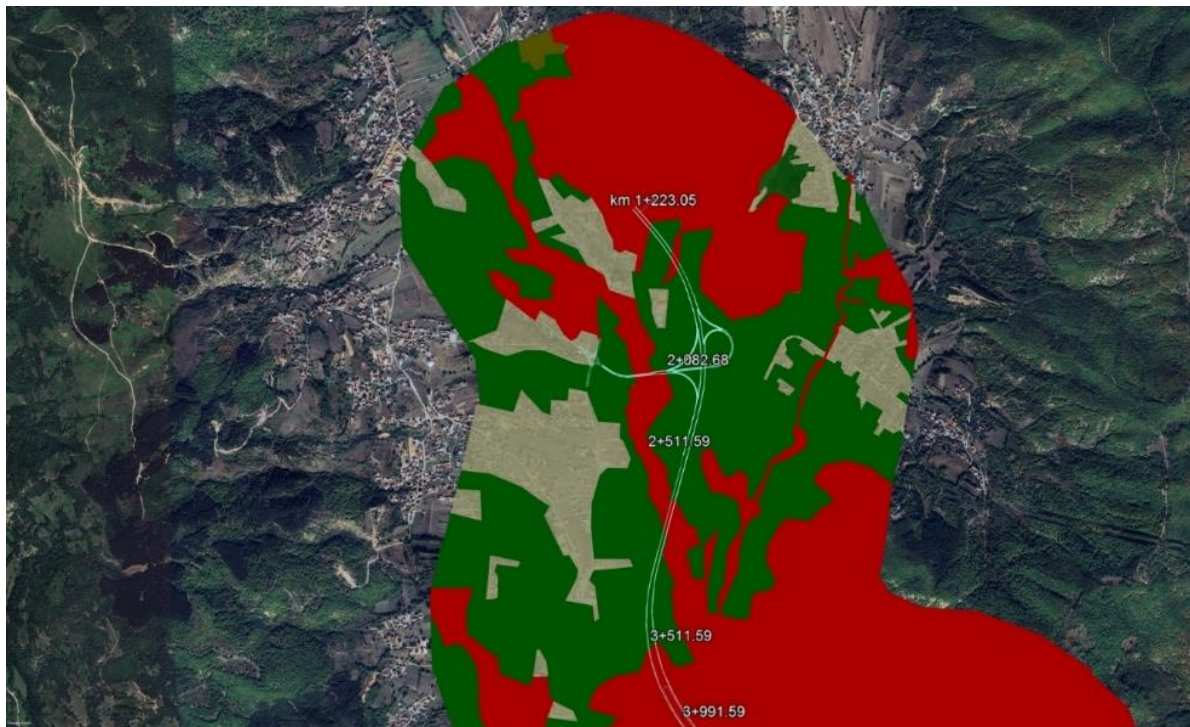
ID	Monitoring activity / Indicator	Objectives	Where?	How?	Period and Frequency	Performed by	Responsibility
		trout and Danube barbel.	with the Zajaska Reka river.		then seasonally, during road operation (2 years).	support from the fish expert.	
MONO 8	Monitoring of re-vegetation / replanting to achieve NNL/NG.	Follow pace of re-vegetation/ success of replanting.	Selected sites for re-vegetation.	Visual inspection.	Seasonally during the first two years. 2 years after the afforestation/revegetation is carried out and during those 2 years, the National Forests is obliged to submit reports on the status, progress and success of the afforestation to the PESR.	Biodiversity expert, with support from experts from PE National Forests.	Company. PE National Forests.

6. Appendices

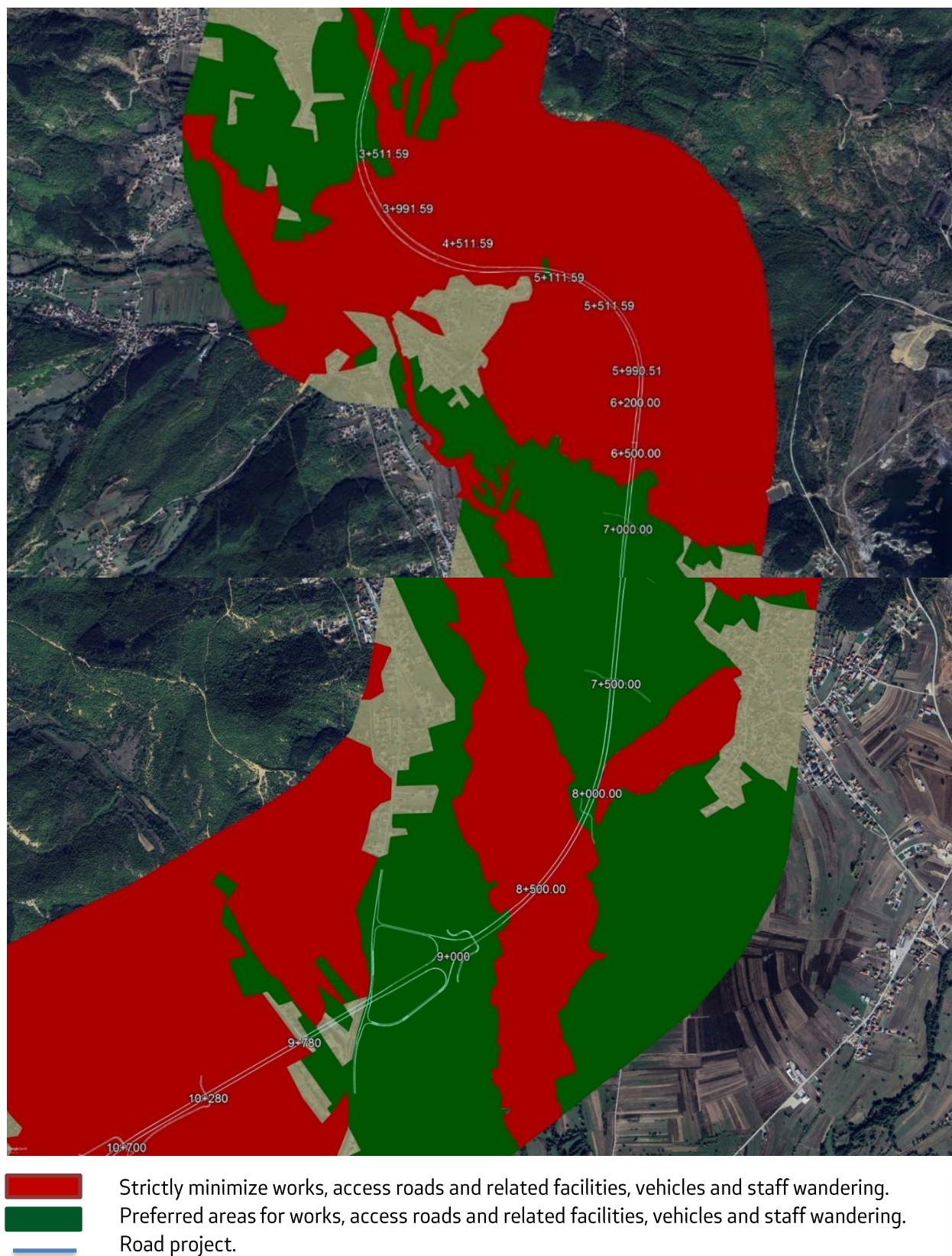
6.1. Appendix 1 Preferred Areas for Access Roads and Related Facilities

In line with MIT01 measure, maps below locate the following:

- natural and critical habitats to avoid for works, access roads and related facilities, vehicles and staff wandering;
- artificial habitats preferred to install works, access roads and related facilities, vehicles and staff wandering.



-  Strictly minimize works, access roads and related facilities, vehicles and staff wandering.
-  Preferred areas for works, access roads and related facilities, vehicles and staff wandering.
-  Road project.



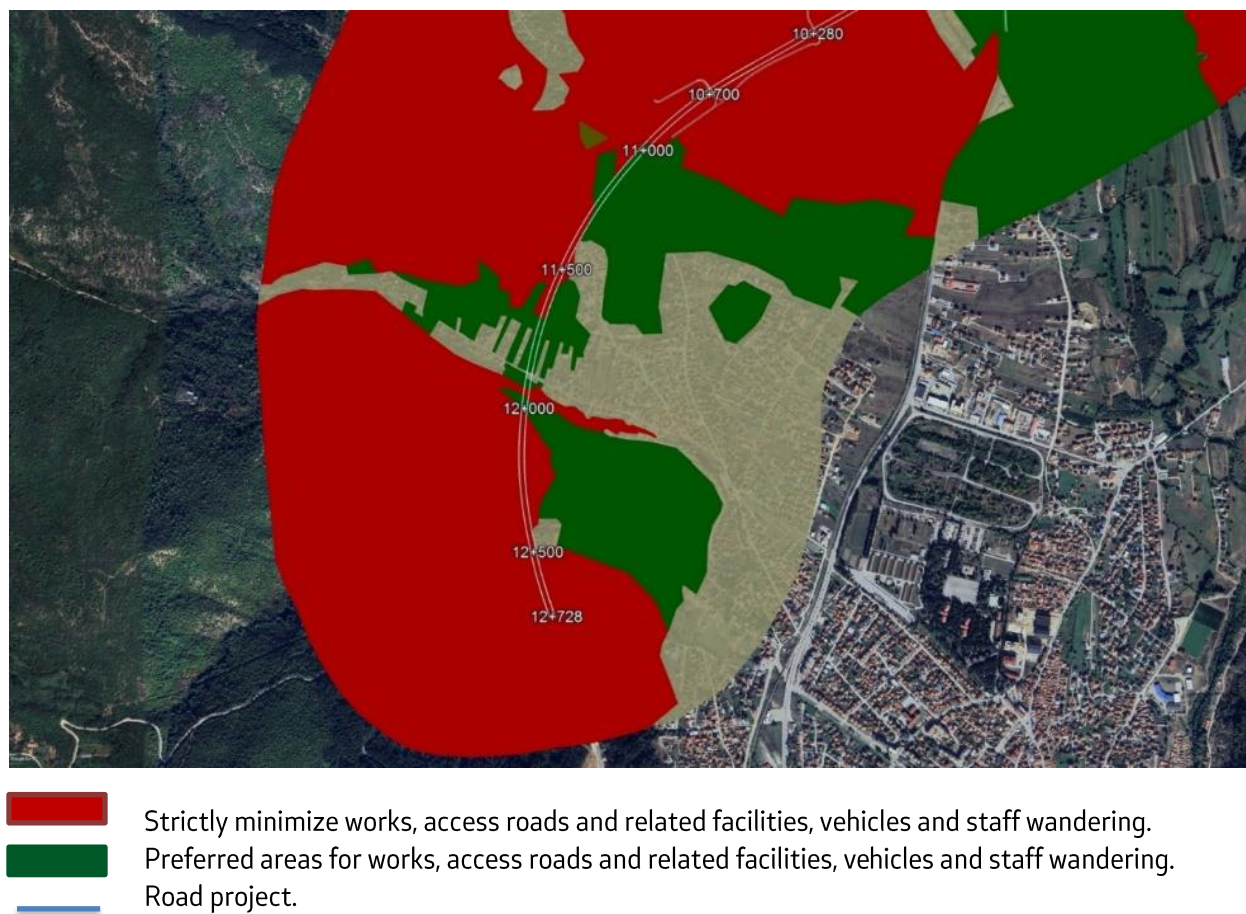


Figure 7 Constraints map – footprint minimization upon natural habitats.

6.2. Appendix 2: Location of Sensitive Habitats

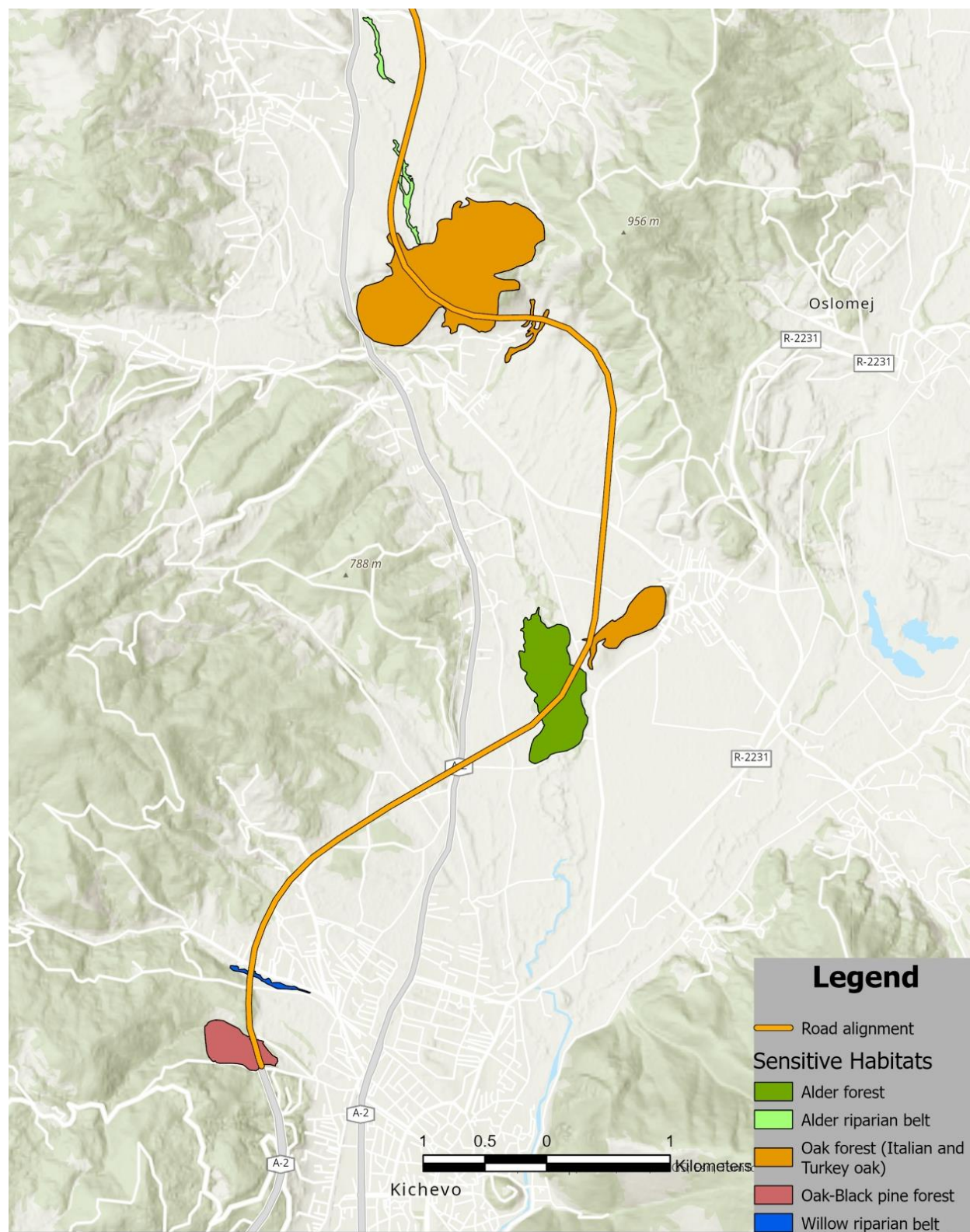


Figure 8 Overview of sensitive habitats along the motorway.

6.3. Appendix 3: Location of Focus Monitoring Sites

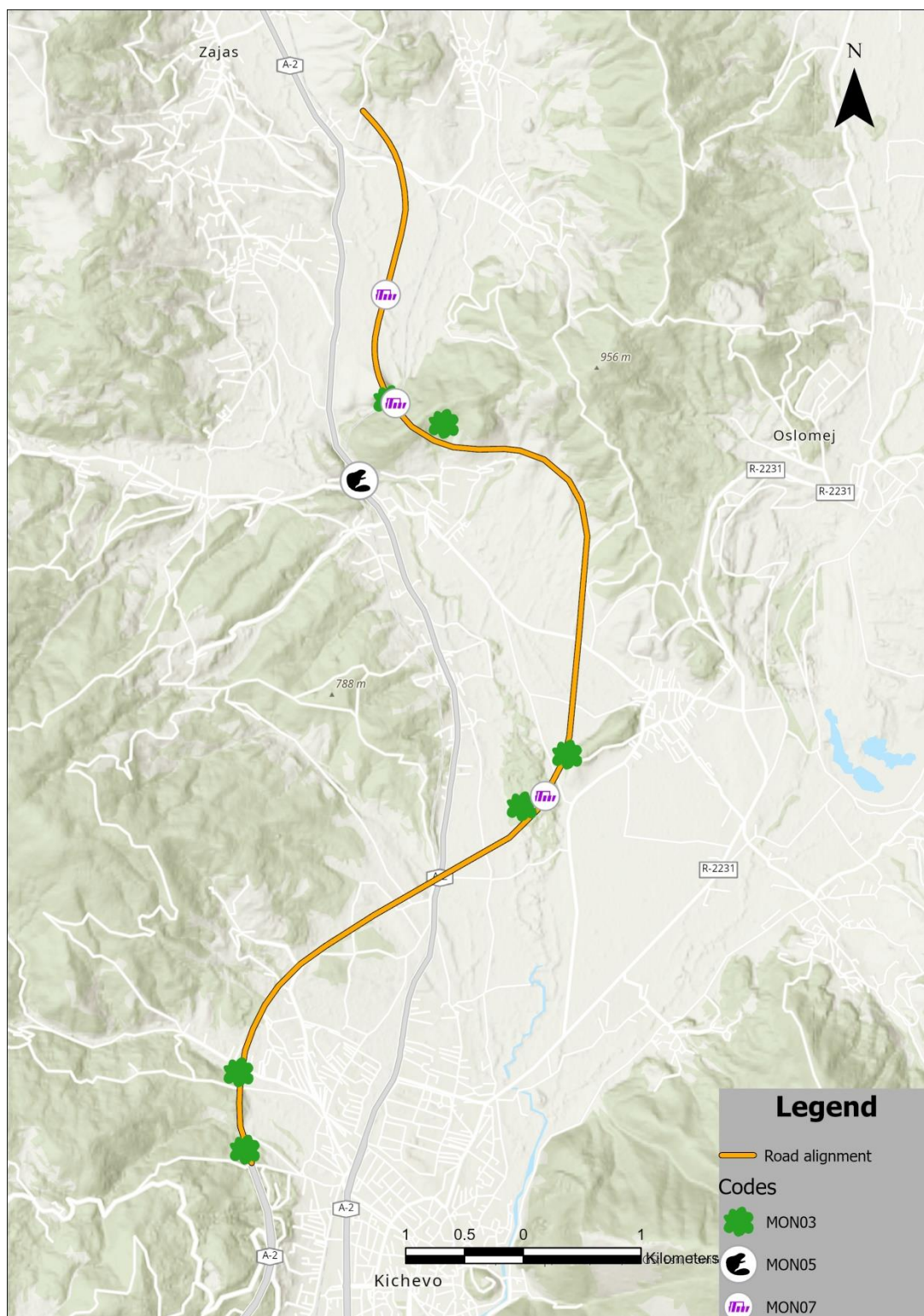


Figure 9 Overview of focus areas for monitoring of conservational important species.

Sites were outlined using GPS field data findings as a reference.

Table 8 Coordinates of focus monitoring sites.

Monitoring ID	X	Y
MON03	20.95647497000	41.58046674600
MON03	20.96211164340	41.57865195850
MON03	20.97470743870	41.55335402570
MON03	20.97008537200	41.54939158350
MON03	20.94188955970	41.52311779760
MON03	20.94124088830	41.52903619310
MON05	20.95350709630	41.57430939560
MON07	20.95620145660	41.58853105410
MON07	20.97246678840	41.55017754410
MON07	20.95720294300	41.58023128240

6.4. Appendix 4: Construction Timeline and Seasonal Restrictions on Construction Activities

Table 9 Construction timeline for minimisation of disturbance during motorway construction.

<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												
<i>Reptiles and amphibians</i>													
	Herpetofauna												
<i>Birds</i>													
	Birds												
<i>Fish</i>													
	Trout and barbel												

Minimisation of construction activities. If vegetation clearance is to take place during bird nesting season, first perform a survey of nesting birds in the presence of a Supervisor Engineer/specialist. Halt construction, if nests/bats roosts are noted, and, following consultation with the Supervisor Engineer /specialist, resolve the matter in line with the recommendation.

No demolition, blasting or vehicle disturbance, the emphasis being on the Zajaska Reka river. Throughout the year, should any nesting sites, holts or roosts be found, halt construction, and, following consultation with the Supervisor Engineer/specialist, resolve the matter as per the recommendation.

6.5. Appendix 5: Pre-Construction and Pre-Clearance Surveys

With reference to minimizing disturbance and mitigating negative impact of motorway pre-construction, the Contractor will implement as follows:

- ✓ Inventory of the PBF/CH habitats subject to removal (permanent loss) based on the final design. Complete alignment, including access roads and tunnel entries;
- ✓ Pre-construction checks aimed at species presence. Full alignment, with focus on hollow trees and other places of shelter.
- ✓ Pre-construction surveys to determine locations and specifications germane to the best preventative solutions for installation of equipment that averts motorway crossing (exclusion fences, sound barriers) to minimise mortality in the motorway operation phase. This is the most relevant for the area of Kolibari (km 4+300 to km 4+900) and Pevci settlement of Kichevo (km 11+250 to km 12+000).
- ✓ Pre-construction surveys to determine the necessity of supplementary wildlife passages to adequately facilitate animal movement. This is particularly applicable to the flatland area from km 7+000 to km 9+400.
- ✓ Pre-clearance check for nesting birds; the entire alignment.
- ✓ Pre-construction checks for occurrence of mammals (otter holts or lie-ups) in the areas where bridge crossings are located. Conducted at bridge crossings, the focus being on the Zajaska Reka river.

6.6. Appendix 6: Sites for Planting Vegetation (Offsetting)¹⁵

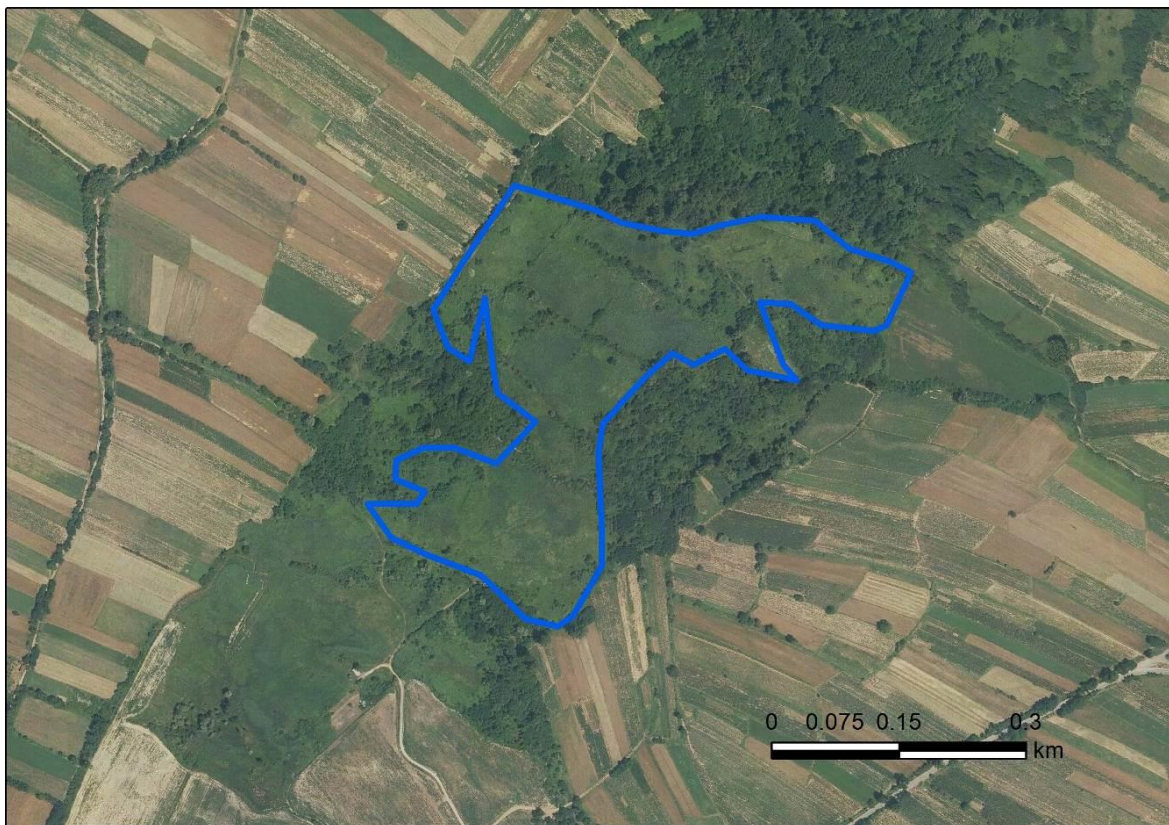


Figure 10 A site for planting riparian vegetation (*Alnus rohlenae*, *Populus alba*, *Salix fragilis* and *Salix alba*), (MI02-MI03).

Species	Recommendation for Share of Plantings (in Percentage)	Trees per Hectare	Total Number of Plant Seedlings
<i>Alnus rohlenae</i> , Balkan alder	60%	300-400	3,800-5,000
<i>Populus alba</i> , white poplar	5%	25-30	300-400
<i>Salix fragilis</i> , crack willow	5%	25-30	300-400
<i>Salix alba</i> , white willow	30%	150-200	2,000-2,500

Central coordinates: 21.092944E, 42.077212N

Patch surface: 14.7 ha.

Total area to be off-set: 12.6 ha.

¹⁵ The proposed locations are final because they are proposed by the PE National Forests for the needs of the project.

Ownership: State-owned land.

Management and monitoring: PE National Forests.

Activity	Timeframe	Key Performance Indicators	Responsibility
Elaboration of re-vegetation plan.	After construction phase completion.	Elaborated and approved re-vegetation plan.	PE National Forests.
Production of plant seedlings.	November-December.	Number of produced seedlings.	PE National Forests.
Planting.	February-March.	Number of planted seedlings.	PE National Forests.
Monitoring.	Seasonally during the first two years. (4 times a year)	Percentage of successful planting.	PE National Forests.

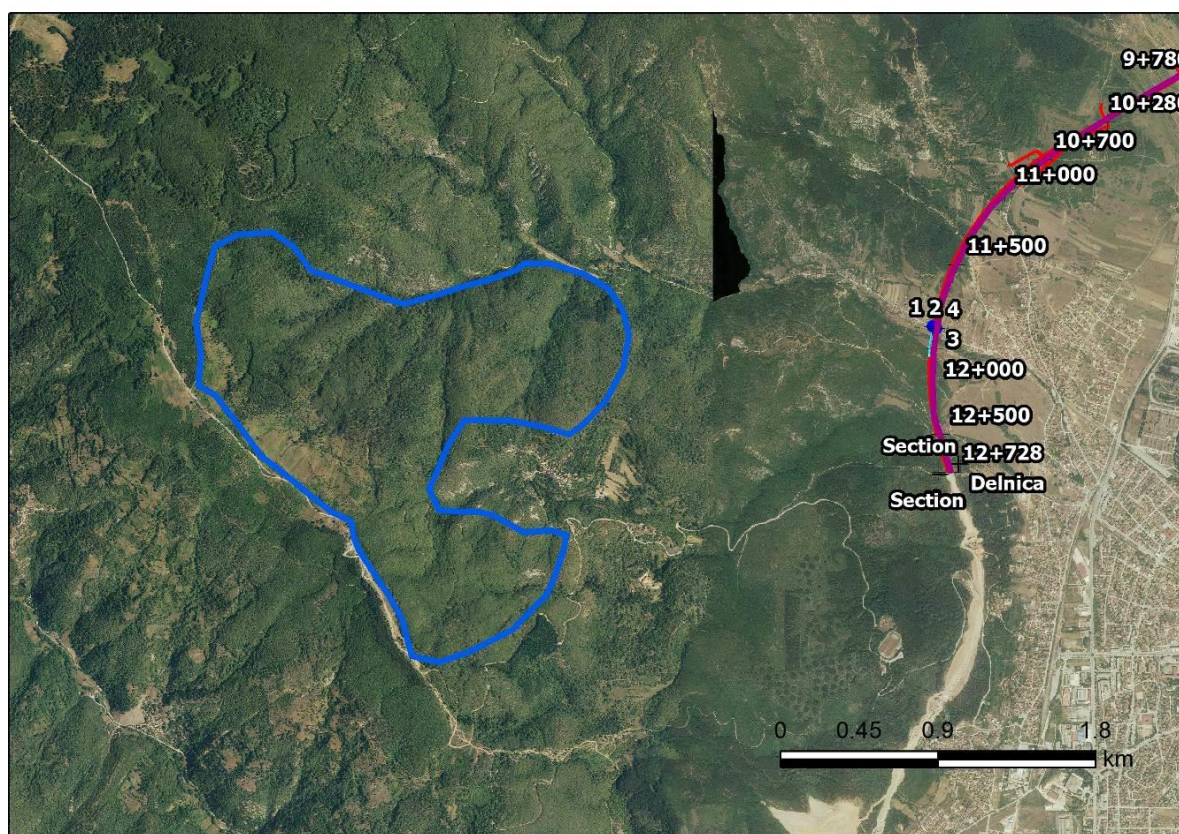


Figure 11 A site for planting oak forest (*Quercus frainetto* and *Quercus cerris*), (MI01).

Species	Recommendation for Share of Plantings (in Percentage)	Trees per Hectare	Total Number of Plant Seedlings
<i>Quercus frainetto</i> , Italian oak.	60%	600-700	5,000-6,000
<i>Quercus cerris</i> , Turkish oak.	40%	400-450	3,200-3,700

Central coordinates: 20.90543E, 41.525033N

Patch surface: 275.2 ha.

Total area to be off-set: 8.2 ha.

Ownership: State-owned land.

Management and Monitoring: PE National Forests

Activity	Timeframe	Key Performance Indicators	Responsibility
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Elaboration of re-vegetation plan.	After the construction completion.	Elaborated and approved re-vegetation plan.	PE National Forests.
Production of plant seedlings.	November-December.	Number of produced oak seedlings.	PE National Forests.
Planting.	February-March.	Number of planted oak seedlings.	PE National Forests.
Monitoring.	Seasonally during the first two ears. (4 times a year)	Percentage of successful planting.	PE National Forests.

Monitoring Plan

Indicator	Method	Frequency	Target
Vegetation cover (%).	Field survey.	Twice per year.	>70% after 2 years.
Survival rate (%).	Counting.	Annual.	>80%
Erosion signs.	Visual inspection.	Quarterly.	No significant erosion.
Invasive species.	Survey.	Annual.	Controlled.

6.7. Appendix 7: Distribution of Fauna Species (Fishes, Amphibians, Reptiles, Mammals and Birds)

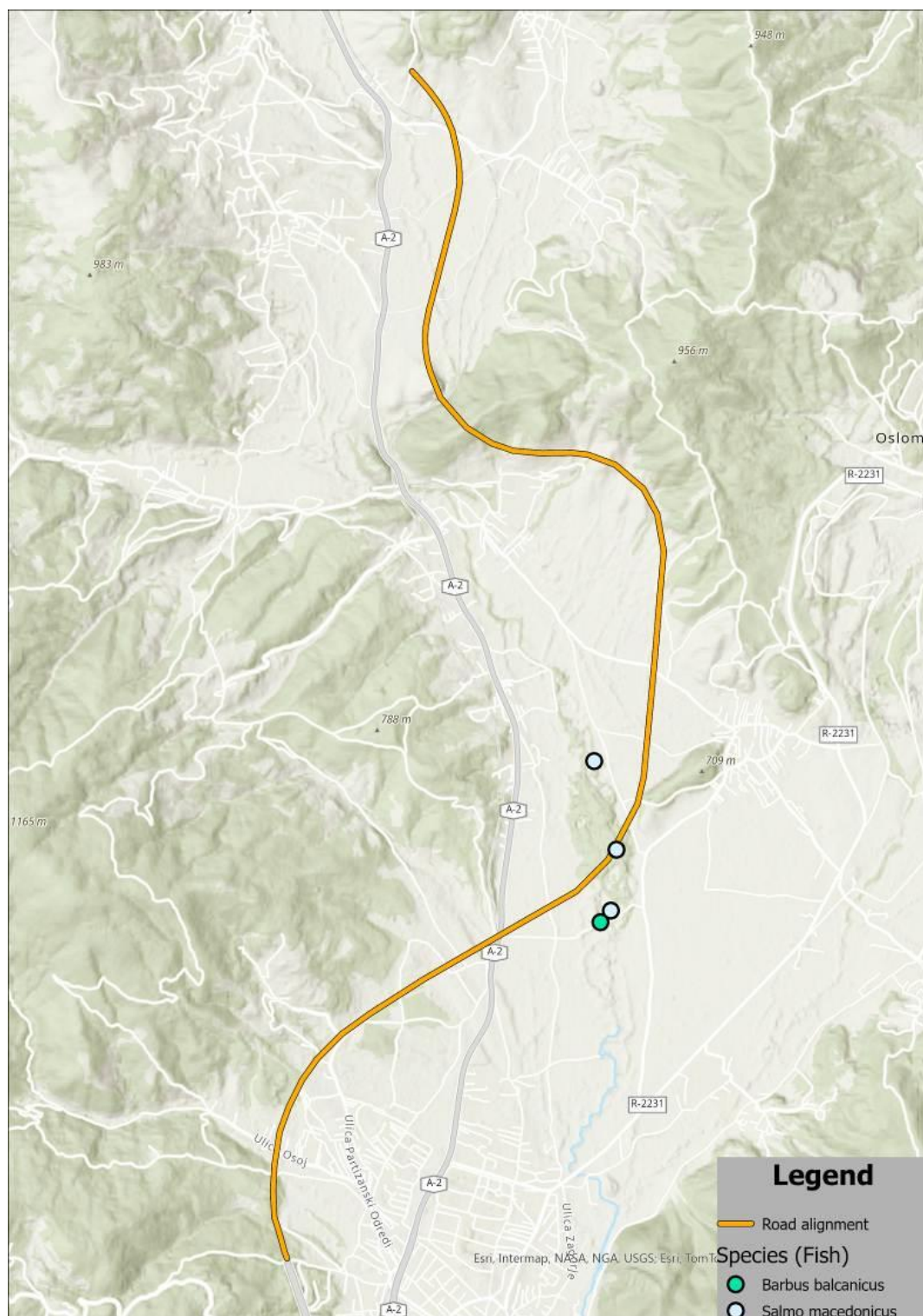


Figure 12 Distribution of fish species

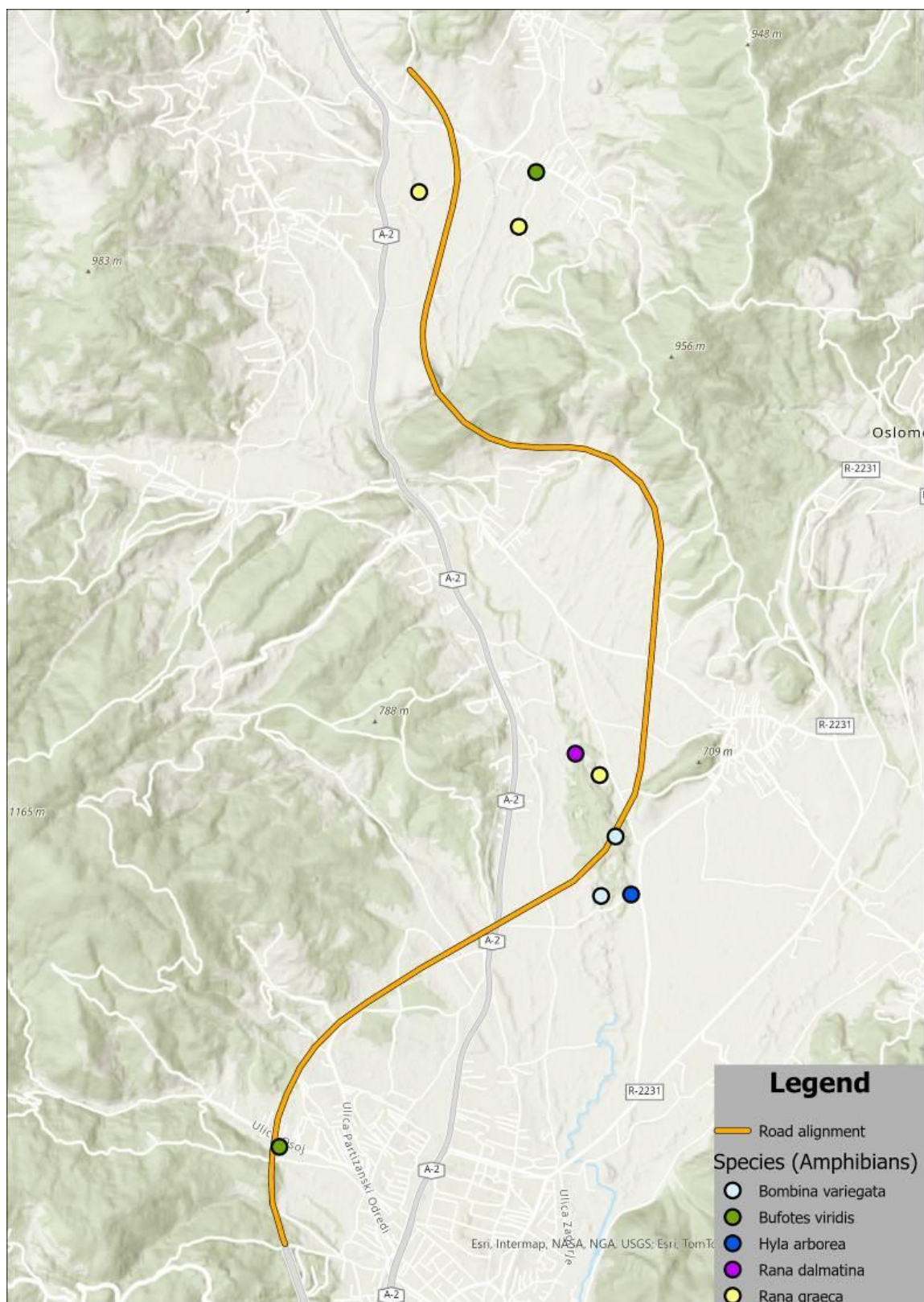


Figure 13 Distribution of amphibian species

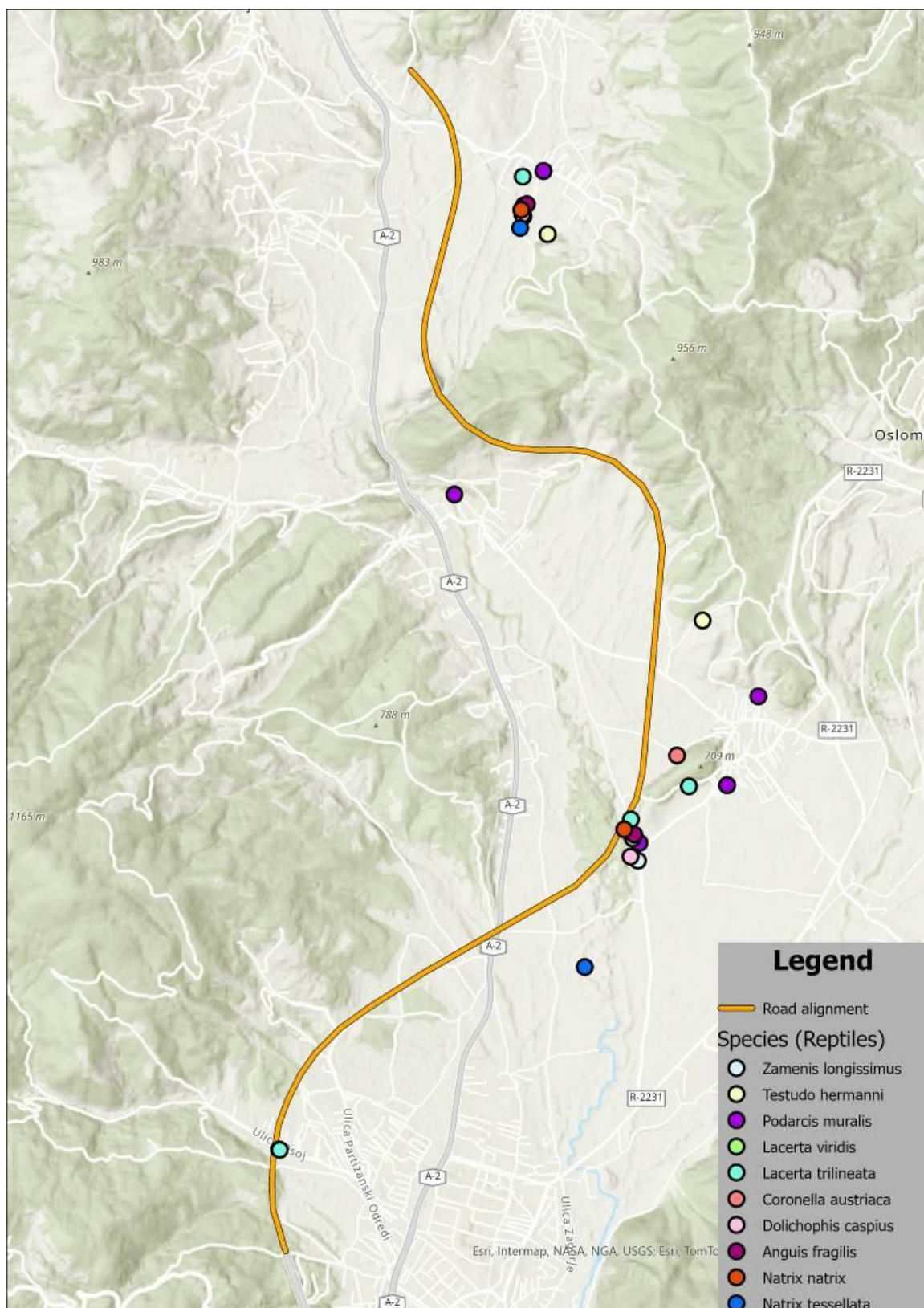


Figure 14 Distribution of reptilian species

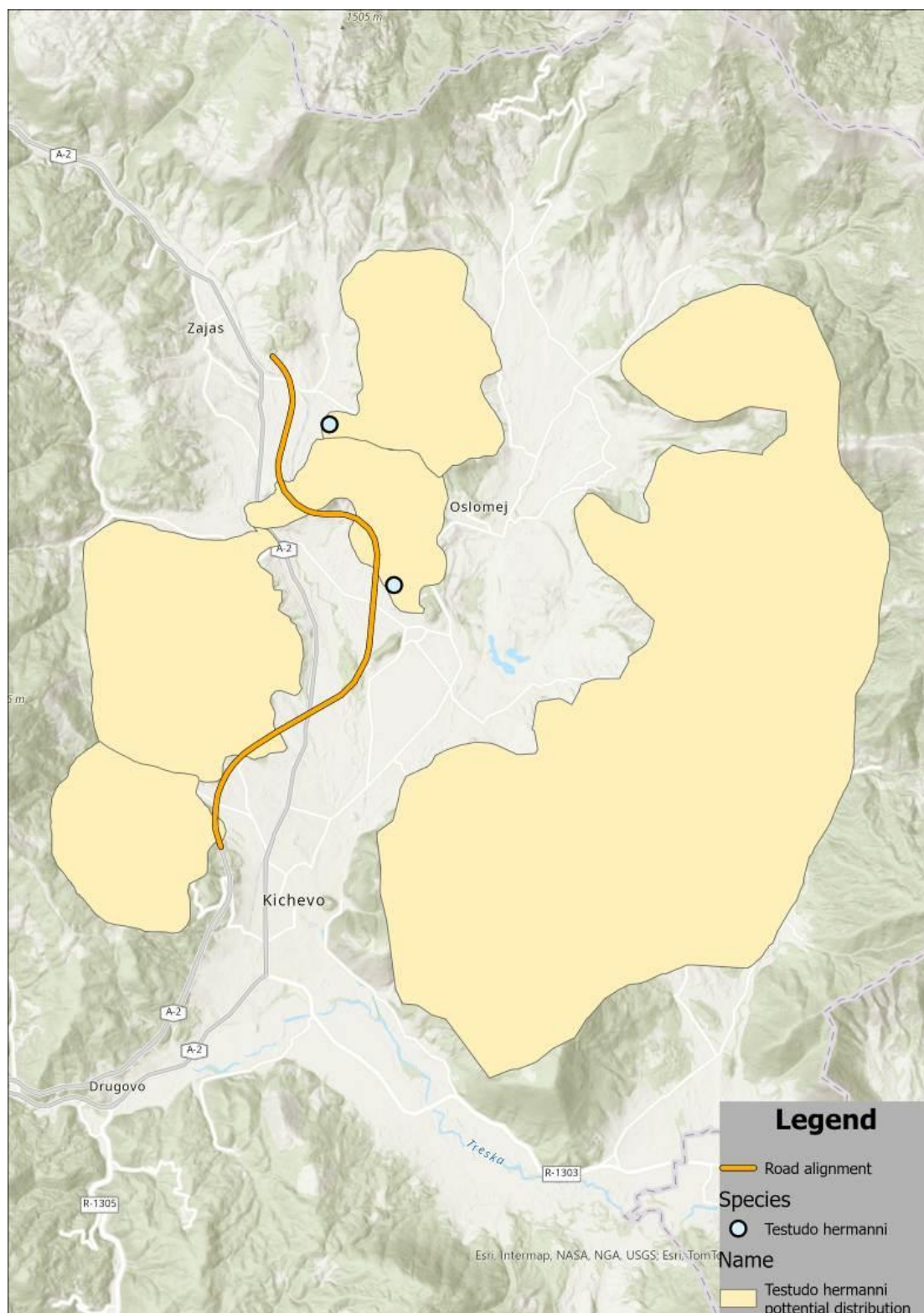


Figure 15 Distribution of *Testudo hermanni*

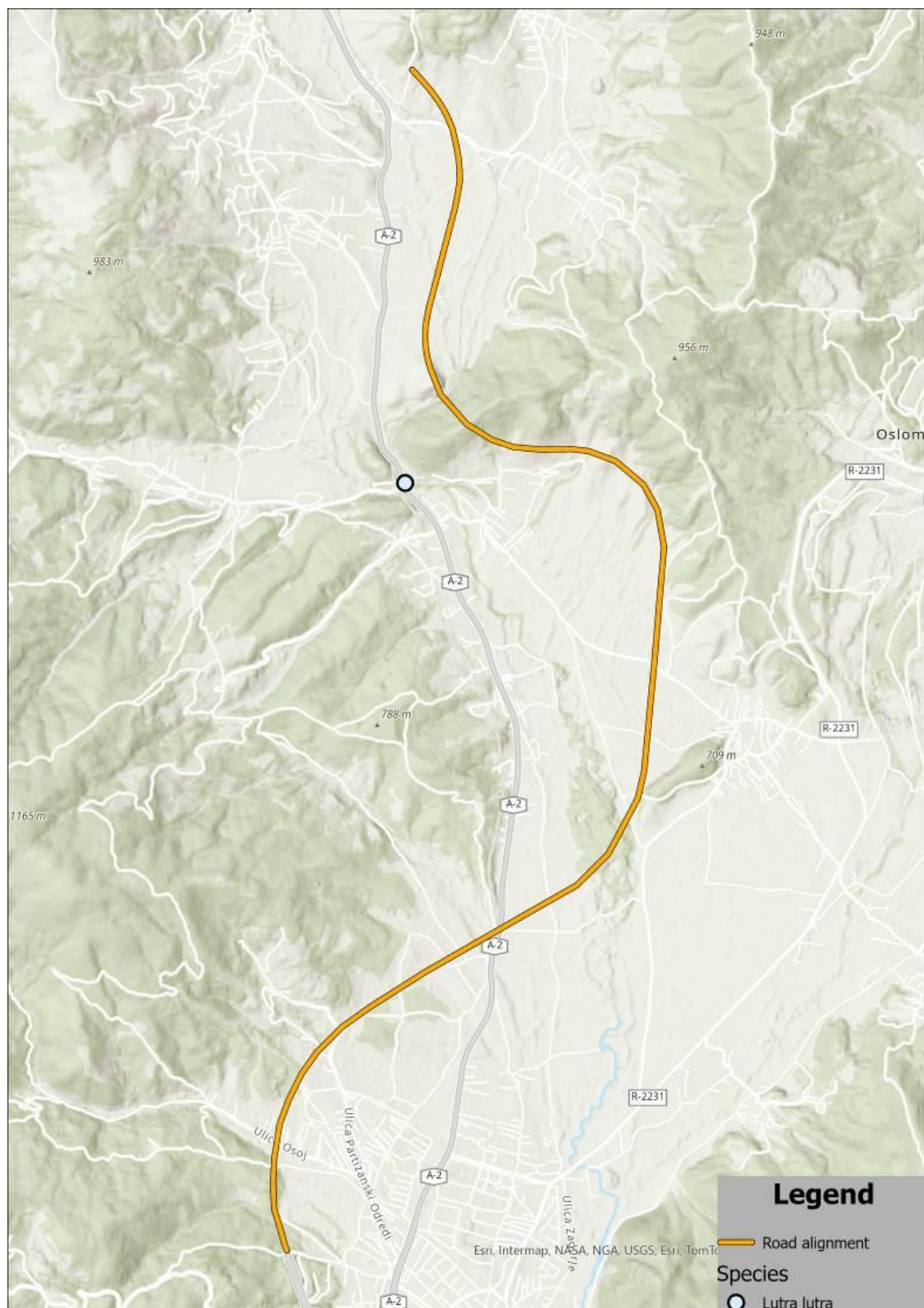


Figure 16 Distribution of *Lutra lutra*

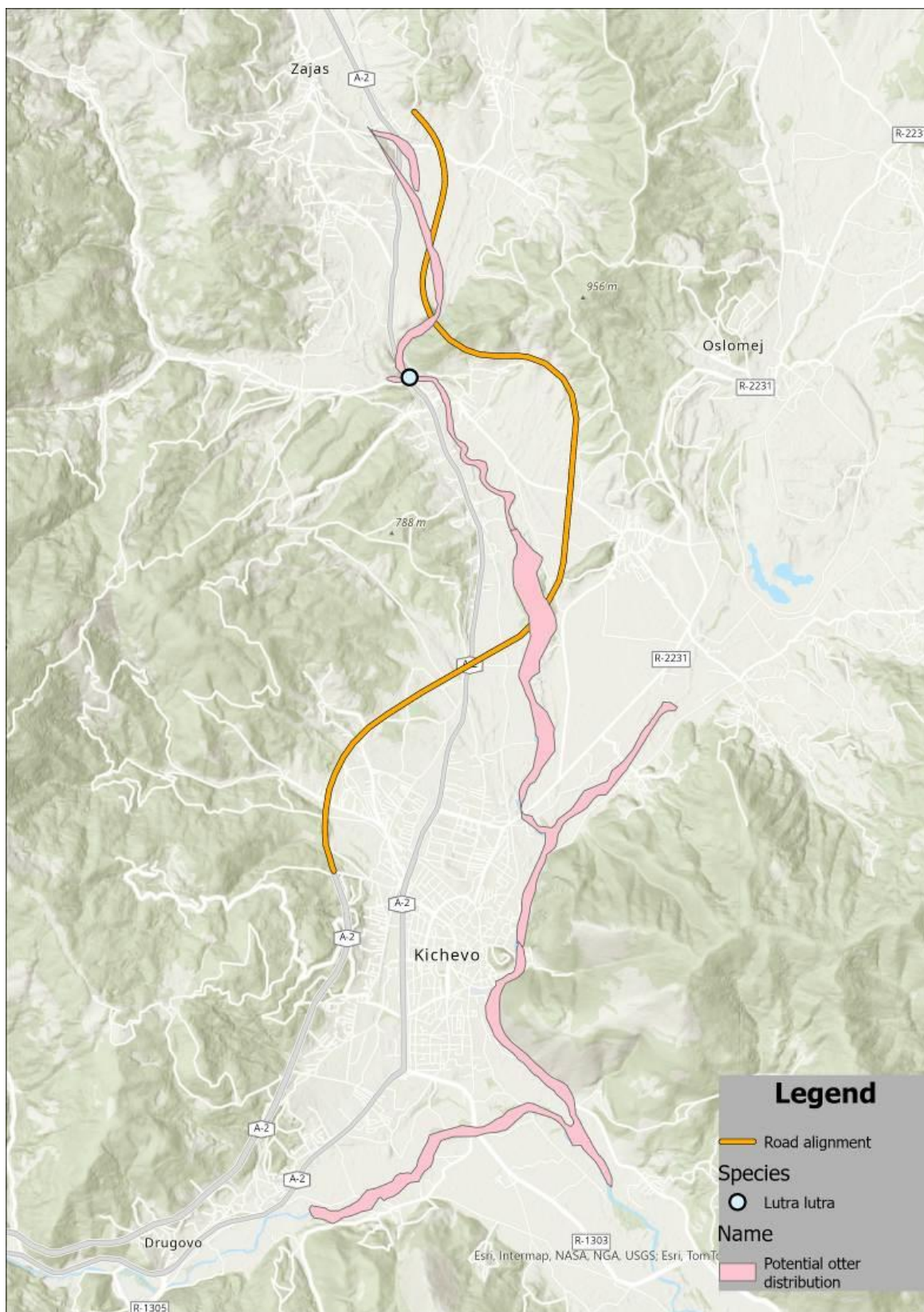


Figure 17 Distribution of *Lutra lutra*

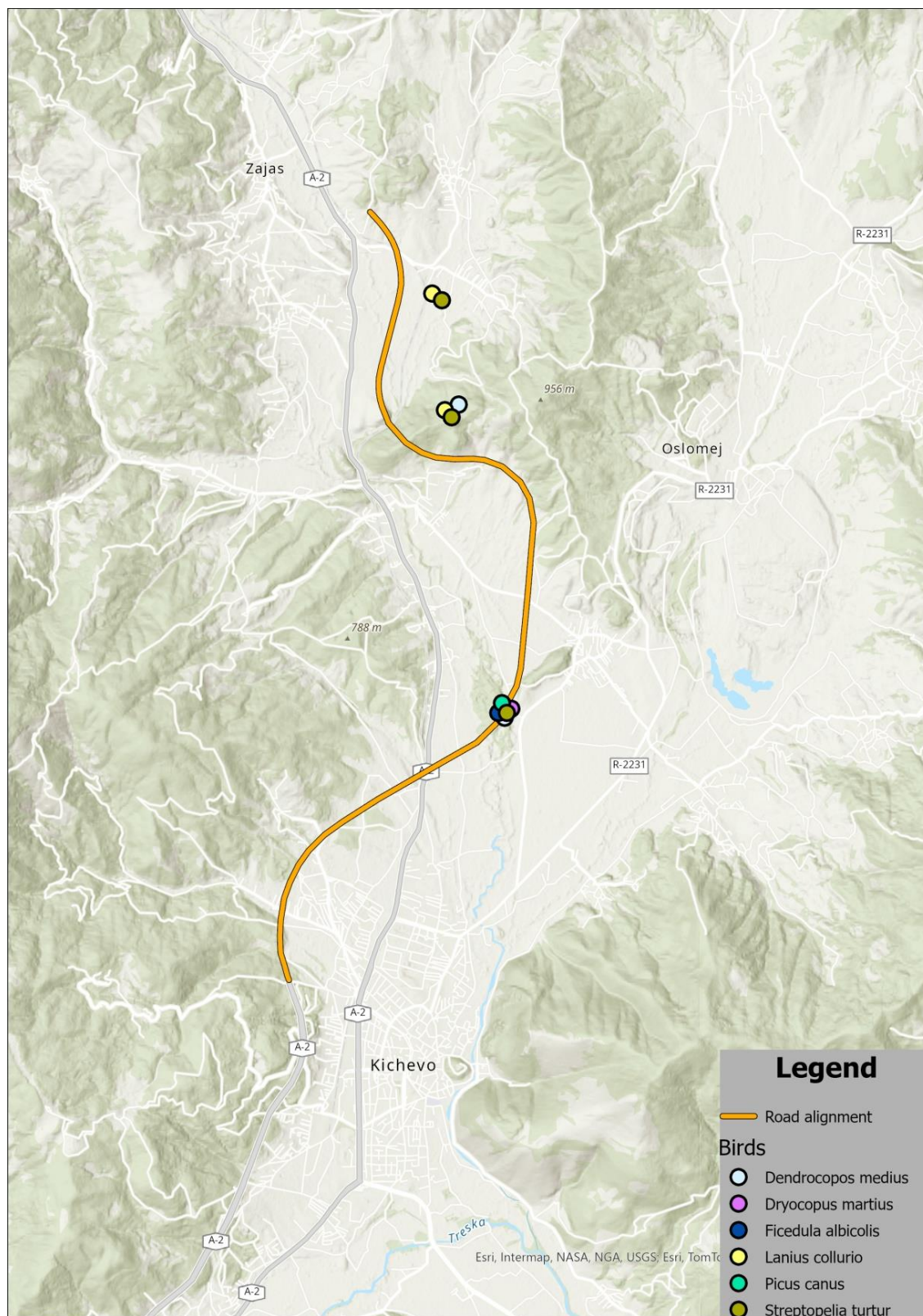


Figure 18 Distribution of bird species