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Gap Analysis & ESIA Disclosure Pack

WB20-BiH-TRA-02 Component 1

Volume 4: Biodiversity Management Plan

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The Infrastructure Project Facility (IPF) is a technical assistance instrument of the Western Balkans Investment Framework (WBIF) which is a joint initiative of the European Union, International Financial Institutions, bilateral donors and the governments of the Western Balkans which supports socio-economic development and EU accession across the Western Balkans through the provision of finance and technical assistance for strategic infrastructure investments. This technical assistance operation is financed with EU funds.
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7	31/12/2025	Biodiversity Management Plan	Team of experts	Irem Silajdžić	Richard Thadani

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1 Introduction

1.1 Background

This Biodiversity Management Plan (BMP) has been written specifically for the Bosnia and Herzegovina, Corridor Vc in FBiH, Section Konjic (Ovcari) - Prenj Tunnel - Mostar North section, to bring together in one document, all of the mitigation proposals, relating to biodiversity for the Section Konjic (Ovcari) - Prenj Tunnel - Mostar North road alignment works.

This BMP contains the results of the desk study on potentially present habitats and species and their areal conducted during September and October 2020, March, April, May, June and July of 2021 and June 2022 biodiversity surveys. The report also provides a chapter on mitigation and monitoring measures proposed based on the 2020, 2021 and 2022 biodiversity assessment findings and measures given in the 2006 EIA Study for LOT 3: Sarajevo South (Tarcin) - Mostar North. This document has therefore been written in order to provide a robust monitoring plan, further detailing the proposed mitigation but also, where possible, to delegate responsibility for the implementation of the biodiversity related mitigation. It is important to note that the BMP is a living document and will be updated periodically to incorporate the findings from additional investigative tasks that will be implemented as outlined herein.

The mitigation hierarchy has been applied to the proposed mitigation strategy contained within this plan. In essence this can be described as a four-step process (Figure 1):

- Avoid or prevent negative impacts on the environment in general and biodiversity in particular;
- Minimise on-site effects of development if impacts cannot be avoided;
- Restore habitats or species populations and
- Offset/compensation measures that are undertaken as a last resort (on or off-site) for the residual adverse impacts.

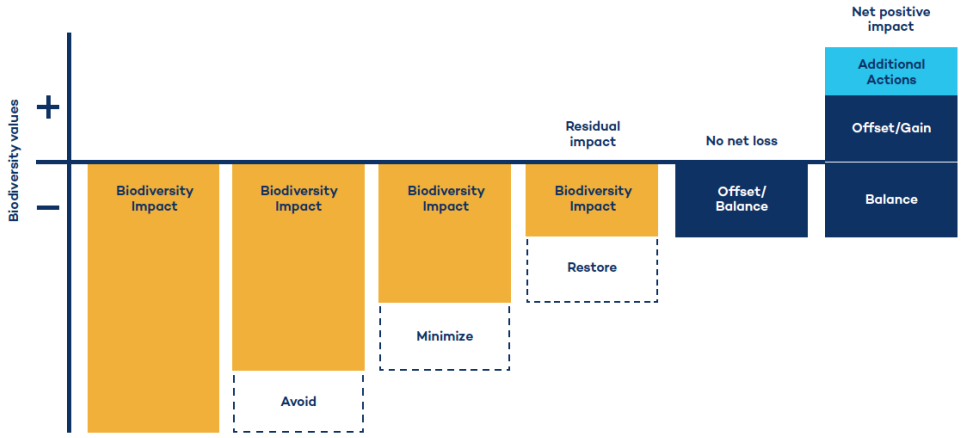


Figure 1: Mitigation hierarchy

One of the main aims of biodiversity conservation and sustainable management of living natural resources is to adopt the mitigation hierarchy approach with the aim of achieving no net loss of biodiversity and, where appropriate, achieving a net gain of biodiversity. The BMP has been developed with the aim of achieving this.

The first aim of any project should be to avoid impacts on biodiversity and ecosystem services. However, when avoidance of impacts is not possible, measures to minimise the impacts and restore biodiversity and ecosystem services will be implemented. Given the complexity of predicting the impacts of the project on biodiversity and ecosystem services over the long term, the aim will be to adopt a practice of adaptive management in which the implementation of mitigation and management measures are responsive to changing conditions and the results of monitoring throughout the Project's lifecycle.

1.2 Project Description

In July 2020 ENOVA was commissioned to conduct Gap Analysis and develop an E&S assessment Disclosure Pack relating to the Corridor Vc section Konjic (Ovcari) - Prenj Tunnel - Mostar North. The results of the gap analysis of existing documentation for biodiversity found that supplementary biodiversity information would be required, so that an informed assessment of sensitive habitats and biodiversity features could be undertaken. The supplementary information has been gathered through both field surveys and an up-to-date desk study.

The following field surveys have been undertaken and will form Technical Annexes to the final Environmental and Social Impact Assessment (ESIA) Study along with appropriate and critical habitat assessment:

- Annex A: Habitats, vegetation, and invasive species
- Annex B: Invertebrates[1]
- Annex C: Vertebrates
  - Annex C-1: Ichthyofauna
  - Annex C-2: Herpetofauna (amphibians and reptiles)
  - Annex C-3: Ornithofauna
  - Annex C-4: Mammals - bats
  - Annex C-5: Large mammals
- Annex D: Critical Habitat Assessment
- Annex E: Appropriate Assessment

This BMP was finalised in August 2025 with the purpose of documenting the results of the assessments on the status and sensitivity of different groups of species and mitigation measures as given in the chapters below. It also contains specific monitoring measures for improving the status of the species that might be affected due to the construction and operation of the motorway.

[1] Only of conservation concern

1.3 Commencement

Due to the length, planned objects and the location of the road, the construction will take place in phases over many years. Detailed implementation schedule is not available at this stage due to the Project complexity with regard to financing and implementation arrangements.

1.4 Authority and Management

The promoter which will implement the Corridor Vc project Section Konjic (Ovcari) - Prenj Tunnel - Mostar North is the PC Motorways of the Federation of Bosnia and Herzegovina (the Company or "JPAC").

JPAC, a limited liability company wholly owned by the Federation of Bosnia and Herzegovina (FBiH), is working on the development of the motorway which is a part of the Trans-European Corridor Vc connecting Budapest (Hungary) and Port of Ploce (Croatia). The total length of the Corridor Vc in FBiH is approx. 335 km.

The European Bank for Reconstruction and Development (EBRD) and the European Investment Bank (EIB) are considering providing a sovereign-guaranteed loan to JPAC. The Project is a follow-on operation to the Banks' previous projects for the construction of four key motorway sections of Corridor Vc in FBiH. The Project involves the construction and operation of the motorway section Konjic (Ovcari) – Prenj Tunnel - Mostar North in total length of 35.26 km.

JPAC has a clear set of guidelines for the implementation of the projects, which is summarised below:

- The first phase is from obtaining the construction permit for a project, until the contract with the construction contractor is signed (responsible body: PIU). This section will be constructed in line with Red FIDIC contractual requirements, i.e. the construction will be carried out in accordance with a design provided by the Investor.
- The second phase is from signing the contract with the contractor, until the completion of construction works (responsible person: Head of Project). The Head of Project is responsible for cooperation with the Supervising Authority. The Supervising Authority is responsible for the overall supervision of: Contractor, construction works and supervision of monitoring of implementation of mitigation measures during the construction stage.
- The third phase is the operation/maintenance phase (responsible body: JPAC Management and Maintenance Department).

Based on the phases outlined above, the Contractor is responsible for implementing the biodiversity mitigation strategy during the Second Phase. The key internal procedure is the *Motorway Sections Construction Procedure – Project Opening and Management - AC-P 7.5-01* which defines, in detail, the steps and responsibilities for the first two phases, whereas the third phase is informally regulated.

The Company does not have any employees whose sole responsibility is **biodiversity** at the moment of writing this report; however, biodiversity is a part of job description of personnel responsible for environmental issues.

JPAC engages a Contractor to undertake services related to road operation, including maintenance, spill clean-up, monitoring, etc. JPAC does not have specific Operation Environmental and Social Management Plans (OESMPs) for its road Projects and therefore passes the various requirements – e.g. monitoring – to the operations contractor via annual contracts. To ensure that all operational management and monitoring requirements are captured and implemented, it is recommended that JPAC produce a formal OESMP, based on the requirements of the local EIA, Decision on the Approval of the EIA Study and ESIA. The Decision on the Approval of the EIA was obtained in January 2024.

JPAC will need to obtain the following permits, as given in Environmental and Social Action Plan (ESAP):

- Preliminary Water Consent (PWC) - application follows the completion of Preliminary Design for the subsection, previous PWC expired in March 2025,
- Urban permit - application follows after obtaining the Decision on Approval of EIA
- Construction Permit - application follows the completion of the Main design
- Water Consent (WC) - application follows the completion of the Main design
- Operation Permit - the application follows the completion of construction activities
- Water Permit (WP) - the application follows the completion of construction for Project subsection
- Relevant water and construction related permits for selected spoil disposal sites
- Relevant water and construction permits for batch concrete plant (if any)

2 Scope

2.1 Scope of the Management Plan

The overall objective of the BMP is to identify the mitigation and monitoring measures for biodiversity in compliance with EBRD PRs and EIB Standards. This management plan has been designed in order to bring together into one document all of the proposed biodiversity related mitigation measures for the section Konjic (Ovcari) – Prenj Tunnel – Mostar North.

Biodiversity Management Plan has been set out in ten sections as follows:

- Section 1 Introduction: General information about the Project and the BMP
- Section 2 Scope: This section introduces the scope of the BMP and outlines existing overlaps with other Management Plans.
- Section 3 Roles and Responsibilities: This section sets out main information on who will implement the biodiversity mitigation and who is responsible for post-construction monitoring.
- Section 4 Project Standards: The requirement for mitigation is set out in this section regarding international, national laws and legislation as well as good practice guidance of Lenders.
- Section 5 Mitigation Measures and Management Controls: This section sets out the mitigation which is outlined in the Biodiversity Management Plan. Where further Management Plans are required, additional information has been included, so that they can be completed prior to commencement of construction.
- Section 6 Restoration: This section outlines how temporarily disturbed habitats will be reinstated to their original or ecologically improved condition after construction.
- Section 7 Residual Impacts: This section identifies any biodiversity impacts that remain after avoidance and mitigation measures have been implemented.
- Section 8 Compensation: This section describes any required measures to compensate for unavoidable and significant residual impacts.
- Section 9 Implementation Schedule: A sample timeframe, usually given in BMP report, could not be included in this section due to the lack of information on planning and duration of construction activities in the moment of development of this report.
- Section 10 Monitoring: Although limited in extent, post-construction monitoring has been proposed. The monitoring requirements are set out in this section, which will need further input once the construction timings for each section are known.
- Section 11 Training: Workforce training regarding biodiversity issues will be required. The training requirements have been detailed in this section.
- Section 12 Audit and Control: Defines the procedures for monitoring, auditing, and ensuring compliance with biodiversity mitigation and management measures throughout the project lifecycle

- Section 13 Document Control: This section describes how biodiversity-related documents will be versioned, updated, stored, and made accessible to relevant stakeholders to ensure traceability and accountability.

2.2 Overlap with Other Management Plans

The ESAP developed as part of this assignment details a number of different Management Plans which are to be finalised and implemented either before or during construction. A number of these plans, while not directly related to biodiversity, are considered to provide (directly or indirectly) mitigation benefits to biodiversity.

An overarching Construction Site Organisation Plan (CSOP) will be produced prior construction to achieve full compliance with EBRD's PRs, EIB's Standards and Good International Practice. The CSOP will also include the following Management Plans relevant to biodiversity:

- Construction E&S Management Plan (CESMP) (CESMP is the upgraded version of legally required Environmental Protection Plan inclusive of social aspects as per EBRD requirements); JPAC to request from the construction Contractor to include all measures defined in the ESIA Disclosure Package into the CESMP, including the mitigation measures for the following aspects: air emissions, noise and vibration management, soil management, waste management, wastewater management, biodiversity management and protection of habitats (as given in BMP), hazardous material management, spill response management, grievance management for workers and for external stakeholders, security personnel requirements, information disclosure and stakeholder engagement, chance find procedure, community health and safety management, accommodation for workers and traffic management,
- Invasive Species Management Plan,
- River Crossing Management Plan,
- Topsoil Management Plan,
- Land and Habitat Restoration Plan,
- Biodiversity Offsetting Plan,
- Detailed Construction Waste Management Plan,
- Borrow Management Plan,
- Emergency Preparedness and Response Plan.

Prior to commencement of the operational phase of the Project, JPAC shall develop an Operation Environmental and Social Management Plan (OESMP). The OESMP will include (but not be limited to) aspects of waste management, air quality management, noise management, spill response, emergency preparedness and response, traffic management and health and safety management. Biodiversity management aspects during the operation phase will be covered in the BMP. The OESMP needs to include all measures stipulated by the Decision on Approval of the EIA and ESIA Disclosure Package, including the mitigation measures for the following aspects: biodiversity management, habitat restoration, waste management, soil management, air emissions management, noise management, spill response management, hazardous material management, emergency preparedness and response, traffic management,

security personnel requirements, grievance management for workers and for external stakeholders, information disclosure and stakeholder engagement, and health and safety management.

JPAC must ensure that Construction Waste Landfill and after-care procedures of the landfill are included in the OESMP, in line with the provisions of the acquired permits and the Main Design. During operation, the key issues to be monitored are air emissions, noise levels, effluent quality, soil contamination, wildlife passes, and animal carcass. JPAC to make publicly available the key monitoring results of the project.

All measures stipulated by this document need to be included in CESMP and OESMP during the construction and operation phase, respectively.

3 Roles and Responsibilities

3.1 Key Roles and Responsibilities for BMP Implementation

The key roles and responsibilities for BMP implementation during the construction and operation phase are set out as standard practice within the general roles and responsibilities of JPAC projects. In summary, the key roles and responsibilities for the BMP implementation are the following:

JPAC ensures that requirements from the ESIA, national EIA, permits, Lender's requirements, FIDIC standards etc. are included in the tender documentation. This must include the BMP commitments, inclusive of Invasive Species Management Plan and Land and Habitat Restoration Plan outlined in the BMP.

Implementation of mitigation measures during the construction stage will be the responsibility of the Contractor in accordance with the contract specifications and loan requirements. This may be achieved most efficiently if the contractor appoints a suitably qualified biodiversity expert specifically to coordinate the implementation and monitoring of the BMP.

The Supervising Authority/PIU responsible for the overall supervision of construction works will supervise the monitoring of implementation of mitigation measures during the construction stage. The Supervising Authority has to submit monthly reports to the JPAC Head of Project who will analyse them and propose corrective measures and actions in order to improve implementation efficiency.

The Head of the Project (on behalf of JPAC) actively participates in all activities related to project implementation and carries out daily visits to construction sites. They also supervise the Supervising Authority, i.e. check the reports submitted by the Supervising Authority, send these reports to the JPAC Management and propose corrective measures if necessary. As the Project is covered by a Decision on the Approval of the EIA Study, this carries reporting responsibilities. JPAC is required to submit Annual Environmental and Social Reports to the EBRD in line with PR 1, and this provision is being undertaken regularly by the Company.

When construction is completed all management and maintenance issues will be dealt with by the JPAC Management and Maintenance Department. It will therefore be this department that will manage and implement the post construction monitoring provided as a part of this Biodiversity Management Plan.

3.2 JPAC Management and Procurement

The responsible bodies for management of all projects by JPAC are appointed at three different phases of projects:

- The first phase is from obtaining the construction permit for a project, until the contract with the construction contractor is signed (responsible body: PIU).
- The second phase is from signing the contract with the contractor, until the completion of construction works: responsible person: Head of Project. The head of project is responsible for cooperation with the Supervising Authority. The Supervising Authority is responsible for the overall supervision of: Contractor, construction works and supervision of monitoring of implementation of mitigation measures during the construction stage.
- The third phase is the operation/maintenance phase (responsible body: JPAC Management and Maintenance Department).

The key internal procedure is the Motorway Sections Construction Procedure – Project Opening and Management - AC-P 7.5-01 which defines, in detail, the steps and responsibilities for the first two phases, whereas the third phase is informally regulated.

During the second phase, the external supervision of implementation of the projects is undertaken by the Supervisory Authority, which is the legal entity responsible for the overall supervision of construction works, as stipulated by the *Decree on Construction Site Organisation, Mandatory Documentation on Construction Site and Construction Work Participants*[2].

3.2.1 First Phase

According to the above-mentioned Procedure, a PIU must be established for every project. The PIU consists of: an engineer from the *Department of Design and Construction* involved in implementation of the contract for construction works, an engineer from the *Department of Documentation* in charge of design activities, a lawyer from the *Department of Property and Legal Affairs* in charge of expropriation activities, an employee from the *Sector for Management and Maintenance* and an employee from the *Sector for Economic and Financial Affairs.* A Head of the PIU is appointed to ensure coordination. They are also required to include the employees of the *Expertise and Quality Department* in order to identify all risks related to projects. Therefore, the PIU is cross-sectoral in order to cover all issues related to the project (technical, environmental, H&S, labour and land acquisition).

Before the contract for construction works is signed, the Head of the PIU is also responsible for all activities related to the evaluation and identification of risks, which must be performed according to the *Guideline for the Risks Identification, Risks Analysis and Management - AC-U 8.5-22*.* Head of the PIU coordinates with representatives of all Departments and Sectors in the PIU, related to the assurance of existence of necessary documentation required for the construction works. For example, Head of the PIU has to involve the *Department of Documentation* in all activities related to project design analyses and issuance of Construction Permits.

[2] Official Gazette of FBiH, No. 48/09, 75/09 and 93/12

Head of the PIU is responsible and sends the request to the JPAC Management for public procurement regarding the selection of the contractor for construction works. When the JPAC Management issues a decision on the start of the tendering procedure, the JPAC Director appoints a Committee for Public Procurement which, together with the Head of the *Department for Public Procurement,* implements the public procurement procedure.

3.2.2 Second Phase

Before the signing of the contract for construction works (with the construction contractor) and the supervision contract (with the supervisory authority), JPAC Director appoints a *Head of the Project* among the engineers from the *Department of Construction,* responsible for all construction activities on behalf of JPAC. The Head of the Project has to prepare monthly reports, as well as obtain and analyse all monthly reports submitted by the construction contractor and the supervisory authority, and to propose corrective measures and actions in order to improve implementation efficiency. Head of the Project monitors the construction activities on a daily basis and is responsible for the legality and regularity of works performed by the supervisory authority. Site visits are carried out daily. Head of the Project is responsible for contractor management. In their work, the Head of the Project has to involve employees from the Department of Expertise and Quality as well. The employee of the Department controls the Head of the Project and the supervisory authority and proposes corrective measures in case of negligence or in order to improve implementation efficiency.

Head of Construction Department or another employee appointed by Director for Design and Construction consolidates the reports developed by all Heads of the Project, the report developed by the Division for Study Documentation and by the Department of Expertise and Quality and sends the consolidated report to the Director of Design and Construction.

According to the *Procedure for Construction of Motorway Sections - Closing of Projects AC-P 7.5-02,* upon the completion of construction works and the issuance of the Take-Over Certificate by the Supervisory Authority, the Head of the Project is responsible for collection of all documentation necessary for the submission of the request for Use Permit. Head of the Project is also responsible for collection of all documentation from the construction site and As Built Project Designs and for sending the said documentation to the person responsible for archiving and to the Head of the Documentation Department.

3.2.3 Third Phase

Following the completion of the construction works, all issues related to operation and maintenance of roads are the responsibility of JPAC *Management and Maintenance Department*. A person within the Department is appointed for each road section, responsible for all issues during this phase. In addition, monitoring of environmental aspects and implementation of all environmental

requirements is carried out by the *Division for Protection and Maintenance-Group for Environmental Protection* during the operation phase.

3.3 Contractor Engagement

As required by its internal *Procedure for Construction of Motorway Sections - Opening of Projects and Project Management AC-P 7.5-01*, JPAC will establish a PIU for motorway section Konjic (Ovcari) – Prenj Tunnel – Mostar North, which will be responsible for Project implementation, under the supervision of the Lenders.

As stated previously, JPAC must ensure that requirements from the ESIA, national EIA, the Decision on the Approval of the EIA Study, Lender's requirements, FIDIC standards (in this particular case the red FIDIC) etc. are included in the tender documentation. This will include the BMP commitments.

JPAC has established Division for Study Documentation, Social and Environmental Policy (within the JPAC Department for Documentation) in January 2020. This newly formed Division has to ensure proper addressing of E&S issues during the pre-construction and construction phases. According to the new Systematisation of Work Positions, new job positions are foreseen, among which a Senior Associate for Environmental Policy, a Senior Associate for Social Policy and a Senior Associate for Site Level Management and Communication with Local Communities. For the purpose of this BMP, it is important to note that JPAC has since hired a Senior Associate for Environmental Policy.

With regards to managing the E&S responsibilities of Project construction, in line with *Decree on Construction Site Organisation, Mandatory Documentation on Construction Site and Construction Work Participants* (Official Gazette of FBiH, no. 48/09, 75/09 and 93/12) the presence of Supervisory Authority, which is the legal entity responsible for the overall supervision and monitoring of construction works, is obligatory at the construction site. The contractor’s performance is monitored against the CSOP, and JPAC receives regular reports on compliance. Other risks (e.g. management of traffic, health and safety, waste management, etc.) are the responsibility of the Contractor, via the contract.

The environmental monitoring during the maintenance phase is performed by the Division for Protection and Maintenance - Group for Environmental Protection. This Group is also responsible for the environmental monitoring during construction phase and for the development of Environmental and Social Reports to be submitted to lenders. JPAC engages a separate contractor to address operational issues, including road maintenance, spill clean-up, environmental monitoring and any other actions. These arrangements are budgeted and renewed annually.

3.4 Key Interfaces

The key interfaces for the implementation of this and other management plans will be as follows:

- The Contractor - must implement the mitigation plans and, in turn, must liaise directly with the Head of Project.
- The Supervisory authority – is responsible for the overall supervision of construction works and will supervise the monitoring of the implementation of all management Plans during the construction stage and will liaise with both the contractor and the Head of Project.
- The Head of Project – is responsible for all construction activities on behalf of JPAC and will produce monthly reports detailing the construction site activities including the implementation of management plans and the actions taken.
- All activities including the implementation of management plans must be reported annually to the Federal Ministry of Environment and Tourism and EBRD.
- JPAC Management and Maintenance Department – this team will require a full briefing prior to taking on the operational responsibilities detailed within the Biodiversity Management Plan.

4 Project Standards

4.1 Summary of Applicable Project Standards

There are a range of applicable project standards (legislation and policy) as described in greater detail in the following section below. In summary, the key applicable standards considered to be as follows:

- *Law on Nature Protection of FBiH*[3]
- Red List of Flora, Fauna and Fungi of FBiH[4]
- *Regulation on Mitigation Measures for Strictly Protected Species and Sub-species and Protected Species and Subspecies of Federation of Bosnia and Herzegovina*[5]
- EU Habitats Directive
- EU Birds Directive
- The Council of Europe's Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention)
- EBRD Environmental and Social Policy (2019)
- EIB Environmental and Social Handbook (2022)
- JPAC Quality and Environmental Policy.

[3] Official Gazette of FBiH, No. 66/13, 01/25
[4] Official Gazette of FBiH, No. 7/14
[5] Official Gazette of FBiH, No. 21/20

4.2 Applicable FBiH Standards

Implementation of the Project requires compliance with the provisions of relevant Federation of BiH legislation on environmental and social issues, physical planning, construction and roads maintenance and management, construction of Motorway on the Corridor Vc, health and safety at work, labour, and land acquisition and resettlement. The review of applicable FBiH requirements is given in Table 1.

Table 1: Overview of FBiH Requirements Relevant for the Biodiversity Management Plan

Issue	FBiH requirements
EIA and environmental permitting	The Environmental Impact Assessment (EIA) process and environmental permitting procedures in FBiH are regulated by the: › *Law on Environmental Protection*[6], and › *Regulation on Projects for Which an EIA is Mandatory and Projects for Which the Need for EIA is Decided*[7]. EIA procedure The EIA procedure is carried out in 2 phases: **Phase 1: Preliminary EIA (screening and scoping), and** **Phase 2: Development of EIA Study.** Construction of motorways is subject to mandatory EIA and permitting by the Federal Ministry of Environment and Tourism (FMoET), and the relevant process is described below. Phase 1: The developer submits a 'Request for the Preliminary EIA' to FMoET to determine the scope and content of the EIA Study. The Preliminary EIA must be developed by an EIA practitioner licensed by FMoET. The 'Request for the Preliminary EIA' must contain: a) a description of the project, b) an excerpt from the spatial planning document, c) data on the type and quantity of materials to be used, and the type and quantity of emissions, d) a description of the potential impacts of the project on the environment during construction, operation, and decommissioning, e) a description of basic and auxiliary raw materials and other sources of energy, f) a description of the environment in the area affected by the project, g) an overview of alternative solutions with regard to environmental impacts, h) information on possible difficulties encountered by the applicant in the collection of data, i) a non-technical summary of the above listed information. FMoET examines the request and ensures public review of the request for obtaining the opinions of relevant stakeholders:

[6] Official Gazette of FBiH, No. 15/21

[7] Official Gazette of FBiH, No. 51/21, 33/22 and 104/22

Issue	FBiH requirements
	› cantonal and municipal/city-level authorities on whose territory the project is planned, › authorities and organisations responsible for environmental protection which may be exposed to significant impacts of the projects (responsible for the protection of cultural, historical, and natural heritage; health protection; any other stakeholders) › authorities responsible for environmental protection in Republika Srpska and Brcko District or another state if relevant › public concerned. These stakeholders are given 30 days to submit their comments. FMoET then issues (within 60 days from receiving the request) a 'Decision on Preliminary EIA' which specifies the content and scope of the EIA Study. Phase 2: The EIA Study has to be developed by an EIA practitioner licensed by FMoET. For projects requiring a Decision on Approval of the Study, the EIA Study must also contain a Waste Management Plan. The developer submits the EIA Study to FMoET. Within 15 days, the Ministry sends a copy to relevant authorities and the public concerned and publishes the EIA Study on its website. FMoET then organises a public hearing as near as possible to the project location and informs the public at least 15 days in advance. FMoET prepares minutes of the public hearing within 7 days. The public may submit its written comments to FMoET within 15 days from the date of the public hearing. FMoET's expert committee assesses the EIA Study within 30 days from the date of the public hearing[8]. Within a further 60 days from the completion of assessment, FMoET issues a 'Decision on the approval or (rejection) of the EIA Study'. The Decision on approval ceases to be valid if the developer does not obtain the construction permit within 3 years from the date of receipt of the Decision. The Decision on the Approval of the EIA was obtained in January 2024.
Water permits	The water permitting procedure in FBiH is regulated by the *Law on Waters*[9] and the *Regulation on Content, Scope, Conditions, Ways of Issuing and Archiving of Water Documents*[10]. The required water acts are: › Preliminary Water Consent – defines whether the applicant has met the conditions for (i) exercising water rights; (ii) the manner of exercising this right; (iii) the documentation for the construction of new, reconstruction or removal of existing facilities. It is valid for 3 years. › Water Consent – confirms that the documentation attached to the request for the Water Consent is in accordance with the Preliminary Water Consent, local legislation on water and spatial planning documents. It has to be obtained before obtaining the Construction Permit (CP). It expires after 2 years if a CP has not been issued and construction works initiated.

[8] If necessary, FMoET may ask the developer to revise the EIA Study and provide another 30 days for corrections. The EIA Study may only be revised once – in case the EIA Study is still not approved, a new Request and new EIA Study must be submitted by the developer.

[9] Official Gazette of FBiH, No. 70/06

[10] Official Gazette of FBiH, No. 31/15, 55/19, 41/20 and 63/22

Issue	FBiH requirements
	› Water Permit – defines: (i) the purpose, manner and conditions for water use; (ii) the operation of facilities; (iii) the manner and conditions for discharge of wastewater and disposal of solid and liquid waste. It confirms that the conditions defined by the Water Consent have been fulfilled. It is valid for up to 15 years. The agency responsible for issuing water acts for this Project is the Water Agency for Adriatic Sea Watershed.
Air quality	According to the *Regulation on the Monitoring of Air Quality and Defining Pollutants Types, Limit Values and Other Standards*[11], air quality is monitored by measuring the concentration of sulphur dioxide, nitrogen oxides, particulate matter PM10 and PM2.5, lead, benzene, carbon monoxide, ground-level ozone, arsenic, cadmium, mercury, nickel and benzo-a-pyrene, with instruments for automatic measurement and sample analysis. The maximum allowable daily concentrations, target values and alert thresholds for pollutants are also regulated by the mentioned Regulation.
Noise	The *Law on Protection Against Noise*[12] regulates the permissible noise levels, noise protection measures, the way of measuring and recording noise, noise limits classified according to the atmosphere, land use and the time of day (day or night), in order to protect human health, working and living space, and the environment in general. The Law defines the limit values of external noise for planning new facilities and sources of noise in FBiH. Vehicle noise standards are defined by the *Rulebook on the Dimensions, Total Weight and Axle Load of Vehicles, on Obligatory Vehicle Devices and Equipment Vehicle, on Basic Requirements to be Met and Traffic Equipment on Roads*[13]. The Rulebook define the permissible sound level limits for individual vehicles.
Waste management	The *Law on Waste Management*[14] sets general requirements concerning construction waste management and management of waste generated during decommissioning. In addition, according to the *Regulation on Construction Waste*[15] a Preliminary Construction Waste Management Plan needs to be submitted for the issuance of the UC, while a Detailed Construction Waste Management Plan must be enclosed to the CP Request.
Water and wastewater management	The *Law on Waters*[16] regulates water and wastewater management and planning. The maximum permitted quantities of hazardous and harmful substances in wastewaters before discharging into natural recipients (surface waters) or into public sewerage system are stipulated by the *Decree on Conditions for Discharge of Wastewater into Environment and into the Public Sewerage System*[17].
Nature protection	The *Law on Nature Protection of FBiH*[18] and its bylaws define the bodies for nature protection, general conservation measures, evaluation of operations in nature, habitats and ecologically important areas, species and subspecies, protection and conservation of

[11] Official Gazette of FBiH, No. 1/12, 50/19 and 3/21
[12] Official Gazette of FBiH, No. 110/12
[13] Official Gazette of BiH, No. 23/07, 54/07, 101/12, 26/19 and 83/20
[14] Official Gazette of FBiH, No. 33/03, 72/09, 92/17 and 72/24
[15] Official Gazette of FBiH, No. 93/19
[16] Official Gazette of FBiH No. 70/06
[17] Official Gazette of FBiH, No. 26/20 and 96/20
[18] Official Gazette of FBiH, No. 66/13

Issue	FBiH requirements
	biodiversity and ecosystems, the establishment of Natura 2000, etc. The Red List of Flora and Fauna of FBiH was developed based on the requirements of this Law. *Decision on Ratification of Bern Convention*[19] was adopted by the Presidency of BiH in July 2008. This Decision provides a translation of the Convention and establishes its ratification in BiH. *Regulation on Protection Measures for Strictly Protected Species and Subspecies and Protected Species and Subspecies*[20] declares wild plant species, animals and fungi important for preservation, and species that have a special significance in ecological, ecosystem, biogeographical, scientific, health, economic and other aspects for FBiH, and strictly protected wild species or protected wild species. Protection measures are established for protected species and their habitats.
Construction site organisation	According to the *Decree on Construction Site Organisation, Mandatory Documentation on Construction Site and Construction Work Participants*[21], Contractors are required to develop a Construction Site Organisation Plan (CSOP). CSOP includes organisation of preliminary works, organisation of site during construction, organisation of site after construction phase, technological scheme, the Environmental Protection Plan and Safety Management Plan. Therefore, this Plan requires the development of other accompanying Plans: › Environmental Protection Plan – suggests detailed measures of environmental and social management by covering the following aspects (sub-plans): air quality, noise and vibration management, soil management, hazardous material management, spill response management, emergency preparedness and response, › Fire and Explosion Management Plan (preliminary fire-fighting activities in case of fires; plan for alerting fire-fighting services), › Occupational Health and Safety Management Plan (prescribes the mandatory equipment for occupational health and safety, preliminary medical assistance and plan for alerting the official medical emergency assistance). The CSOP must be developed by the Contractor prior to the commencement of construction works. The Plan has to be controlled and signed by the Supervisory Authority which is the legal entity responsible for the overall supervision of construction works, as stipulated by the above-mentioned Decree. The Plan should correspond to the requirements, safety measures and obligations contained in the Environmental Permit or environmental requirements laid down in the approval process for the construction.
Road safety	A General Audit of project documentation that includes the audit of Traffic Signalisation and Equipment Design is required by local legislation (*Law on Basis of Road Safety on Roads of BiH*[22], and the

[19] Official Gazette of FBiH, No. 8/08

[20] Official Gazette of FBiH, No. 21/20

21 Official Gazette of FBiH, No. 25/22, 42/22, 93/22 and 33/24

[22] Official Gazette of BiH, No. 6/06, 75/06, 44/07, 84/09, 48/10, 18/13, 08/17, 89/17, 09/18, 46/23 and 88/23

Issue	FBiH requirements
	accompanying key Regulations[23], *Law on Roads of FBiH*[24], and the accompanying key Regulations[25]). Upon the completion of the Main Design (including the Main Traffic Signalisation and Equipment Design), investors publish a public call for an auditor who prepares the first report on compliance with the existing legislation, guidelines and specific standards. The investor forwards the report to the designer for review and response. The designer analyses the report and may accept or reject the provided comments. The report is then sent back to the auditor. If the auditor does not accept the rejections (if any) of his/her comments, an attempt is made to reconcile the opinions of the auditor and designer. In case such reconciliation is not achieved, the investor makes the final decision. The auditor prepares the final audit report which is an integral part of the Main Design (the audit report is attached as the first page of the Traffic Signalisation and Equipment Design, verified by the seal of the auditor). An inspection report by the committee for technical acceptance of buildings and facilities is required prior to the issuance of a UP for any built structure including roads. The Regulation on Technical Inspection of Built Structures[26] defines the manner of appointment of the committees for technical acceptance, the procedure of technical inspection and other related issues. The committee for technical acceptance prepares a report.
Motorway design	According to the *Law on Motorway on Corridor Vc*[27], JPAC defines the Technical Specifications (TS) for the design, construction and maintenance of motorways on Corridor Vc. According to this Law, TS are developed taking into consideration BAS, EN and ISO standards as well as specific requirements for BiH. TS include: › Set of Instructions for the Design, Procurement, Installation and Maintenance of Motorway Elements, Structures or Their Parts on the Motorway developed by JPAC in order to standardise and uniform as much as possible necessary requirements regarding the construction of motorways and to give instructions for designers, supervisory teams and contractors › BAS standards, European EN and ISO International Standards › *Guidelines for the Design, Construction, Maintenance and Supervision*[28], in line with FBiH legislation as well as European and international requirements and legislation. These Guidelines are adopted into the FBiH legislation by FBiH Government through the Decision on the *Guidelines for the Design, Construction, Maintenance and Supervision of Roads in FBiH*[29] › Laws, regulations, decrees and other legal acts adopted by the FMoPP.
Public consultations	The primary law that ensures the rights of citizens to information is the *Law on Free Access to Information in FBiH*[30], which stipulates that all citizens and legal entities have the right to access information in

[23] All published in the Official Gazette of BiH, No. 16/07

[24] Official Gazette of FBiH, No. 12/10, 16/10 and 66/13

[25] All published in the Official Gazette of FBiH, No. 48/03

[26] Official Gazette of FBiH, No. 58/14, 89/18, 44/20 and 42/21

27 Official Gazette of FBiH, No. 08/13

[28] Faculty of Civil and Geodetic Engineering of the University of Ljubljana and DDC Consulting & Engineering Ltd, 2005

[29] Official Gazette of FBiH, No. 80/06

[30] Official Gazette of FBiH, No. 32/01 and 48/11

Issue	FBiH requirements
	the control of a public authority, and each public authority has a corresponding obligation to disclose such information. Procedures related to environmental information disclosure are further elaborated in the *Law on Environmental Protection*[31], which stipulates that every person and every organisation must have adequate access to information regarding the environment at the disposal of public authorities, including information on hazardous materials and activities in their communities, and be enabled to participate in the decision-making process. Regulatory bodies and governments are obliged to encourage public awareness and participation, facilitate access to information, judicial and administrative procedures, as well as to registers of installations and polluters in the future. Furthermore, BiH acceded to the Aarhus Convention on Access to Information, Public Participation in Decision Making and Access to Justice in Environmental Matters in 2008. This Convention regulates rights related to the environment and links the responsibility of public authorities with environmental protection. It aims at democratic cooperation of the public and public authorities and introduces a new procedure for public participation in negotiating and implementing international agreements. Under the Convention, access to information, public participation in decision making and access to justice are an integral part of environmental protection management. The public consultation requirements for the EIA procedure are described above under item "EIA and environmental permits".

4.3 Lender's Requirements

4.3.1 EBRD Requirements

The Environmental and Social Policy (ESP, 2019) is a key EBRD document, which details the commitments of the Bank's Funding Agreement to promote in the full range of its activities, environmentally sound and sustainable development. Bank-financed projects are expected to meet good international practice related to sustainable development. The Bank has defined specific PRs for key areas of environmental and social issues and impacts. The EBRD PRs and their applicability to this Project are given in Table 2. New facilities or business activities to be financed by EBRD should be designed to meet PRs from the outset. If a proposed business activity to be financed relates to existing facilities that do not meet PRs at the time of Board approval, the client will be required to adopt and implement an ESAP.

Table 2: EBRD PRs applicable to the Project

Performance requirements	Applicable to the Project
PR1: Assessment and Management of Environmental and Social Risks and Impacts	Yes
PR2: Labour and Working Conditions	Yes

[31] Official Gazette of FBiH, No. 15/21

Performance requirements	Applicable to the Project
PR3: Resource Efficiency and Pollution Prevention and Control	Yes
PR4: Health, Safety and Security	Yes
PR5: Land Acquisition, Restrictions on Land Use and Involuntary Resettlement	Yes
PR 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources	Yes
PR7: Indigenous Peoples	No
PR8: Cultural Heritage	Yes
PR9: Financial Intermediaries	No
PR10: Information Disclosure and Stakeholder Engagement	Yes

Under the EBRD Environmental and Social Policy 2019 (ESP), EBRD categorises each project to determine the nature and level of environmental and social investigations, information disclosure and stakeholder engagement required. The categorisation of each project depends on the nature, location, sensitivity and scale of the project, and the significance of its potential adverse future environmental and social impacts.

- Category A: A project is categorised A when it could result in potentially significant adverse future environmental and/or social impacts which, at the time of categorisation, cannot readily be identified or assessed, and which, therefore, require a formalised and participatory environmental and social impact assessment process.
- Category B: A project is categorised B when its potential adverse future environmental and/or social impacts are typically site-specific, and/or readily identified and addressed through mitigation measures. Environmental and social appraisal requirements may vary depending on the project and will be determined by the EBRD on a case-by-case basis.
- Category C: A project is categorised C when it is likely to have minimal or no potential adverse future environmental and/or social impacts and can readily be addressed through limited environmental and social appraisal.

Based on an assessment review of the Project against EBRD criteria and having in mind that this subsection is totalling approx. 35 km in length and belongs to the 335 km long motorway, the Project is classified as Category A.

4.3.2 EIB Requirements

EIB requires that all the projects it is financing are acceptable in environmental and social terms by applying appropriate safeguards to all its operations. The EIB Environmental and Social Handbook provides an operational translation of those standards grouped across 11 thematic areas, as follows:

- Standard 1: Environmental and Social Impacts and Risks
- Standard 2: Stakeholder Engagement
- Standard 3: Resource Efficiency and Pollution Prevention
- Standard 4: Biodiversity and Ecosystems,

- Standard 5: Climate Change,
- Standard 6: Involuntary Resettlement,
- Standard 7: Vulnerable Groups, Indigenous Peoples and Gender (Indigenous People – not applicable to this Project)
- Standard 8: Labour Rights,
- Standard 9: Health, Safety and Security
- Standard 10: Cultural Heritage
- Standard 11: Intermediated Finance (not applicable to this project)

4.4 EU Requirements

EBRD, as a signatory to the European Principles[32] for the environment, is committed to promoting the adoption of EU environmental principles, practices and substantive standards[33] by EBRD financed projects, where these can be applied at the project level, regardless of their geographic location. When host country regulations differ from EU substantive environmental standards, projects will be expected to meet whichever is more stringent. Table 3 gives an overview of EU requirements applicable to this Project.

Table 3: Overview of EU Requirements Relevant to the Project

Directive	Brief description
EIA Directive **(Directive 2014/52/EU on the assessment of the effects of certain plans and programmes on the environment)**	The amended EIA Directive simplifies the rules for assessing the potential effects of projects on the environment that were part of the previous EIA Directive (85/337/EC) and its amendments. It requires an assessment to be carried out by the competent national authority for certain projects which have a physical effect on the environment. The EIA must identify the direct and indirect effects of a project on the following factors: man, the fauna, the flora, the soil, the water, the air, the climate, the landscape, the material assets and cultural heritage, and the interaction between these various elements.
Birds Directive **(Directive 2009/147/EC on the conservation of wild birds)** **and** **Habitat Directive (Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora)**	The two principal EU Directives relating to nature conservation provide a legal framework for the protection of habitats and fauna and flora species. Both Directives promote the maintenance of biodiversity by requiring Member States to take measures to maintain or restore natural habitats and wild species listed on the Annexes to the Directive at a favourable conservation status, introducing robust protection for those habitats and species of European importance. The Habitats Directive led to the setting up of a network of Special Areas of Conservation to protect the 220 habitats and approximately 1,000 species listed in Annex I and II of the Directive which are considered to be of European interest following criteria given in the Directive. Together with Special Protection Areas which are designated under the Birds Directive, these form a network of protected sites across the European Union called Natura 2000. The Emerald network is an ecological network to conserve wild flora and fauna and

[32]https://www.nib.int/filebank/a/1521315365/9ae732ab406cefafa3525b7bd10ad134/7215-European_principles_for_the_environment.pdf

[33] Substantive environmental standards of the EU are comprised in EU secondary legislation, e.g., regulations, directives and decisions.

Directive	Brief description
	their natural habitats of Europe, which was launched in 1998 by the Council of Europe as part of its work under the Convention on the Conservation of European Wildlife and Natural Habitats or the "Bern Convention".
Water Framework Directive **(Directive 2000/60/EC establishing a Framework for Community Action in the Field of Water Policy)**	This Directive establishes a framework for the protection of inland surface waters, transitional waters, coastal waters and groundwater. Member States shall implement the measures necessary to prevent or limit the input of pollutants into groundwater and to prevent the deterioration of the status of all bodies of groundwater, subject to the use for the abstraction of water intended for human consumption and those bodies of water intended for such future use. Member States shall ensure the establishment of programmes for the monitoring of water status in order to establish a coherent and comprehensive overview of water status within each river basin district for groundwater such programmes shall cover monitoring of the chemical and quantitative status.
Waste Framework Directive **(Directive 2008/98/EC on Waste)**	This Directive sets the basic concepts and definitions related to waste management, such as definitions of waste, recycling, recovery. It explains when waste ceases to be waste and becomes a secondary raw material (so called end-of-waste criteria), and how to distinguish between waste and by-products. The Directive lays down some basic waste management principles: it requires that waste be managed without endangering human health and harming the environment, and in particular without risk to water, air, soil, plants or animals, without causing a nuisance through noise or odours, and without adversely affecting the countryside or places of special interest. Waste legislation and policy of the EU Member States shall apply as a priority order the following waste management hierarchy: prevention, preparing for re-use, recycling, recovery, disposal. The Directive introduces the "polluter pays principle" and the "extended producer responsibility". It incorporates provisions on hazardous waste and waste oils and includes sets recycling and recovery targets.

It is also important to mention the *Aarhus Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters* to which Bosnia and Herzegovina acceded in 2008. The Aarhus Convention grants the public rights regarding access to information, public participation and access to justice, in governmental decision-making processes on matters concerning the local, national and transboundary environment.

4.5 Applicable Corporate Standards, Policies and Procedures

JPAC holds the ISO 14001:2015 standard and the ISO 9001:2015 quality management standard. The standards are indirectly related to biodiversity management through promotion of environmental management.

Within the EMS, JPAC has developed a set of internal procedures and guidelines regarding environmental and social management (ESM) systems containing a

substantial number of procedures and guidelines. Relevant procedures and guidelines regarding environmental management systems (EMS) have been submitted to the Consultant for a review of content and quality of these documents. The review has also included the Main List of Documentation of the implementation of previous Projects with the Company. According to the Main List of Documentation, the Company's internal procedures related to EMS are specified in Table 4 below. There are no specific procedures solely pertinent to biodiversity management. However, this aspect is covered with relevant environmental management procedures.

Table 4: List of Relevant Procedures and Guidelines related to Environmental Management Practices of JPAC

No.	Procedure/Guidance
1.	Quality and Environmental Protection Manual AC-QM/EM-01* (2017)
2.	Quality and Environmental Protection Policy (2017)
3.	Risk Management Procedure AC-P 6.1-01* (2017)
4.	Procedure for Internal and External Communication AC-P 7.4-01* (2017)
5.	Documented Information Management Procedure - AC-P 7.5-01* (2017)
6.	IFI Financed Procurement Procedure AC-P 8.4-01* (2017)
7.	Procedure for Construction of the Motorway Sections - Opening of the Project and Project Management AC-P 7.5-01 (2013)
8.	Procedure for Construction of the Motorway Sections - Closing of the Project AC-P 7.5-02 (2013)
9.	Motorway Network Management and Maintenance Procedure - AC-P 6.3-01 (2013)
10.	Property Expropriation Procedure - AC-P 7.5-03 (2016)
11.	Environmental Protection Management Procedure - AC-P 6.1-02 (2017)
12.	Guideline on Application of Safety Measures During Tunnel and Surface Mining Works - AC-U 7.5-01 (2013)
13.	Guideline on Participation/Activities of Construction Sector in Expropriation Procedure - AC-U 7.5-08 (2013)
14.	Guideline on Risk Identification, Analysis and Management - AC-U 8.5-22* (2017)
15.	Internet Data Updating Procedure - AC-U 4.2-02 (2014)
16.	Guideline on Activities of OHS Department - AC-U 6.4-02 (2015)
17.	Guideline on Activities of Fire Protection Department - AC-U 6.4-01 (2015)
18.	Guideline on Technical and Financial Evaluation of Proposals During Procurement Regulated by International Lenders' Rules - AC-U 8.5-33 (2018)
19.	Guideline on Conditions and Procedure for Approving Sub-contractors and Suppliers for Motorway and Trunk Highway Construction - AC-U 8.4-02 (2019)
20.	Guideline on Activities of Sector for Legal Support to Project Implementation - AC-U 7.1-05 (2019)
21.	Guideline for the Assessment of Compliance with the Applied Legislation AC-U 9.1-02 (2017)

Below is a summary of some of the most relevant procedures and guidelines:

- Procedure for Construction of the Motorway Sections - Opening of the Project and Project Management AC-P 7.5-01 - this procedure closely organises and coordinates activities related to activities in the field of preparations for the construction of the motorway sections regarding the technical domain of the

projects, particularly in the field of preparation for the construction and development of medium-term and annual plans and programs of the company.

- Guideline for the Assessment of Compliance with the Applied Legislation AC-U 9.1-02 -this guideline regulates the procedure in the evaluation of compliance with legal and other regulations.

5 Mitigation Measures and Management Controls

5.1 Introduction to Mitigation

In order to demonstrate net gain/no net loss of biodiversity, the mitigation hierarchy is applied to Project's potential biodiversity impacts. The first aim of any project is to avoid impacts, but where impacts cannot be avoided, they should be minimised. If an impact cannot be minimised to the extent that it becomes non-significant in nature, then further mitigation and compensation may be required. Finally, if an impact cannot be mitigated for within the project footprint, then offsetting can be considered; though this should be carried out as a last resort, if possible. From inception to completion, the aim of a project should be to achieve no net loss of biodiversity, and, where possible, to achieve net gain. With the mitigation hierarchy in mind, this section contains three tables, each relating to the timing or phase of mitigation: preconstruction, construction and operation.

5.2 Avoidance

Avoidance of biodiversity losses can be achieved in various ways. For this Project most feasible opportunities are found in avoiding impacts through Main Design requirements and temporal/spatial restriction of works (i.e. avoiding works in areas with high biodiversity value during fish, amphibian, bird and bat breeding/nesting/roosting). Minimisation of biodiversity loss is achieved by implementing by adjusting construction or operation activities. Where adverse impacts cannot be avoided or minimised during the project it is aimed to restore habitat loss as much as possible within the project area and to postpone any biodiversity impacts where possible.

Preparation of the Main Design requires ensuring the systematic conservation planning. Main Design requirements to be implemented in pre-construction are as follows:

- According to the 2022 technical descriptions of the subsections Konjic (Ovcari) – Prenj Tunnel and Prenj Tunnel – Mostar North, a total number of planned viaducts is nine, and tunnels six (including the Prenj Tunnel). Structures such as viaducts and tunnels are permeable structures that enable habitat connectivity and unobstructed movement of animals. Additionally, motorway passing through the nature via tunnels avoids negative impacts and is the optimal solution regarding biodiversity issues. That is the case with

this Project as well. Tunnels are planned through the most valuable features (candidate Emerald site and potential Natura 2000 site Zlatar, potential Natura 2000 site Prenj-Cabulja-Cvrsnica and partly in candidate Emerald site Kanjon Bijele) avoiding negative impact on their integrity and conservation objectives (qualifying features). The areas of motorway layout and Konjic bypass layout that are currently planned to be in tunnels must not decrease unless significant obstacles are encountered.

> The motorway viaduct planned to go over Neretva shall be constructed without any disturbance of the riverbed or riparian habitats. Current design documentation envisages such solution for the viaduct on the motorway layout, and it must not be altered (Figure 2).

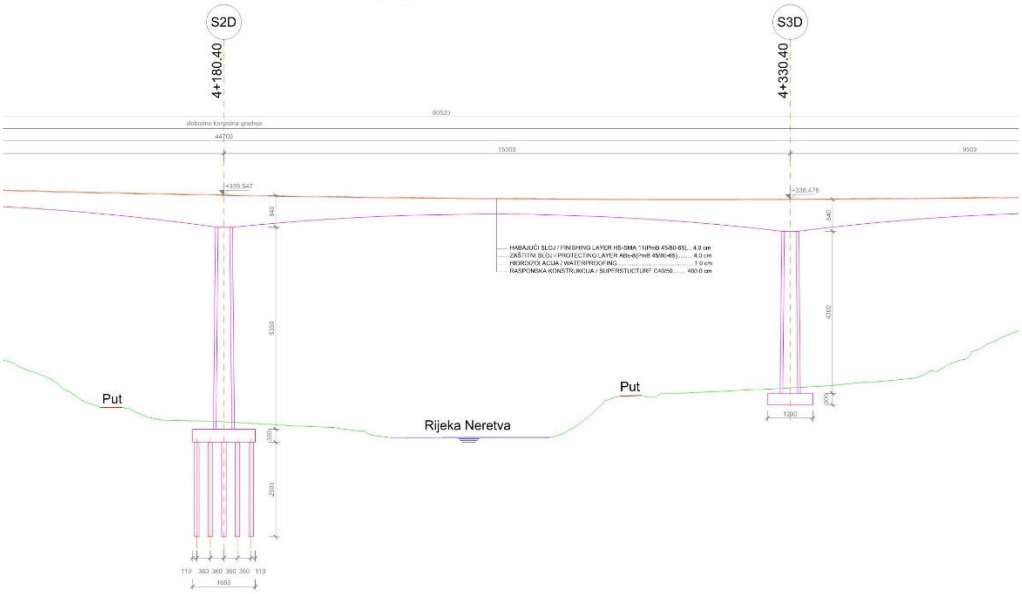


Figure 2: Longitudinal cross-section of the viaduct over Neretva

> Construction activities in the unnamed stream near Repovica (Konjic bypass) are not allowed.

> Perform construction of the bridge over Neretva on Konjic bypass during the dry season.

> Prior to commencement of construction, select inert waste disposal sites and borrow pits and any access roads they may require, machinery parking spaces, other access roads, service plateaus, fuel containers, construction worker camps and other (temporary) infrastructure. Selection of these localities must be based on minimal impact on natural habitats. Review of selected sites must be performed in order to ensure compliance with EBRD PR 6 and EIB Standard 4. Infrastructural elements must not be established in potential Natura 2000 sites, candidate Emerald sites, critical habitats (CH) or within priority biodiversity features (PBF) unless there is no other viable option based on analysis of environmental, social, and financial criteria, which must be agreed upon by the Lenders and accompanied by mitigation and compensation (if necessary) during Main Design preparation. Additionally, measures as outlined in the ESMP must be implemented.

- Permanent structures with potential negative impact on biodiversity such as gas stations and billboards with bright lights must not be planned within potential Natura 2000 sites, candidate Emerald sites, PBFs or CHs.

The spatial and temporal restrictions during construction phase are as follows:

- Prohibit access to banks or areas adjacent to waterbodies, to the extent required to protect the structural integrity of riverbanks.
- Pause works near water bodies during the spawning period and migrations of fish (February to April).
- Restrict works near ponds, streams, and canals (reproductive centers) during the reproductive period of amphibians (March and April).
- It is necessary to break through the access roads and work on the Tunnel Klenova Draga in the off-breeding period from July to March, i.e., to suspend the works from the beginning of incubation to the take-off of the fledglings (beginning of March-end of June) to prevent potential impact on the golden eagle (*Aquila chrysaetos*) if the nesting of the species is confirmed prior to construction.
- Regarding mammals, measures during the construction period refer to avoiding tunnelling and excavation works in the period from March to May, when the largest number of species give birth to offspring. This ensures peace in the hunting area and a period of wildlife getting used to the new conditions in the habitat.
- Project construction must not be undertaken at dusk, dawn and at night to avoid disturbance to nocturnal and crepuscular fauna (i.e., bats) from increased noise and vibration within candidate Emerald sites Zlatar and Konjicka Bijela and potential Natura 2000 sites Zlatar and Prenj-Cabulja-Cvrsnica.

5.3 Minimise

5.3.1 Preconstruction Measures

The following mitigation activities will need to be programmed to take place prior to the construction of each road subsection (Table 5).

The entity responsible for implementation of preconstruction actions is JPAC. JPAC can transfer the responsibility to the Contractor as per Contractual Agreement.

Table 5: Preconstruction Activities

Feature	Action	KPI[34] Notes
General mitigation measures	- JPAC (or Contractor if JPAC transfers the responsibility) must timely implement a set of mitigation measures listed in the BMP which refer to pre-construction phase.	Construction Site Organisation Plan developed Construction Environmental

[34] KPI – Key Performance Indicator

Feature	Action	KPI[34] Notes
	› Avoidance and mitigation measures given in BMP must be included in Main Design to ensure Project is in line with EBRD's PR 6 and EIB Standard 4. › Develop CSOP to achieve full compliance with national requirements and EBRD's PRs and CESMP. › The Biodiversity Offsetting Plan (BOP) must be prepared in line with BMP prior to the commencement of construction activities and implemented as soon as technically feasible. › Develop and implement the Invasive Species Management Plan (ISMP) within the CESMP. The plan defines management controls for the control of invasive species during construction activities and it should contain the following: › Purpose of the document – the aim of the Plan, including the goals and objectives for managing invasive species, ISMP must follow mitigation hierarchy, legal and other regulations and constraints and identification of the parties responsible for implementation › Identification of invasive species (a detailed inventory of invasive species found in the Project area including their characteristics, distribution and impact on native ecosystems) – according to the baseline collected during preparation of the ESIA a total of 20 invasive species are present along the motorway, while eight species are present along Konjic bypass › Detailed mapping and photographs of extent of invasive species stand – detailed monitoring targeting invasive species is necessary as ISMP heavily relies on good mapping input in order to timely recognise high-risk areas › Risk assessment – an assessment of the potential impact of invasive species on native ecosystems, including an evaluation of the likelihood of invasion, the potential for spread, and the potential for negative impacts on biodiversity and ecosystem services. › Prevention and early detection – a plan for preventing the introduction and establishment of invasive species, including measures such as monitoring, screening, and education. › General control and eradication measures and good international practice – a plan for controlling and eradicating invasive species, including the methods and techniques that will be used to remove or manage invasive species populations. Measures such as regular washing of machinery upon exiting areas rich in invasive species and control of soil originating from such areas are common general measures to prevent the spread of invasive species › Species-specific removal methods and controls - prevent and control the spread of invasive species, with focus on the species with A2 and A3 invasive codes: Boxelder maple, Tree of heaven, Redroot pigweed, Annual ragweed, Paper mulberry, Horseweed, Jimsonweed, Indian goosegrass, Annual fleabane, Jerusalem artichoke, Black locust, Persian speedwell, Rough cocklebur and Spiny cocklebur	and Social Management Plan developed Main Design in place, and in accordance with suggested mitigation measures in this BMP

Feature	Action	KPI[34] Notes
	› Material storage and disposal methods and controls – mapping of invasive species stands will enable calculations of amounts of soil that cannot be used again on different locations, in turn, adequate methods of soil control, processing and disposal can be provided, such soil must not be disposed on disposal sites within candidate Emerald sites or potential Natura 2000 sites as they can be a hotspot of further spread › Restoration and rehabilitation – a plan for restoring and rehabilitating native ecosystems that have been impacted by invasive species, including measures such as habitat restoration, reforestation, and erosion control. › Contingency plan – a plan for addressing unexpected situations or changes in the project that may impact invasive species management, including emergency response plans for new invasive species introductions or unexpected impacts on native ecosystems. › Monitoring programme and reporting – Monitoring of invasive plant species must be developed for the process of eradication on control of the invasive species, but also as a program of evaluation of the ISMP itself, monitoring programme must be based on SMART goals and have clear KPIs that can be easily observed and measures by a Biodiversity Expert during Construction. › The revegetation and reinstatement of habitats is a process that occurs upon completion of construction and must be detailed in Land and Habitat Restoration Plan (LHRP). The LHRP is to be developed as a part of CESMP and should contain, but is not limited to, the following information: › Introduction – an overview of the purpose of the plan, including the goals and objectives for restoring land and habitat, description of the project site, including its size, location and characteristics such as topography, soils and vegetation › Scope of the LHRP – the chapter shall elaborate on the background, project characteristics, aims and objectives of the LHRP, planning or physical constraints, baseline information (vegetation communities, invasive species), precise maps of construction works, habitat maps, location and status of habitats and species of conservation concern › Restoration goals, methods, and strategy - The LHRP must provide a statement of restoration goals, including the desired condition of the land and habitat and the timeframe for achieving those goals, identify appropriate restoration methods (such as native plant revegetation, soil amendment, erosion control, and water management) and strategies that will be applied across the site. Potential strategies are: natural regeneration, assisted natural regeneration (e.g. through fencing to exclude livestock), reconstruction and fabrication. › Management – detailed methods and techniques for planting must be specified: sourcing of planting stock, preparation of planting site, timing of planting, a list of suitable local native species, number of each species,	

Feature	Action	KPI[34] Notes
	planting density, use of mulch and fertilizer, ongoing maintenance requirements. › Implementation – This section must include implementation schedule detailing actions to be undertaken to achieve aims and objectives of the LHRP, information on the qualifications of personnel involved in the implementation of the LHRP, any permits needed for LHRP implementation and record keeping requirements. › Monitoring and reporting – The LHRP must outline monitoring strategy that shall set out the intended methodology and performance indicators. Monitoring for restoration projects is typically undertaken using quantitative methods i.e. transect or quadrat based monitoring and qualitative methods i.e. observations on daily record sheets. The monitoring strategy should be based on the size and complexity of the site and LHRP. Examples of performance indicators include composition and relative abundance of each plant species in a revegetation program is as per the reference vegetation community, > 90% survival rate of planted stock, growth of >1m by year three and 1.5m by year five for plantings and cumulative cover of 80% by year three, increased recruitment of native species, increased percentage cover of native species and no increase in invasive species and weeds. The LHRP must include reporting requirements such as frequency of reporting, duration of reporting and who the report will be submitted to. › The LHRP must outline projected costs of plan implementation including staffing, equipment, materials, and source(s) of funding. › The LHRP is primarily developed for the construction phase, however, the Plan must be developed in a way that will oblige long term monitoring of success. The LHRP must be binding for the Contractor during the whole construction phase, however, if the construction phase is shorter than five years, the LHRP obligations are to be transferred to the JPAC. › If the pre-construction phase begins more than five years after the surveys conducted as a part of ESIA (detailed surveys finalised in the beginning of June 2021), additional rapid biodiversity assessment must be done in order to establish whether any changes occurred regarding habitats and/or species. › Should any threatened species and/or habitats of conservation concern on national or international level be registered prior to construction, BMP must be updated in agreement with EBRD and EIB. The update must include additional mitigation measures and updating of the PBF/CH accounting to ensure no net loss and net gain of biodiversity if needed. › Comply with the provision of PR 6 and Standard 4 for no net loss (and preferable net gain) of biodiversity, plan revegetation in disturbed habitats. › Oil separators to be selected in line with EN 858-1 and EN 858-2 standards during Main Design phase.	

Feature	Action	KPI[34] Notes
Invertebrates	› Mitigation measures in the pre-construction period are reduced to avoiding/minimising works in the area of forest ecosystems within the zone of indirect physical impact, and it should be especially emphasised that, during the construction of access roads, it is necessary to plan works in a manner to avoid additional deforestation and ecosystem damage through clear demarcation of areas where construction activity is allowed. › Impact measures and mitigation measures are significant for the prevention of avoidable negative impacts on invertebrates; however, due to the wide distribution of found species and the possibility of subsequent recolonisation of habitats, no significant irreversible negative effects are expected. Of the species found, only *Morimus funereus* is related to forest habitats. Habitat loss during the exploration phase can be compensated through the excavation site recultivation during the project construction and operation phases.	BMP, CHA updated prior to construction in case of important findings regarding fauna
Fish	Life cycles of a large number of aquatic organisms are adjusted to periods of high water and low water flow rate, so even small fluctuations in the amount and period on the flow rate could have significant impacts not only on aquatic organisms, but also on the organisms living in riparian zone. This could, as final consequence, lead to disturbance of the structure and function of food webs. Therefore, it is necessary to ensure sustainable long-term protection of natural aquatic habitats and adequate protection of aquatic species. › In order to protect fish species and their habitats, including species at risk, from development activities it would be necessary to reduce or eliminate constriction of flow through structure design. No river training of Neretva and its shoreline, and no interference of the natural flow rates of rivers is allowed. Due to engineering limitations, one pillar of viaduct over Tresanica River must be located near the river which will result in river training. River training must be done using good practice that will ensure the new riverbed resembles the old one in dimensions, sediment, and plant and fauna composition. › Design and install culverts to prevent creation of barriers to fish movement on motorway intersections with streams. Culverts shall be single span structures which do not have in-stream support and do not affect the riverbed, i.e. they have no artificial invert, and a natural bed is maintained. Such structures are suitable for small watercourses. They can come in a variety of forms from pre-cast concrete structures (arch or portal [rectangular]), panel bridges that come in prefabricated sections to bridges designed for site specific requirements. Single span structures have minimal impact on the river systems and the risk of causing a barrier to wildlife is low. If engineering issues occur and installation of single span structures is not possible, then closed culverts are to be installed. Closed culverts shall be in the shape of a box or closed arch. The dimensions shall be determined upon determination of stream flow as the streams of the Project area have very high flow during the spring and culverts must be able to accommodate increased water load.	

Feature	Action	KPI[34] Notes
	› Prevent leakage of oils to avoid contamination of water and adverse impacts to aquatic species by including installations of double the standard number of oil separators on bridges over rivers. Spill kits in the form of oil absorbent booms and other spill containment equipment to be kept on site to be deployed in the event of a spillage, and site staff trained in their use. › Concrete mixing and washing areas should be located more than 500 m from any watercourse. Wastewater from these areas shall be intercepted and hauled to a licenced disposal facility authorised by the Cantonal ministry responsible for environmental protection in accordance with the *Rulebook on issuing a permit for small business activities in waste management* (Official Gazette of the FBiH, No. 9/05). › Design setting up settling tanks at the concrete batching plant to treat the wastewater before discharging it. Treated wastewater shall meet the standards specified in the *Regulation on the conditions for the discharge of wastewater into the environment and public sewage systems* (Official Gazette of the FBiH, No. 26/20 and 96/20).	
Amphibians and reptiles	› Fragmented habitats along small unnamed streams, suitable for amphibians found in the area of Ovcari are located below the Ovcari interchange. In the process of Main Design development, culverts must be installed to enable water flow and movement of amphibians. › Should any threatened species or species of conservation concern be identified during preconstruction surveys, BMP update process must include additional mitigation measures to avoid any impacts and further assessment of possible residual impacts. If residual impacts are expected, no net loss accounting should be updated.	
Birds	› An inactive nest of a Golden Eagle (*Aquila chrysaetos*) was found in the area of Klenova Draga in 2021 and one individual was registered in flight at the same location in 2022. Prior to start of construction, it is necessary to conduct additional research in order to determine whether the nest is active in the first year of construction and if there is another location in the immediate environment where this species nests. Depending on survey results, updating of BMP and ESMP might be required. If inhabited nest(s) of the golden eagle is (are) registered, risk assessment must be performed to identify potential adverse impacts the Project might have. If adverse impacts are likely to occur, mitigation measures must be provided and implemented. Measures may include restriction of works, establishing a feeding site in order to attract the eagle to an area away from the project etc. Monitoring of such nests most be performed throughout the construction phase. › It is necessary to plan the works on all parts of the Corridor Vc subsection Konjic (Ovcari) – Prenj Tunnel – Mostar North, to begin in the period July - March, i.e., outside the bird breeding period. This is especially important for the works near tunnel portals.	
Mammals	› Design viaducts as passable structures that will enable fauna movement is avoidance and a mitigation measure. Other adverse impacts and, subsequently, mitigation measures	

Feature	Action	KPI[34] Notes
	have a negligible effect due to the possibility of wildlife migration and the fact that this is an area that is not recognised as an important habitat for mammals.	

5.3.2 Construction Measures

During the construction phase a range of mitigation measures will need to be implemented to reduce the impact that the project will have on local biodiversity. Where mitigation is a by-product of a different management plan, this has been detailed in the Table 6 below. The revegetation and reinstatement of disturbed habitats is mentioned as a measure below as they are a requirement for construction phase, however, the detailed instructions are given in the Chapter 6. The responsible body for implementing mitigation measures during construction phase is the Contractor (and the employed Biodiversity Expert) unless otherwise stated. BMP requirements must be included in tender documentation by the JPAC.

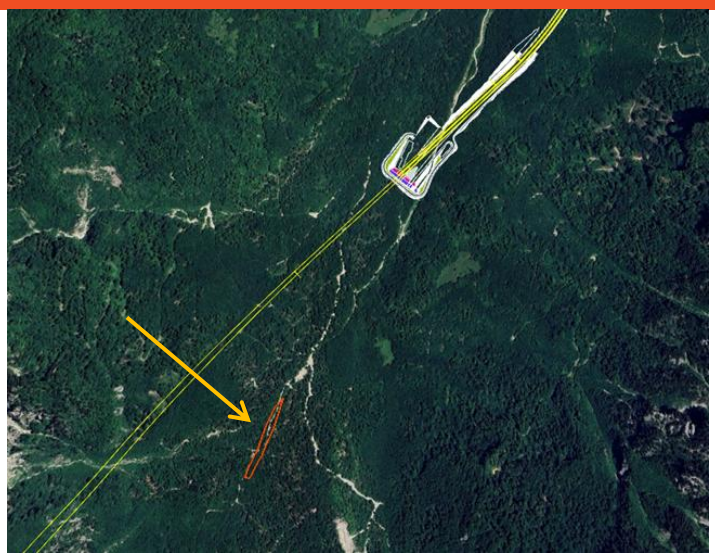
Table 6: Construction Activities

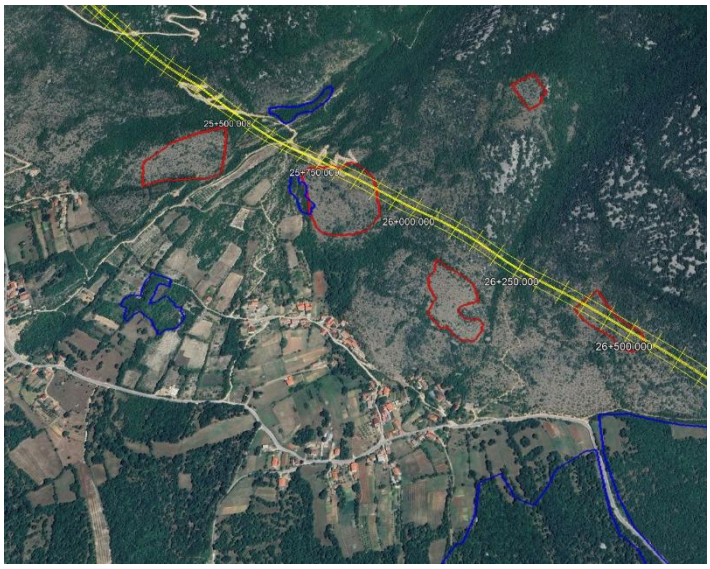
Feature	Action	KPI[35] Notes
General measures	› Implementation of mitigation measures during the construction stage will be the responsibility of the Contractor in accordance with the contract specifications and loan requirements. As the project is located in ecologically sensitive area, adequate and timely implementation will be ensured by employment of a suitably qualified Biodiversity Expert (BE) specifically to coordinate the implementation and monitoring of the ESMP and BMP. › Temporarily cover karstic features to prevent dust ingress, backfilling from construction site or runoff from concrete works. › During the construction period, underground cave systems and caverns with cave organisms may open as the karst is characteristic by its porosity and caves. In case of encountering karst voids, it is obligatory to immediately suspend the works. The void opening should be inspected by the Contractor's Geologist and/or Tunnel Engineer who shall instruct any required stabilisation of the opening. › The Contractor's Geologist must document the situation with photographs and video records and send them to the engaged speleobiologist and karst expert. On receipt of the documentation/records from the geologist the Karst expert shall determine if it is necessary to inspect the void. When inspecting a karst void the Karst expert shall perform the 3D spatial survey and record geological formations evident in the cave. This includes types of limestone formations and sediments, any evidence of fauna and flora (alive or only remains), determination if there is or was any water in the karst feature and if there is any airflow present through the	Employed Biodiversity Expert prior to commencement of works

[35] KPI – Key Performance Indicator, in this case, the level at which additional or targeted mitigation would be required.

Feature	Action	KPI[35] Notes
	feature. On receipt of the records from the Contractors Geologist, the Speleobiologist shall determine if his presence is necessary. He/she may visit the site to inspect fauna and or to collect water samples for eDNA testing. Alternatively, he/she may instruct the Contractor's Geologist, who must be trained as required, to take the water samples. If needed, the Speleobiologist shall contribute specific mitigation measures to be implemented regarding protected species. › Access to the karst void is to be limited strictly to the responsible experts. The Contractor shall inform the biospeleologist and take all necessary measures instructed by the speleobiologist to prevent drainage of any water from the void, the intrusion of dust and construction-related water, and to minimise light penetration into the void. Collect any individuals of *Proteus anguinus* washed out of the void and store in in water container and immediately inform the speleobiologist. › The Contractor shall implement strict nitrate management measures to protect potential underground habitats of the *Proteus anguinus*, despite species being unconfirmed. The use of nitrate-containing explosives shall be minimised; emulsion explosives with low nitrate leaching potential are preferred. › On-site speed limits must be enforced to avoid direct mortality of animals. › In the time frame from 48h to 24h before commencing vegetation clearing, BE shall do a walkover of the site. › Where lighting is required, it will be directional, non-UV and used only when necessary. › In order to prevent fauna from entering, all construction sites within candidate Emerald sites and potential Natura 2000 sites must be fenced with a wire fence at least 3 m tall, the bottom 30 cm of the fence must be made of preformed metal sheets, recycled plastic lumber or (perforated) scored plastic and will prevent smaller fauna from entering the site. Alternative solution are concrete blocks. › Hunting and collection of medicinal plants by workers is strictly prohibited for their safety and prevention of negative impact exploitation may have. › Construction materials must be stored and maintained away from watercourses. Chemicals and fuels must be stored in secure containers located away from watercourses or water bodies. Spill kits in the form of oil absorbent booms and other spill containment equipment to be kept on site to be deployed in the event of a spillage, and site staff trained in their use. › Refuelling of parking of machinery must not take place near the watercourse and must only be carried out in designated areas. › Special attention must be given to blasting techniques in line with the Blasting Management Plan. Continuously implement ISMP and LHRP. › Employed BE must inform the Contractor about the vulnerability of karst areas, protected cave fauna and the	

Feature	Action	KPI[35] Notes
	importance of protective measures to preserve drinking water sources. › Appropriate brief training targeted at the needs of different construction personnel can help raise awareness of the vulnerability and ecological importance of karst areas (e.g. short karst conservation workshops, leaflets).	
Habitats, flora and vegetation	› To minimise habitat loss to the extent practicable, areas scheduled for habitat and land clearance will be clearly demarcated and mapped upon completion of the Main Design when all structures will be known. BE to clearly mark areas for vegetation clearance with biodegradable paint and install temporary fencing to prevent unnecessary loss of vegetation in the Project area. Personnel must also be informed by the BE that any activities outside the designated areas are strictly forbidden except for entry and exit along designated access routes. This will minimise the risk of habitat clearance outside of these areas. › During the vegetation clearance and earthworks, the disposal of the material is to be well managed in line with CWMP submitted as a part of the 2025 ESIA Disclosure package, in order to prevent the degradation of natural vegetation and invasion of non-native species into the natural habitats. Removed topsoil rich in organic matter must be deposited in controlled way and later used for arrangement of embankments, cuts and for restoration purposes. › Only designated roads will be used for movement of machines and vehicles unless authorised otherwise. Only planned access roads and the motorway route are to be used for construction activities and organisation of construction site. Should any need for additional areas to be used occur, e.g., additional access roads, natural areas such as woodland and dry grasslands must to be avoided and only already modified areas may be used (e.g. existing roads or degraded non-natural habitats). Allowing such works in natural habitats, PBF or CH can be done only with (i) previous analysis that must clearly show lack of viable alternatives and (ii) upon approval of the Lender. › There must be no loss of plants of conservation importance. If they are found, they must be moved to a suitable and safe undisturbed habitat nearby, e.g., away from roads, construction works and settlements. The relocation must be carried out by an expert, under the supervision of the Federal nature protection inspector and an expert for the given species, as prescribed by the *Rulebook on protection measures for strictly protected species and subspecies and protected species and subspecies* (Official Gazette of FBiH, No. 21/20). › The identified growing sites of flora species determining Priority Biodiversity Features and Critical Habitat identified within the Project's area of impact and will be fenced to prevent encroachment into areas of concern. › Habitat type 3240 Alpine rivers and their ligneous vegetation with *Salix elaeagnos* (PBF) is found within 277 m (at the closest point) to the route (Figure 3). As a result, no significant impact is expected as a result of Prenj tunnel construction.	No additional habitat disturbed, outside the project area Revegetate other disturbed areas with autochthonous plant species as per LHRP No level of pollution should be accepted Sediment dust not evident on plants 30 m away from the motorway route

Feature	Action	KPI[35] Notes
	 *Figure 3: EAAA of habitat type 3240 Alpine rivers and their ligneous vegetation with Salix eleagnos (in red) in relation to the north portal of Prenj tunnel* › Four EAAAs of 6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates habitat type (PBF) were found in the project's general area, of which one, located in Ovcari, requires targeted measures to ensure no net loss. It is positioned in the hilly area above settlement and planned start of the subsection is located within the habitat (Figure 4).  *Figure 4: EAAA of habitat type 6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates in Ovcari* Unavoidable 6210 habitat loss will occur. The total size of the affected habitat is 0.26 ha and the area that is on the motorway footprint is approx. 0.17 ha. The residual impacts on PBFs are not acceptable and compensation is required. The area in question suffered through a forest fire in April 2020 and the forest on the hill above it burned down as is visible on satellite imagery. The forest fire severely affected the quality of this habitat, but it also provides an opportunity for its reinstatement	

Feature	Action	KPI[35] Notes
	and like-for-like compensation of lost habitats on site. Compensational measures are presented in BMP Chapter 7. › Habitat type 62A0 Eastern sub-Mediterranean dry grasslands (*Scorzoneratalia villosae*) (PBF) is a common and widespread habitat in this area of Europe. It is also present in the project area, in multiple locations around Konjic and Podgorani. The EAAAs around Konjic will not be impacted by the construction works; however, approx 1.1 ha will be under direct impact by the motorway and embankments in Podgorani (Figure 5). Net gain must be achieved by compensation through management of surrounding habitats and planting of adequate plant species. It is also important to note that EAAA of *Cyclamen hederifolium* (PBF) is adjacent to this habitat type and must not be endangered by the compensation effort.  *Figure 5: EAAAs of habitat type 62A0 Eastern sub-Mediterranean dry grasslands (*Scorzoneratalia villosae*) (red) and Cyclamen hederifolium (blue) in Podgorani* › 62A0 habitat type is also present in Kutilivac – approx 100 m north of the southern portal of the tunnel. It is assumed that, due to the route passing under the habitat, that no direct impacts will be present. However, precautionary mitigation measure of no machinery movement or destruction of this habitat is allowed in the area.	

Feature	Action	KPI[35] Notes
	 *Figure 6: EAAA of habitat type 62A0 Eastern sub-Mediterranean dry grasslands (Scorzoneratalia villosae) is Kutilivac* › Priority habitat type *6220 Pseudo-steppe with grasses and annuals of the Thero-Brachypodietea (CH) is found on a number of locations around the planned route, two of which stand for for protection from negative impacts during construction – a total of four EAAAs in Ovcari and Kutilivac are found. This habitat must not be disturbed during construction. Due to the distance to the motorway (Ovcari) and position above the planned Tunnel T5 (Kutilivac) no impact on these sites is expected. 	

*Figure 7: EAAAs of *6220 Pseudo-steppe with grasses and annuals of the Thero-Brachypodietea habitat type in Ovcari*

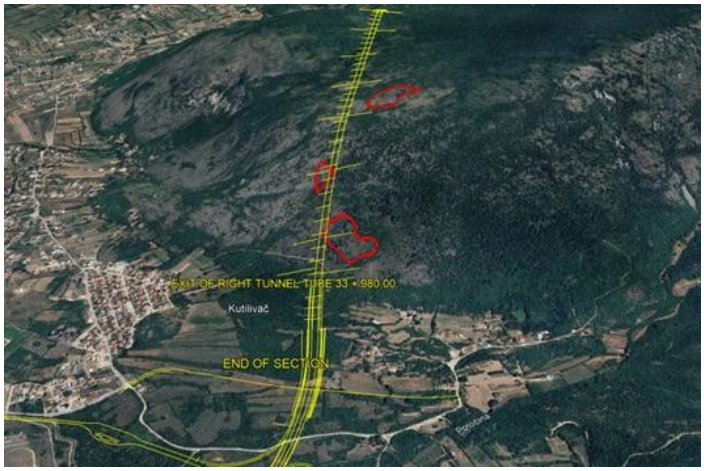


*Figure 8: EAAAs of *6220 Pseudo-steppe with grasses and annuals of the Thero-Brachypodietea habitat type in Kutilivac*

- Plant species *Spiranthes spiralis* is a PBF therefore there must not be a loss of this species or its habitat. Two EAAAs are positioned in a way that makes them possibly suscept to adverse impact of motorway construction. Precisely, they are located in Humilisani, approx 1,400 m and 2,800 m via existing R435a road away from the planned route (Figure 9). Due to the fact that these existing roads might be used as access roads, it is important not to allow the machinery to exit the roads and widen them.

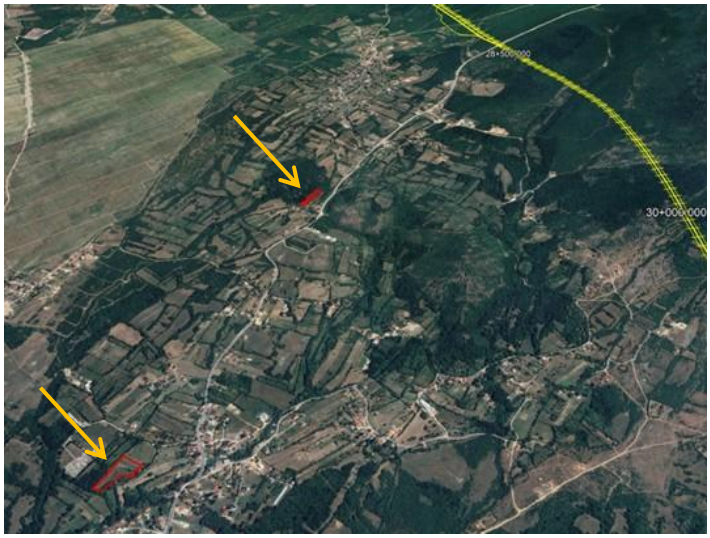


Figure 9: Two EAAAs of Spiranthes spiralis in Humilisani in relation to the motorway route

- Species *Anthyllis vulneraria* L. subsp. *praepropera* is a PBF as well and two EAAAs, one in Podgorani and one in Humilisani, might be impacted by the project. No loss of habitats marked in Figure 10 and Figure 11 are allowed and they must not be used for any Project objects. They are at 35 m and 25 m of distance to the Project respectively.

Feature	Action	KPI[35] Notes
	 *Figure 10:* Anthyllis vulneraria *L. subsp.* praepropera *EAAA north of Podgorani in relation to the motorway route*  *Figure 11:* Anthyllis vulneraria *L. subsp.* praepropera *EAAA in Humilisani in relation to the motorway route* › *Crocus dalmaticus* is a plant species qualifying for PBF due to being endangered in FBiH. The project will not impact the conservation status of this species due to two small EAAAs being located in project's impact area (Figure 12). It can be assumed that, due to their position, no habitat loss will be caused.	

Feature	Action	KPI[35] Notes

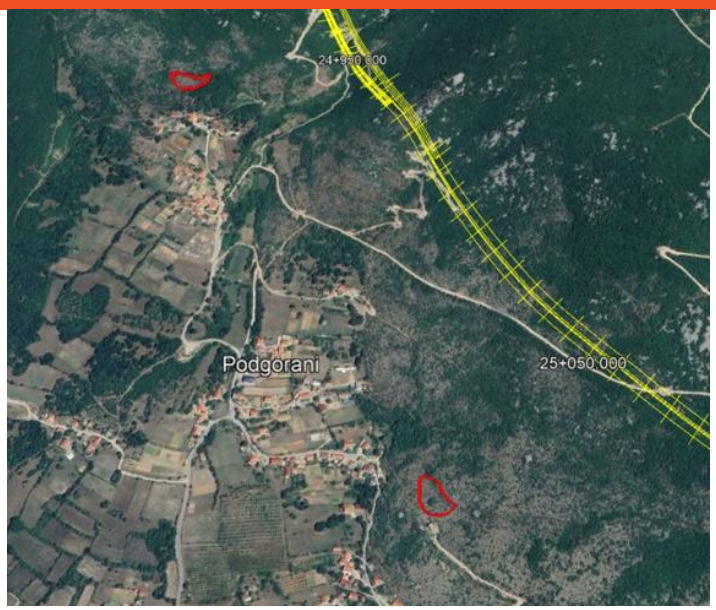


Figure 12: Crocus dalmaticus *EAAAs in Podgorani*

- *Cyclamen hederifolium* is a PBF (CR in FBiH). Based on the available literature research and field surveys, this species has been found in BiH at more than 20 localities. EAAA size is approx. 25 ha. Anticipated project activities are unlikely to significantly impact the long-term survival of the species or cause impact on the conservation status change. There are multiple EAAAs of this species located close to the Project footprint (Figure 13), meaning that there is a potential of impact on this species' habitat in the absence of mitigation hierarchy implementation. JPAC must ensure there is no net loss by compensating for 1.55 ha, which is 6.2% of the EAAA, that will be under direct impact and lost as a consequence of construction works within EAAA of *C. hederifolium*.

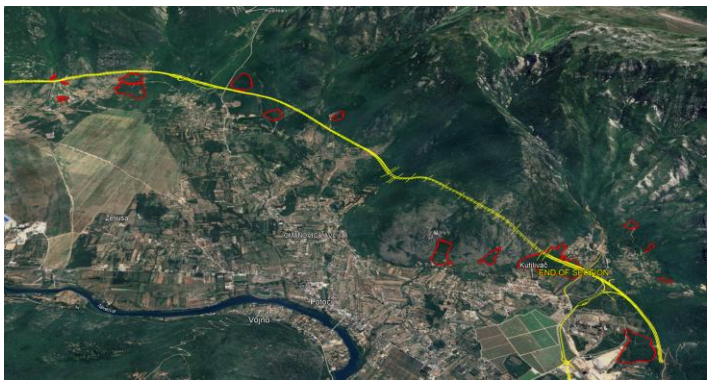
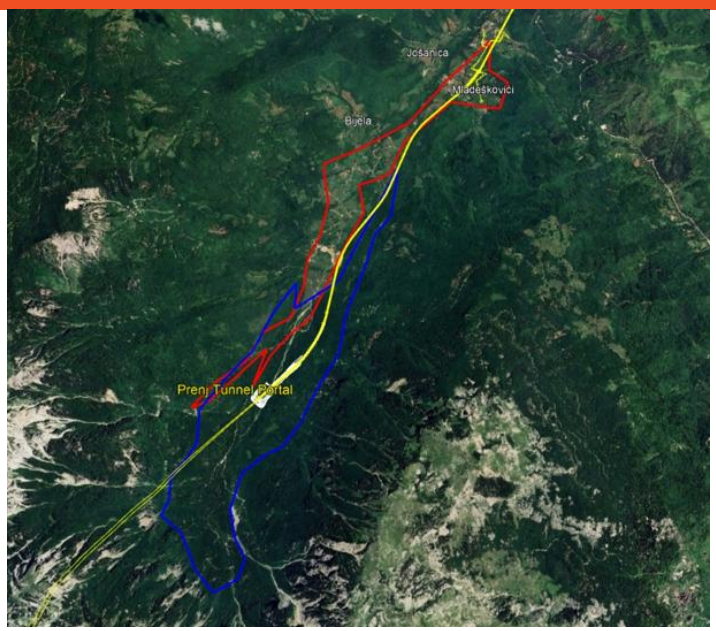
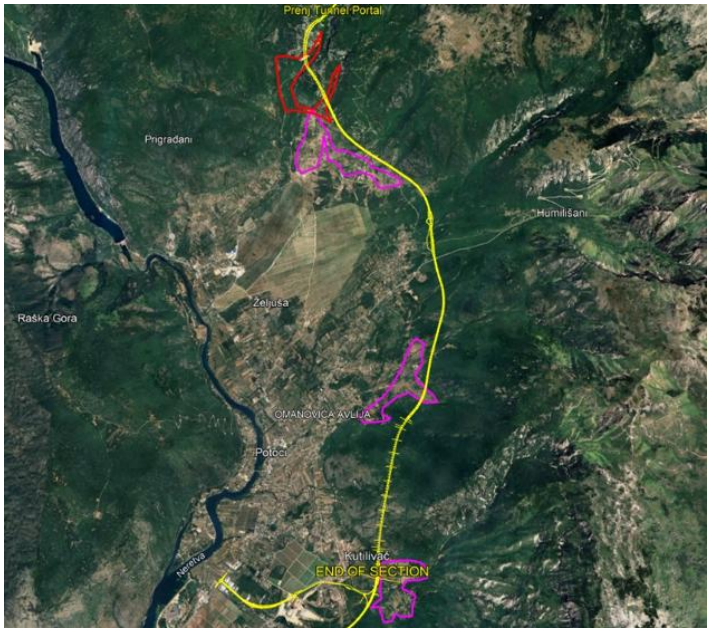


Figure 13: EAAAs of Cyclamen hederifolium *located close to the motorway route*

- Open cuts need to be re-vegetated as soon as possible which is also desirable to prevent soil erosion.
- All planted vascular plants (i.e. trees, grasses, herbs) will be regularly watered by the contractors to promote establishment for the first three years following planting /

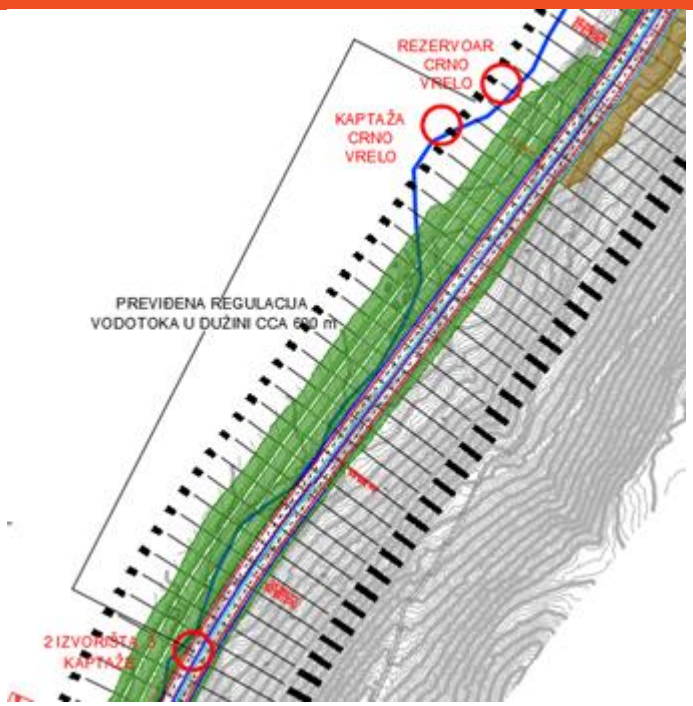
Feature	Action	KPI[35] Notes
	translocation, or until successful establishment has been achieved. › Implement pollution prevention measures at construction site, e.g. spill containment bunds to prevent any leakage from the oil tanks. › Prevent unnecessary movement of vehicles outside of area designated for implementation of construction activities to preserve surrounding vegetation from dusting. Spraying and wetting of the temporary traffic lanes to prevent generation of dust and sedimentation of dust on nearby vegetation. The measures must also be set out within the CSOP. › The excess construction waste must be reused to level the road route and the remaining material shall be disposed of at the designated disposal site(s) in order to prevent degradation of other natural vegetation and no temporary landfills are to be formed elsewhere, as these act as focal points for dispersion of invasive species. › Remove the fertile layer of soil and temporary store it, so that it can be used after the completion of construction works for remediation of degraded land and revegetation. › Install drainage infrastructure to prevent erosion. › Fire must not be used as means to clear vegetation to ensure a minimal impact footprint during habitat clearance and to reduce the risk of forest fires and mortality and injury to wildlife. › Mechanisms to prevent fire will be detailed within the CSOP (OHS and Fire and Explosion Management Plan and Emergency Preparedness and Response Plan).	
Vegetation – Invasive Species	› It is necessary to control the spread of the species by continuously implementing of ISMP developed in the pre-construction phase. › Actively manage and maintain vegetation of areas marginal to the construction site to prevent drastic edge effect and spread of invasive species. › Any soil contaminated with invasive species will be stripped and stored separately on plastic or terram. The materials must be fenced. During reinstatement, the material will be placed in the exact location it was taken from, to prevent the spreading. › Depending on the species encountered and if deemed necessary, any surplus material contaminated or suspected of being contaminated with invasive species will be disposed of at an approved and licensed waste facility. › Depending on the species encountered and if deemed necessary, the buckets, blades, tracks and tyres of all plant and machines that have been in contact with invasive species will be sprayed down, to ensure that rhizomes are not transported to uncontaminated areas. › A site-wide ban on workers bringing vegetation or soil from outside the site area must be imposed to prevent dispersion of non-native invasive species.	No increase in invasive species coverage compared to the level detected in Biodiversity Baseline of the ESIA report and Annex A

Feature	Action	KPI[35] Notes
Invertebrates	› Restrict the movement of construction machinery, mechanisation and means of transport exclusively to the area approved under the motorway route and access roads for the purpose of habitat protection, especially grass habitats and woodland habitats). › The species *Zerynthia polyxena* was found in the locality of Podgorani. Areas inhabited by this species are open meadow habitats. The female lays eggs on species of the genus *Aristolochia*. No habitats with a nourishing plant from the genus *Aristolochia* were found within the route area. However, opening of forest habitats, provided that the area is maintained in a way to promote the development of meadows rather than lawns along the motorway, can lead to an increase in open micro-habitats of this species. Such maintenance entails supporting diversity in herbaceous plants and reduction in mowing frequency. › *Euplagia quadripunctaria* was found at the locality of Humilisani and Polje Bijela. Areas inhabited by this species are thermophilic deciduous forests and forest edges. The larvae feed on various plant species. Opening of forest habitats and larger areas of marginal parts favour the species tied to the forest edge. The specific habitats of the species will not be endangered during construction, but the construction of the motorway will increase the marginal parts of forest habitats resulting in net gain of habitats for said species. › The aforementioned invertebrate species shall also benefit from (open) grassland compensation efforts as required from the JPAC by this BMP and targeted compensation will not be necessary. › Avoid unnecessary cutting of older trees and removal of dead wood in the zone of project area of influence, particularly oak, from habitats as they are important for saproxylic species. Leave 5% of healthy cut down trees in the forests to enhance habitat for said species. › *Morimus funereus* and *Lucanus cervus* (species not found but expected to be present in the project area according to literature and distribution data) species depend on preserved forest areas, old beech and oak trees. During cutting down of trees on the footprint of the route, at least 5% of cut down trees are to be stacked in piles that will remain in the area along the route to ensure that individuals developing in the trees complete the cycle and that subsequent generations of insects can lay eggs in the trees until the natural decay of the collected plant mass. Whenever possible, avoid unnecessary cutting of older trees and removal of dead wood. › EAAAs od aforementioned species are mapped in the figures below:	No significant adverse impact on saproxylic insects caused by dead wood removal 5% of healthy cut down wood left in the forests Restoration of habitats completed as given in the Land and Habitat Restoration Plan

Feature	Action	KPI[35] Notes
	 *Figure 14: Euplagia quadripunctaria (delineated in red) and Morimus funereus (delineated in blue) EAAAs north of Prenj tunnel*  *Figure 15: Euplagia quadripunctaria (delineated in red) and Zerynthia polyxena (delineated in purple) EAAAs south of Prenj tunnel*	
Fish	› Prohibit or limit access to banks or areas adjacent to waterbodies, to the extent required to protect the structural integrity of riverbanks. › Ensure natural fish passes during construction and operation by placing culverts where the motorway intersects with streams.	Neretva riverbanks and riverbed not disturbed No level of pollution should be accepted, however, based

Feature	Action	KPI[35] Notes

	› Pollution prevention control measures will also be implemented as detailed within the CSOP and will include:
	  › Avoid movement of heavy machinery in watercourses to prevent adverse impacts on aquatic species.
	  › Prevent chemical leakage to avoid contamination of water and adverse impacts to aquatic species. Pollution prevention control measures will be implemented as detailed within Main Design phase (oil separators in line with EN 858-1 and 858-2 and SBR treatment unit).
	  › Sediment control can also be achieved through construction phasing to minimise activities which cause disturbance and the greatest impact e.g., during the wettest periods of the year. Grading activities and revegetation as per LHRP should be undertaken as soon as possible. Where relevant, perimeter controls such as silt fences, fibre rolls, and berms should also be used to prevent temporary erosion and sediment control on a local basis.
	  › Disposal of materials is prohibited in the riverbed and on the riverbanks. Concrete mixing and washing areas should be located more than 500 m from any watercourse. Wastewater from these areas shall be intercepted and hauled to a licenced disposal facility authorised by the Cantonal ministry responsible for environmental protection in accordance with the *Rulebook on issuing a permit for small business activities in waste management* (Official Gazette of the FBiH, No. 9/05).
	  › Set up settling tanks at the concrete batching plant to treat the wastewater before discharging it. Treated wastewater shall meet the standards specified in the *Regulation on the conditions for the discharge of wastewater into the environment and public sewage systems* (Official Gazette of the FBiH, No. 26/20 and 96/20).
	  › The ends of the bridges should be embanked and secured against erosion during the construction phase. Open cuts near the river will need to be revegetated as soon as possible to prevent soil erosion.
	› Prohibit direct discharges of any pollutants to the rivers.
	› Restrict riparian vegetation removals only to the area necessary for performing construction works and machinery access.
	› The motorway construction requires regulation of a 600 m stretch of the Bijela River to protect a downstream water source, resulting in the loss of approximately 0.12 ha of high-quality aquatic habitat (habitat quality score 0.75 Qha) of *Cottus gobio*. This will require targeted offset for the species outlined in Chapter 8 and further to be defined in BOP.
		on the JPAC Corporate Standards, if the environmental testing (soil, water etc) for pollution exceeds the given standards, then remedial measures should be implemented

Feature	Action	KPI[35] Notes
	 *Figure 16: Planned regulation of River Bijela in length of approx. 600 m*	
Amphibians	› Due to the confirmed presence of amphibian species listed in Annex II and IV of Habitat Directive it is important to avoid any habitat destruction except the area designated for construction of the motorway e. g. to avoid construction of auxiliary or access roads or formation of disposal sites. › Habitats clearance will be undertaken by the contractors in a progressive and sensitive manner to enable fauna to move away from the area of works, disperse into surrounding habitats and to avoid fauna from being isolated in fragmented areas of habitat. › Avoid habitat destruction and alteration outside of the defined Project footprint to the best extent possible. › In locations Streams no. 1 and 2 in Ovcari, artificial pond in Zelenika and artificial pond in Bosnjaci (Figure 17, Figure 18), due to identification of a large number of amphibians and potential habitat fragmentation, tunnels should be set up to allow the unimpeded passage of animals. To encourage use by amphibians and reptiles, all terrestrial crossings should have a natural substrate on the tunnel floor that consists of soil, sand, branches and other natural materials. The precise design, dimensions, and factors that may affect tunnel placement are listed in the *Guidelines for Amphibian and Reptile Conservation During Road Building and Management Activities in British Columbia*[36] and should be taken into consideration when designing and planning. › Fragmented and small habitats, presented in Figure 17 and Figure 18, suitable for amphibians found in the area of	No disturbed habitats outside of the demarcated construction zone Passages for amphibians installed No loss of species listed in Annex C-1.

[36] http://a100.gov.bc.ca/pub/eirs/finishDownloadDocument.do?subdocumentId=15141

Feature	Action	KPI[35] Notes
	Repovica (Konjic bypass), Mladeskovici, Klenova draga, Zelenika and Bosnjaci (motorway) must not be disturbed by heavy machinery during construction. Unnamed streams in Ovcari are located below the Ovcari interchange. In the process of Main Design development, culverts must be installed to enable water flow and movement of amphibians as aforementioned for pre-construction phase.	

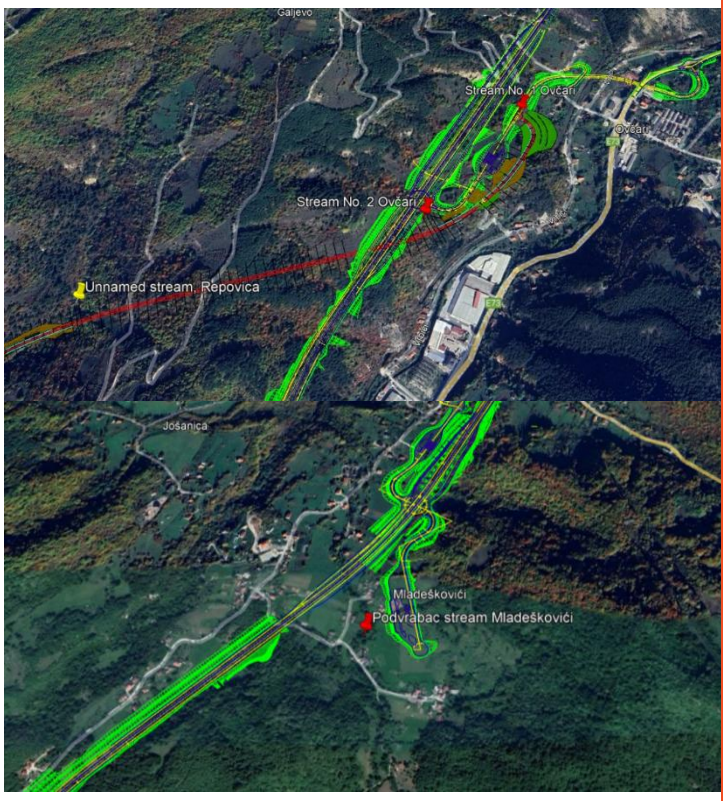


Figure 17: Amphibian breeding sites north of Prenj Tunnel

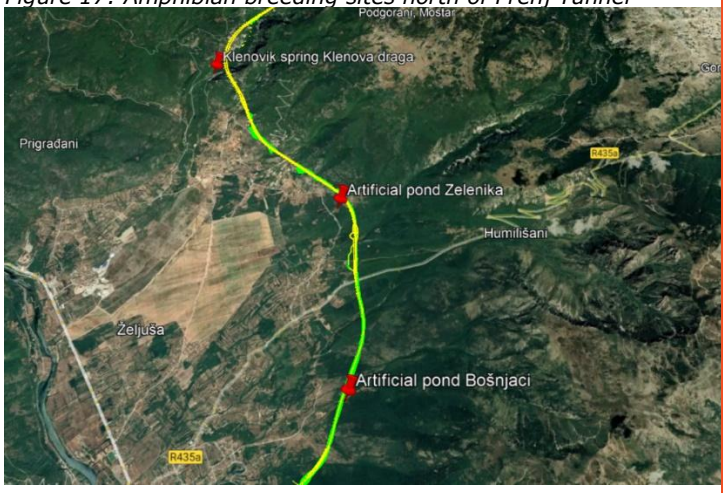
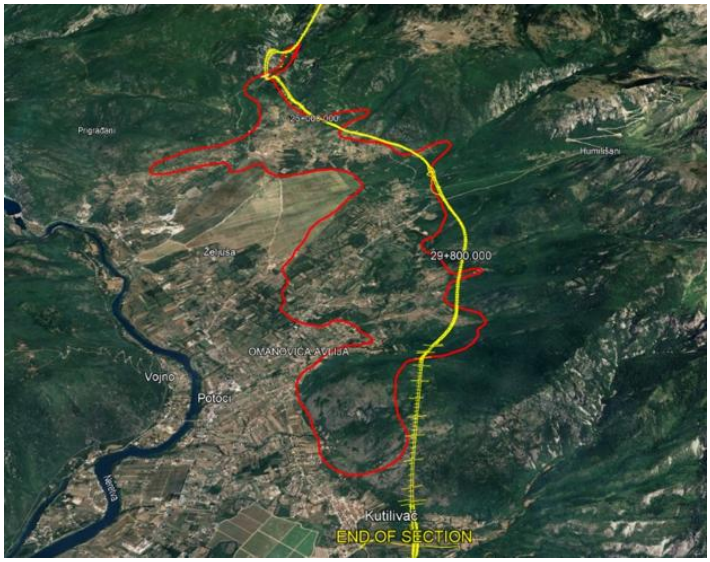


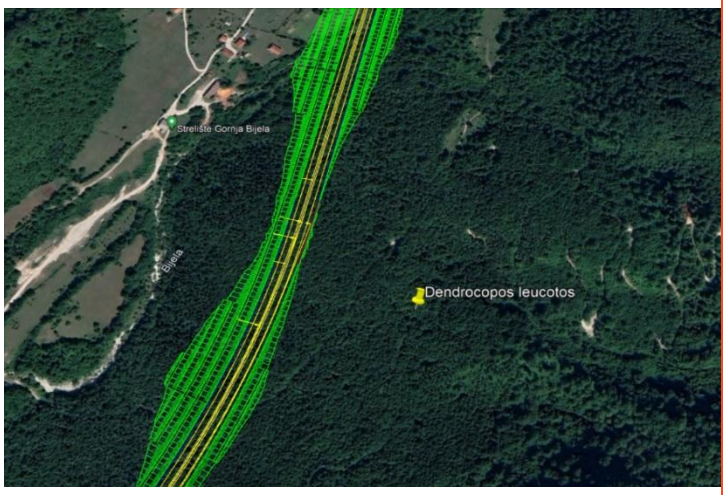
Figure 18: Amphibian breeding sites south of Prenj Tunnel

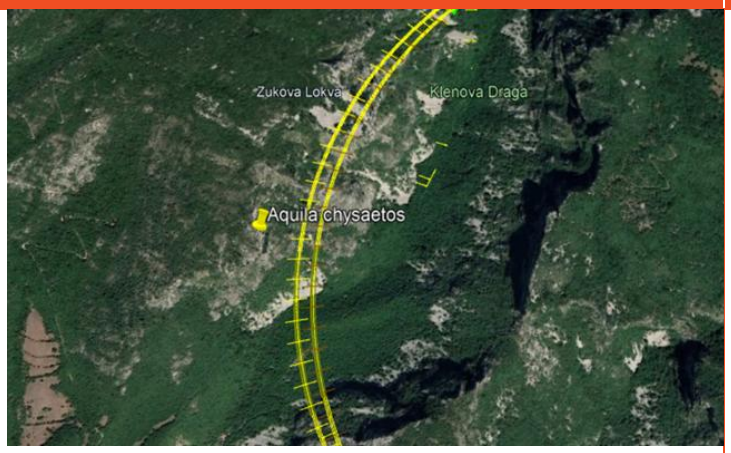
- On the sites of Zelenika (43°27'23.72"N 17°54'28.93"E), Humilisani (43°26'20.56"N 17°54'46.72"E), and Bosnjaci (43°25'37.3"N 17°54'39.2"E), the motorway will disturb the habitats of reptiles where there are frequent east-west migrations, and therefore tunnels should be installed under the road with drift fences to keep animals off the road and to

Feature	Action	KPI[35] Notes
	guide them through the tunnels. Locations have been given based on the planned structure of planned embankments and existing structures such as roads. Tunnels can be constructed of a variety of materials, including concrete, steel, PVC piping and polymer surface products. Steel is thought to be less desirable because of its high thermal conductivity and coldness during spring migratory periods; metals leaching from galvanised steel may be harmful to amphibians that may use the tunnels. Tunnels of large diameter (approx. 1 m) are more effective and also allow for the passage of other animals. Natural substrate should be placed in the tunnel. Smaller tunnels with overhead openings (vents) for ambient light and moisture are effective; the vents are covered by metal grates to minimise interference with vehicle movements along the road. Tunnels must not exceed 30–35 m in length. Fencing is needed to intercept movements of animals and direct them towards the tunnels. Where the drift fencing is parallel to the road, additional fences are needed to funnel the animals towards the tunnel entrance. Drift fences can be constructed of various materials, including hardware cloth, rigid plastic and polyethylene sheets. Fences about 50 cm in height appear to be suitable for most species; bury the bottom 6–10 cm of the drift fence to prevent animals from tunnelling underneath. Fences should be regularly inspected for damage. This might involve construction of a permanent fence to keep animals away from the road if monitoring in the operational phase shows high mortality. This is an option where most of the important habitats are on the same side of the road.  *Figure 19: Locations of reptile tunnels* › A safety fence must be placed along construction site near occasional watercourses. The fence should prevent ingress of amphibians to the construction areas. › The employed BE will be on hand to supervise the habitat clearance works and provide advice to the workforce when required.	

Feature	Action	KPI[35] Notes
	› There must be no loss of amphibians of conservation importance. If found, they must be relocated to the appropriate unaffected habitat nearby that is not exposed to risk e.g. away from road, construction works and settlements. Relocation must be performed by the BE. › It is necessary to perform daily checks for the presence and removal of individuals of the species fire salamander (*Salamandra salamandra)* within the motorway subsection under construction, and, if species are found, safely remove them from the area to the habitat of the same type away from machines, local roads and other dangers. › Relocation of species must be done by the BE under the supervision of the Federal inspector for nature protection and an external expert for the given species as prescribed by the *Rulebook on protection measures for strictly protected species and subspecies and protected species and subspecies* (Official Gazette of FBiH, No. 21/20). › Amphibians are among the most sensitive species regarding chemical pollution, so it would be recommended to install oil separators along the project zone, that would be frequently monitored and ensure that oil and chemical spills are prevented or controlled in a timely manner. › Ensure no loss of amphibian species or conservation concern listed in Annex C-1: Amphibians and reptiles. Construction site within candidate Emerald sites and potential Natura 2000 sites must be fenced with a wire fence at least 3 m tall, the bottom 30 cm of the fence must be made of preformed metal sheets, recycled plastic lumber or (perforated) scored plastic and will prevent smaller fauna from entering the site.	
Reptiles	› Due to the confirmed presence of reptile species listed in Annex II and IV of Habitat Directive it is important to avoid any habitat destruction except the area designated for construction of the motorway e. g. to avoid construction of auxiliary or access roads or formation of disposal sites. › Habitats clearance will be undertaken by the contractors in a progressive and sensitive manner to enable fauna to move away from the area of works, disperse into surrounding habitats and to avoid fauna from being isolated in fragmented areas of habitat. › During the construction period sites will be managed so that they do not provide suitable habitat for reptiles (shelter and hibernation). Measures would involve not stockpiling rubble and only undertaking works to move rubble when temperatures are above 7°C. i.e., when reptiles are not in hibernation. › Since a high frequency of individuals of the *Testudo hermanni* species has been determined along the motorway route south of the Prenj Tunnel, it is necessary to implement several mitigation measures in order to reduce the possibility of tortoises being run over on the roads during construction: › Daily inspection and removal of the Hermann's Tortoise - *Testudo hermanni* individuals as part of the construction section under construction needs to be undertaken and if species found, safely removed into suitable habitat away from the construction site and not exposed to risks such	No fatalities of reptiles in construction site, namely HD Annex II and IV reptile species listed in Annex C-1 to the ESIA

Feature	Action	KPI[35] Notes
	as existing roads or settlements. Removal must be done by a qualified BE employed by the Contractor to implement mitigation measures. During the construction period, the sites will be managed so that they do not provide suitable habitat for the tortoise (no shelter, food). › If eggs are found during construction, it is necessary to ensure they are not disturbed or destroyed, and BE must be informed in order to safely and adequately remove them from the location. › EAAA of Hermann's tortoise is very wide in the Project area as it can be found almost everywhere in this part of Herzegovina but, for guidance with regard to area that needs attentive observing, Figure 20 was prepared.  *Figure 20: Hermann's tortoise EAAA* › Appropriate education targeted at the needs of different construction personnel can help to achieve minimal impact on species occupying areas of construction, as well as to ensure safety of the construction personnel in case of encounter with reptiles.	
Birds	› When it comes to ornithofauna, in order to preserve the bird population in the referenced area, it is necessary to apply the following mitigation measures during the construction phase: › It is necessary to install protective panels on the bridges over the Tresanica River in Ovcari, over the Neretva River and in Mladeskovici. At these localities, a high frequency of birds feeding high in the sky is noticeable, which is why it is possible for them to get hurt due to collisions with moving cars. Protective panels must be placed on both sides of the road at a height of at least 3 m. In order to reduce the collision of birds with protective panels, it is necessary to stick black and white foil over the transparent plexiglass, which increases the visibility of the panels for birds, or silhouettes of birds of prey, which would scare the birds and move them away from the route. › On the part of the route between 10 + 200 km and the Prenj tunnel in the zone of direct impact, one territory of	No habitat loss for the Birds Directive Annex I species as given in Annexes C-2 and D No nesting birds should be disturbed during construction. If a nesting bird is found then remedial action (avoidance) will be required

Feature	Action	KPI[35] Notes
	the white-backed woodpecker and two territories of the black woodpecker have been registered (Figure 21). Both species are indicators of old and preserved forests with a lot of rotten trees on the ground. In order to protect these species, it is necessary to reduce removal of the forest cover to the required minimum (width of the road, embankments).  *Figure 21: Recorded white-backed woodpecker (*Dendrocopos leucotos*) in relation to the planned motorway route* › In the area of Klenova Draga, an abandoned nest of a Golden Eagle has been registered, while one bird was spotted flying above Klenova Draga in 2022 (Figure 22). If it is established that in the following seasons the couple is active at the given locality, it is necessary to apply a number of protective measures: › There are no access roads for the transport of machinery and materials for the construction of the motorway at the given locality. It is necessary to break through the access roads in the off-breeding period from July to February, i.e. to suspend the works from the beginning of incubation to the take-off of the fledglings (beginning of March-end of June). › Remove trees from access roads only to the width of the road. The existence of a living barrier made of trees will significantly absorb noise, and tree canopies will reduce the visibility of machines, which could reduce the negative impact of disturbance. › If a pair stays in the nest during the motorway construction phase, putting motorway into operation will cause no major negative impacts on this nesting pair.	

Feature	Action	KPI[35] Notes
	 *Figure 22: Location of the inactive nest of golden eagle (Aquila chrysaetos) in relation to the planned motorway route* › Where and when possible, habitat clearance must be undertaken outside of the breeding bird season. Where this is not possible, pre-clearance checks will be undertaken to identify active nesting sites. These will be retained until the young have fledged. Clearance must be done progressively to allow animals to escape.	
Bats	› Project construction will not be undertaken at dusk, dawn and at night to avoid disturbance to nocturnal and crepuscular fauna (i.e. bats) from increased noise and vibration. › Deforestation should be reduced to a minimum, only the necessary interventions required for the implementation of project activities are allowed. This kind of degradation directly on the motorway is irreversible and inevitable, however, degraded habitats used in construction activities need to be reinstated through the process of reforestation as given in the LHRP. Due to the fact that bats use forests as a shelter, reforestation of disturbed habitats adjacent to the construction site with autochthonous species is necessary. No roost sites have been identified during desk or field surveys. Their potential destruction would be an unacceptable loss of biodiversity therefore if any are found during construction, the BE must be included in planning of adverse impacts mitigation such as relocation to alternative sites. › Potential roost sites are one of the most important features for the bat species conservation, therefore shall be preserved and not to be disturbed. Pre-clearance checks of trees will be undertaken by an experienced BE prior to the commencement of works to avoid causing disturbance or injury to roosting bats. Any tree above 100 mm in diameter measured at breast height following good forestry practice is to be checked. The BE will initially walk the alignment and mark trees with features that may potentially support roosting bats (i.e. holes and crevices). The detected bats will be translocated to a receptor roost by an experienced bat ecologist following a method statement prepared by the ecologist and under supervision of Federal inspector for environmental protection as stipulated by the *Rulebook on protection measures for strictly protected species and*	No damage to bat roost sites or fatalities caused by negligence during construction

Feature	Action	KPI[35] Notes
	subspecies and protected species and subspecies (Official Gazette of FBiH, No. 21/20). › Should any roosts be accidentally disturbed by negligence of the Contractor or as the result of an accidental situation, habitat restoration should be done after the construction phase is finished. Alternative roost sites in the vicinity should be built in case of any being destroyed by the construction works.	
Mammals	› Mitigation measures during the construction period refer to avoiding mining works in the period from March to May, when the largest number of species give birth to offspring. This ensures peace in the hunting area and a period of wildlife getting used to the new conditions in the habitat. › During the construction period, three key pressures are defined: a) habitat fragmentation, b) wildlife mortality on the construction site, and c) wildlife grouping on the construction site due to organic waste disposal. › Habitat fragmentation will be most noticeable during the period of motorway construction because the constant, long-term presence of construction operations with noise and physical barriers will prevent the passage of wildlife through parts of the area. The effect on wildlife during the construction period will disappear after the completed works, so roads and passages for wildlife will be re-established during operation phase. Although the effect of habitat fragmentation during the construction phase is negative, it affects a small number of species in the area of direct impact of the project. Given the fact that the effect of construction is temporary in terms of noise and the presence of people, it is not necessary to implement strict mitigation measures regarding this pressure. › During the construction phase, significant construction work such as excavation and trenching works will be carried out in the area of physical and direct area of influence of the motorway. It is expected that in the conditions of disturbed habitat structure and game movement, there will be game mortality (most likely deer, rabbits and foxes). It is recommended that the contractor fences all parts of the area where significant earthworks and excavations will be carried out. › Long-term works on the Prenj tunnel can lead to accumulation of organic waste that will attract carnivorous species, which could have negative effects on local species of carnivores. Waste generated during construction phase (e.g. inorganic waste that could trigger possible injuries) and organic waste (because of accessible food source, this represents a threat of possible diseases) need to be adequately managed, as given in the Waste Management Plan and Construction Waste Management Plan. It is recommended that landfills not be formed along the subsection of the motorway, in that way human-wildlife contact will be avoided. › Machinery operation should be restricted to daylight hours to minimise the risk of vehicle collisions with nocturnal and crepuscular wildlife.	If any protected mammal species are found to have been injured or died as a result of the construction process, the mechanism for the death of that species should be identified and implemented, e.g. remedial mitigation may be required, such as repairing the exclusion fencing etc.

Feature	Action	KPI[35] Notes
	› Protection measures must be imposed to protect mammals from accidents during this phase. All surplus material that will not be used in the construction works must be stored on previously planned locations. The construction waste must be systematically managed and transported away from the construction site to a construction waste landfill to prevent fatalities of fauna. Waste disposal along the route should be avoided.	

5.3.3 Operation Measures

As already mentioned in this report, additional surveys will be completed as part of preconstruction activities. These additional surveys will inform the design of operational mitigation measures. At this time, the draft operational measures are set forth below in Table 7. These will be updated based on additional surveys, and the mitigation measures updated and disclosed prior to beginning of operations. In operation phase, there should be no further earth moving or large-scale construction activities taking place on the road sections.

Implementation of the post-construction activities will be the responsibility of the JPAC Management and Maintenance Department as well as selected Contractors for operation and maintenance activities.

Table 7: Operation Phase Enhancement

Feature	Action	KPI[37] Notes
General mitigation measures	› The fence along the motorway should be constructed properly (1,5 m-high in general, 3 m in designated sites) wire fence which in the lower parts (at least 50 cm from the ground) has a diameter of 2 cm or less), to ensure there would be no collision of these species during operation phase. The use of a dense net in the lower part of the fence will prevent the passage of mammals to the motorway route. › Undertake regular maintenance of fence and protective bird panels along the motorway route. During the maintenance, special attention should be dedicated to lower 50-100 cm of the fence, designed to keep herpetofauna off the motorway. › All damage to the fence is to be promptly repaired, therefore regular inspections are required. During operation phase the road should be driven on or slowly walked on once per month for the first three years of operation to register any road kills. During operation, a record will be kept of all roadkill (species and location). › Surveyor will use an index of number of casualties per km for at least four sections of the motorway similar in length. In case the number of run over individuals is higher or more frequent in certain sections of the motorway, it is necessary undertake additional measures (e.g., to set the live traps for	No chemical pollution events noted Reports on regular cleaning of the pollution control equipment Not recording high numbers of roadkills

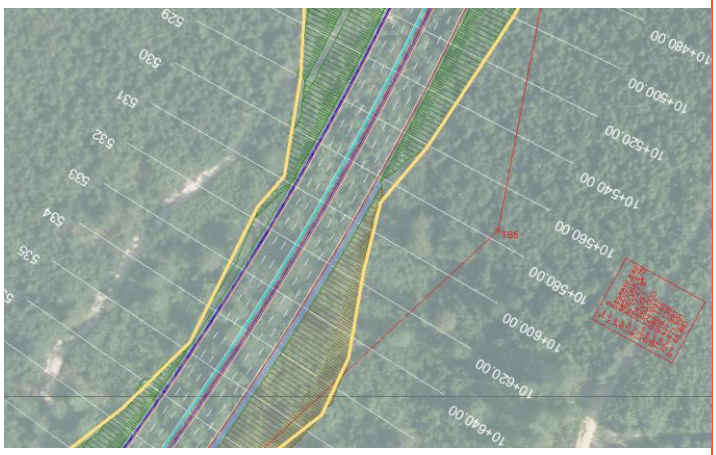
[37] KPI – Key Performance Indicator, in this case, the level at which additional or targeted mitigation would be required.

Feature	Action	KPI[37] Notes
	individuals in order to move the individuals to another suitable habitat in a safe and acceptable manner, and/or install the denser safety fence at least 50 cm from the ground). › The viaducts along the motorway route, which are constructed as open passages for wildlife, should be regularly maintained and kept passable during operation phase. › Adequate maintenance of drainage structures and oil separators (EN 858-1 and 858-2) to ensure their efficiency regarding the pollution prevention by engaging an authorised third party to ensure their efficiency regarding the pollution control. › Prevent erosion and minimise washing and leaking of solids from surrounding area by grass plantation, interception and drainage, application of mulch coverage, use of lattice plots, concrete prefabricated panes or gypsum.	
Habitats, flora and vegetation	› Avoid the use hazardous substances and materials in maintenance of the area surrounding the motorway, as to protect the environment from their potentially harmful impacts. › Undertake regular maintenance and cleaning of the drainage structures and oil separators.	No chemical pollution events noted
Vegetation – Invasive Species	› Actively manage and maintain vegetation of areas marginal to the motorway to prevent drastic edge effect and spread of invasive species. › Implement an ISMP for these species, with regular monitoring and integrated management including mechanical removal of the existing specimens and responsible herbicide use in order to prevent further spread.	Decrease in the number of invasive species of the project area where invasive species are found
Invertebrates	› Possible negative pressure on the invertebrate species caused by the construction of the Prenj tunnel comes down to the aggregation of insects in the lighting and the death of insects when in contact with cars moving at high speed. The ecotone along the motorway can play a significant role in the expansion of the habitats of butterflies and other insect species that inhabit marginal habitats. The importance of the ecotone along the motorway will be reflected through the increase of the habitat area of indigenous species of open habitats, such as the species *Euplagia quadripunctaria*. However, the effects of ecotones and habitat fragmentation are much more significant for forest species (such as *Lucanus cervus*) that fly from forest to open habitats, thus increasing the likelihood of individuals being killed by cars. If monitoring in operation phase determines that the frequency of dead individuals is high, necessary, the installation of high barriers (mesh materials) is necessary.in the parts where the high frequency of dead individuals is determined after monitoring. › Reinstatement of habitats after the construction with planting of autochthonous plant species characteristic for the area must be done as elaborated in BMP Chapter 6.	Low number of fauna fatalities

Feature	Action	KPI[37] Notes
	› Adequate maintenance of drainage structures and oil separators (EN 858-1 and 858-2) to ensure their efficiency regarding the pollution prevention. › Adequate regular cleaning and maintenance of drainage structures and oil separators by engaging an authorised third party to ensure their efficiency regarding the pollution prevention.	

Fish	› Sediment and erosion controls to mitigate erosion of exposed soils to adjacent waterbody.
	  › Stabilise/reinforce stream banks using tree and shrub plantings.
	  › Rehabilitation of stream morphology and substrate to pre-disturbance condition or better is necessary.
	› Adequate maintenance of drainage structures and oil separators (EN 858-1 and 858-2) to ensure their efficiency regarding the pollution prevention.
	› Adequate regular cleaning and maintenance of drainage structures and oil separators by engaging an authorised third party to ensure their efficiency regarding the pollution prevention.	

Amphibians and reptiles	› Fences, culverts and passages should be monitored and maintained in order to prevent amphibian and reptile mortality and site connectivity in the area. Maintenance of installed fence along each side of the motorway to prevent intrusions of animals and possible fatalities of animals. All noticed damages to the fence are to be promptly repaired. › Smaller passages such as culverts may become partly or completely blocked with washed sediment, windblown soil, natural debris and discarded trash. Sometimes mammals may dig into soil in a bottomless passage, causing a blockage. Passages require regular checking during the year. Specialist equipment may be needed to reach into them to remove obstructions and this includes items such as plastic bags that get lodged and that may interfere with monitoring. Vegetation usually cannot grow other than at the entrances of smaller passages. Where possible and if the target species will tolerate it in the smaller passages, low depths of soil or no soil can make maintenance easier and less costly. This approach may also discourage predators to establish burrows or dens in passages. Passages may silt up completely in storm events and need substantial effort to clear. A high-pressure hose may be needed to do this and it is needed to refresh passages every three years or after a suspected road spillage, notably for slotted surface tunnels where oil, salts and other potentially harmful residues may accumulate on the passage floor. › The motorway maintenance service is obliged to record any injury cases in order to respond timely with additional protection measures.	
Birds	› Should any fatalities of birds be observed during the regular maintenance of the road in the operation phase, protective barriers should be placed at such locations in consultation with local ornithological society.	

Feature	Action	KPI[37] Notes
Bats	› Plant high trees on chainage 10+580.00 in the form of hop-overs for bats. The aim with hop-overs is to reduce the mortality risk by guiding the bats across the roads above the traffic. The chosen locality is placed in forested area where bats are present, and where embankments narrow down and the road cuts into the slope. This will be utilised as a natural pathway and guidance for bats along with trees.  *Figure 23: Location of hop-over for bats* › All species of bats are nocturnal animals. They rest in dark places during the day and fly out to eat in the evening. The light near the colony will affect their behavior and reduce the number of outings intended for hunting. Strong light will reduce social flight and cause the species to move to another darker location. Illumination of the bat litter leads to disturbances that cause the bats to leave the litter. Also, light causes insects to accumulate allowing bats to aggregate in those places. As mitigation measures replacement bulbs are needed in the candidate Emerald and potential Natura 2000 sites, such as: › Low pressure sodium lights (typical yellow lamps seen along roadsides). The light is emitted in one wavelength, does not contain ultraviolet (UV) light and does not attract a large number of insects. › High pressure sodium bulbs (lighter purple-yellow bulbs). Light is emitted through a wide band of long wavelengths. Insects are attracted to stronger light that is captured only by some species of bats. › Mercury bulbs (bluish-white bulbs). They emit light in a very wide spectrum, including UV light to which insects are particularly sensitive. Insects are attracted in large numbers along with the high density of bat species, especially from the genera *Nyctalus*, *Eptesicus* and *Pipistrellus* (the mentioned genera were recorded during field research). › The choice of bulbs shall depend on technical requirements and recommendations, as well as financial feasibility. › Avoid construction of artificial streetlights, tunnel lights and lightened traffic signs on part of motorway that cross forest and water habitats. Avoid the construction of auxiliary	

Feature	Action	KPI[37] Notes
	facilities, such as gas stations, resting places, billboards etc. near such habitats.	
Mammals	› Motor vehicle noise is a constant but not limiting factor. Adapting to noise and conditioning to emerging conditions is a phase in adaptation for local populations of mammal species and will result in avoidance behaviour. It is not necessary to implement mitigation measures. › Habitat fragmentation after construction remains one of the biggest negative pressures on mammal species. The area of the Prenj tunnel passes through a very dynamic landscape, and due to the large number of viaducts and tunnels the subsection is discontinuous in terms of possible passage of wildlife under infrastructure or in the case of the Prenj tunnel, the entire Prenj plateau, through which the processes of wildlife movement take place, remains intact. › However, due to the extensive works that will be performed, the habitat structure around the bridges will be negatively affected, so it is necessary to recultivate the habitat around the viaducts in order to create wildlife corridors. The research determined the highest frequency of wildlife in the slope areas of Mt. Prenj. By preserving the entire plateau of the Mt. Prenj, the habitats of large carnivores have been preserved in the context of structural integrity. The determined higher frequency of low game, primarily rabbit, fox and roe deer game shows that these are species that do not have a wide territory and do not show patterns of seasonal migration. › Accidents with animals may occur during their attempt to cross over the motorway, therefore the motorway needs to be fenced and the fence maintained properly throughout the operation phase (as given above in section General mitigation measures). › Maintenance of the installed fence along each side of the motorway to prevent intrusions of animals and possible fatalities of animals on the motorway. Any damage to the fence is to be promptly repaired, therefore regular inspections are required (as given above in section General mitigation measures). › The motorway maintenance service is obliged to record mammal injury cases in order to respond timely with additional protection measures (as given above in section General mitigation measures). › The viaducts along the motorway route constructed as open passages for wildlife must be kept passable during operation phase.	

6 Restoration

Where adverse impacts cannot be avoided or minimised during the project it is aimed to restore habitat loss as much as possible within the project area and to postpone any biodiversity impacts where possible. This is done by implementing minimisation measures as given in the previous chapter. However, the habitats adjacent to the construction site can still be affected by the construction works. Therefore, enhancement of habitats within the Project site shall be performed through restoration.

The measures related to habitat removed due to site clearance activities and related to avoidance, minimisation and restoration of vegetation and fauna are to be included within LHRP that must be developed as a part of CESMP. A LHRP is a site-specific document that provides guidance on the ecological restoration and ongoing management of terrestrial and aquatic habitat utilised by native flora and fauna. This plan will include measures to increase the stability of loose materials and surfaces which become exposed during construction phase. It will also include measures restoration of the borrow pits and their surroundings, if any, and recultivation of the construction waste landfill. The LHRP scope further reduces biodiversity impacts within the Project site during construction, therefore allowing for a realistic timeframe to develop and implement the biodiversity offset scope. The main two methods have been considered:

- Improvement of the quality of existing habitats within the Project site;
- Creating new and similar habitats on the Project site as well as in the surroundings off-site.

Based on these methods, several opportunities for habitat restoration and enhancement have been identified within the wider project area. The most promising location for habitat enhancement is the hilly area above Ovcari, but the LHRP must also be implemented along the motorway. Recommendations for the development of the LHRP regarding the suitability to enhance habitat in a feasible way are given below.

Project-specific guidelines regarding the implementation are as following:

- The LHRP for the Konjic (Ovcari)-Prenj Tunnel-Mostar North section must be developed by the Contractor as a part of the CESMP. As the requirement given in the BMP is that the Contractor must engage an experienced BE, they will be the responsible person for its development and implementation. If the BE does not have relevant experience in habitat restoration, engagement of Botany Expert is necessary.
- The LHRP development must be accompanied by surveys and careful planning. The ESIA Baseline provides initial information, however, the details regarding planting matrix and exact species to be planted in particular parts of the motorway zone require more detailed and targeted surveys. The surveys shall further guide the LHRP in determination of structure and composition of areas that must be revegetated.
- The main recommended restoration strategy for the section Konjic (Ovcari)-Prenj Tunnel-Mostar North is reconstruction, a strategy where the aim is to re-establish a vegetation community similar to the original vegetation

community in structure, composition and diversity. A reference community (or communities) should be used to determine the structure, composition, and diversity of the goal community, and therefore species to be used in planting, planting density, etc. Communities selected as reference communities should be located (where possible) in close proximity to the site, have similar abiotic features and be in good condition with low levels of disturbance. It is important to consider the issue of genetics in the selection of seeds and seedlings. For the specific section, native species, including Dalmatian laburnum (*Petteria ramentacea*), hornbeam (*Carpinus orientalis*) and oak (different species of the genus *Quercus* found in the project area) are the most common and desirable species recommended to be used for restoration.

- Approximately 21.14 ha of *Euplagia quadripunctaria* (PBF) habitat is located on the project footprint and will be inevitably lost by the motorway and access road construction – 17.43 ha in Mladeskovici and 3.71 ha in Klenova Draga to be impacted by an access road. The habitats found in Badnjena Draga will not be lost due to motorway passing over the area via a viaduct. The quality of affected habitats is medium. Restoration measures are related to habitat revitalisation. Feeding plants of *E. quadripunctaria* are numerous and widespread. In the process of reinstatement of habitats in line with the LHRP, forming hedgerows on the forest edges created by the vegetation clearance is the key compensation measure for the species. Reinstatement should be done with native herbaceous plants (e.g., *Rubus fructicosus*). The exact calculation of area for habitat gain is difficult to calculate at the moment, as not all structures that will need forest and vegetation clearance are known. Approximately 13.35 ha in Konjicka Bijela and 8 ha in Klenova Draga will be suitable for habitat (re)instatement efforts enabled by vegetation clearance and creation of open habitats for the species.

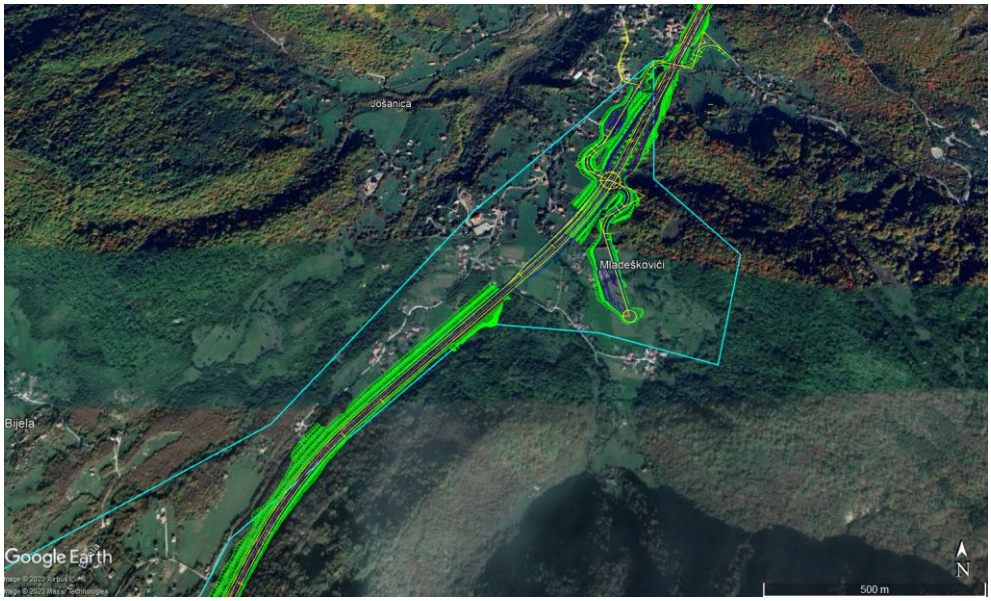


Figure 24: Euplagia quadripunctaria EAAA in Mladeskovici

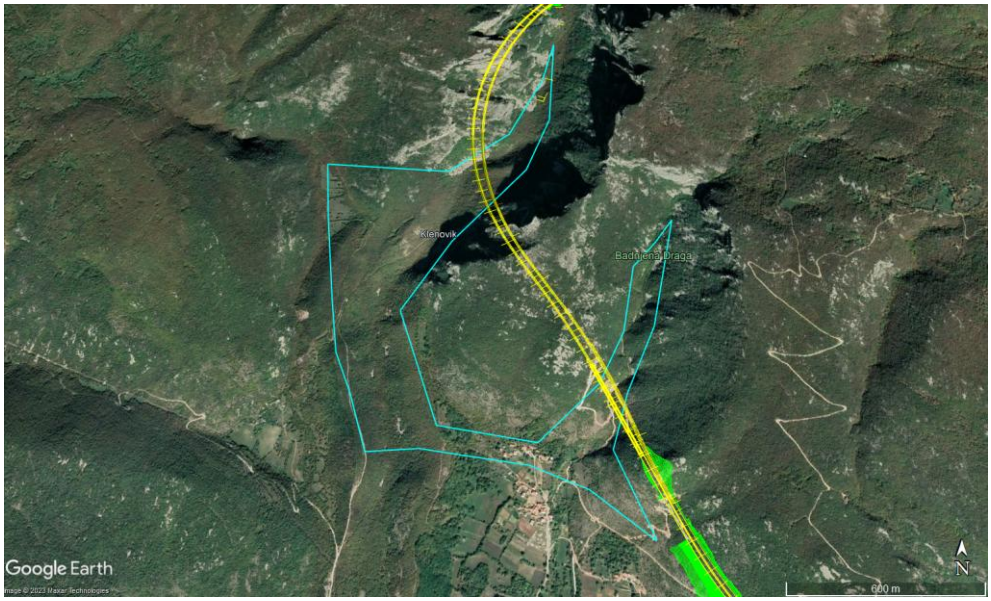


Figure 25: Euplagia quadripunctaria EAAA in Klenova Draga

- The restoration of land habitats adjacent to the construction works as well as restoration of other adjacent areas must be performed. The LHRP must ensure implementation of afforestation measures. Undertake reforestation along the Project right-of-way where disturbance occurred as a part of the anti-erosion works to preserve slope stability and reduce erosion. In areas unsuitable for woodland due to the soil or other existing conditions, undertake revegetation with autochthonous perennial herbaceous species.
- Restoration must be started within three months, at the latest, upon cessation of works on subsection(s) where restoration is planned. If conditions for reinstatement are met earlier (works finalised in the part where habitat of concern is located but continued in other parts of the subsection) the reinstatement must start earlier in order to prevent further degradation of habitats caused by lack of maintenance.

- Compensation guidelines are provided in this chapter and not within construction measures as it occurs when construction is finalised the responsible body for compensation and further maintenance is JPAC that can transfer the responsibility to the Contractor as per Contractual Agreement. JPAC/Contractor must have a designated biodiversity specialist with over five years of professional experience within the team or appoint an external expert to guide and implement compensation in line with the BMP guidelines.

7 Residual impacts

If impacts cannot be avoided, minimised, or mitigated through the application of the mitigation hierarchy, biodiversity compensation (offsets) must be considered as a last resort. The table below outlines the CH and PBF features where measurable residual impacts are anticipated. Where relevant, the Q*ha metric (quality multiplied by area) has been applied to quantify residual losses and determine the area and quality of habitat required to achieve ecologically equivalent compensation.

During the ESIA preparation, several fauna species of conservation concern were recorded or considered due to their confirmed and potential presence. However, based on field surveys and outlined mitigation measures, it is concluded that only a limited number of species or habitats will experience residual impacts requiring compensation. For the majority of species discussed throughout the ESIA, no measurable or significant residual impacts are expected, and therefore no offsets are warranted. An illustrative example is the *Bombina variegata* (Yellow-bellied toad) confirmed during field surveys but with habitats remaining undisturbed due to being present above a tunnel, not needing compensation.

Balkan chamois (*Rupicapra rupicapra balcanica*) is associated with high-altitude, steep, and rugged terrain. The Project area is only occasionally traversed by the chamois, not representing their permanent or core habitat. Presence was unconfirmed during surveys. The olm (*Proteus anguinus*) is an obligate cave-dwelling amphibian extremely sensitive to groundwater contamination. However, eDNA analysis show that no olm populations are present in the directly affected karst systems. In addition, the BMP and ESMP include robust pollution prevention measures during construction and operation phases to eliminate any indirect risk. The presence of otter (*Lutra lutra*) in the broader region has been previously reported by third parties; however, the record could not be independently verified during field surveys conducted for this project. In the absence of confirmed presence and with no suitable breeding or foraging habitat affected, and considering the full suite of mitigation measures included in the BMP to protect aquatic ecosystems, no significant residual impact on the species is anticipated. Brown Bear (*Ursus arctos*), Grey Wolf (*Canis lupus*), Wildcat (*Felis silvestris*) and Eurasian Lynx (*Lynx lynx*) are wide-ranging carnivores all listed as species of conservation concern and were considered in the CHA. They occur in the broader region, but no dens, breeding sites, or migratory corridors were found within or near the Project footprint. The landscape-scale availability of suitable habitat and the absence of critical features within the project zone indicate that project-related impacts cannot be considered significant. For aforementioned species no significant or measurable residual impacts are expected on these species after avoidance, mitigation, and minimisation measures are applied.

Although offset measures are proposed for some common and widespread species—as required by the EBRD and EIB policies when CH or PBF triggers are met—it is important to highlight that the project is not expected to affect their long-term viability or regional populations, given their wide distribution, habitat availability, and ecological resilience in the broader landscape.

Table 8: Summary of needed compensation for residual impacts on PBF/CH

Biodiversity receptor	Impact	Impacted area (ha)	Habitat quality (Q)	Compensation minimum (Qha)	Acceptable if BMP measures implemented?
6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates	Direct habitat loss	0.17	0.25	0.0425	Yes
62A0 Eastern sub-Mediterranean dry grasslands (*Scorzoneratalia villosae*)	Direct habitat loss	1.1	0.5	0.55	Yes
Morimus funereus	Direct habitat loss	15.22	0.75	11.42; however, compensation will not be surface- but habitat quality-based	Yes
Lucanus cervus	Habitat fragmentation	N/A	-		
Cerambyx cerdo		N/A	-		
Cottus gobio	Direct habitat loss	0.12	0.75	0.09	Yes
Pseudopus apodus	Direct habitat loss	26.98	0.5	13.49	Yes
Testudo hermanni	Habitat fragmentation				
Podarcis melisellensis					
Lacerta trilineata					
Algyroides nigropunctatus			0.25	6.75	
Platyceps najadum		2.83	0.25	0.71	
Lacerta agilis	Direct habitat loss	0.37	0.5	0.19	Yes
Woodpeckers	Direct habitat loss	10	0.75	7.5	Yes
Bats	Disturbance and light polution	N/A, ubiquitous	0.5	N/A	Yes

Note: Features marked in green denote PBFs and the ones marked in orange denote CHs.

8 Compensation

A number of priority biodiversity features and critical habitats were identified in the Project area and will likely be under adverse pressures of different nature. Some of the features, as given in Annex D: Critical Habitat Assessment to the ESIA Study, will be under direct and unavoidable impact due to their position in relation to the planned motorway route. Therefore, compensation must be done in order to adequately offset these residual impacts and meet the EBRD PR 6 and EIB Standard 4 requirements. Biodiversity offsets are measurable positive conservation outcomes on priority biodiversity features that are attributed to Project activities, and whose magnitude outweighs that of the residual adverse biodiversity impacts arising from the Project development. Offsetting is based on systematic biodiversity accounting based on the explicit calculation of biodiversity losses and gains at matched impact and offset sites. The goal of biodiversity offsets is to achieve No Net Loss and preferably a Net Gain of biodiversity, in comparison to the baseline situation before the project is implemented. No Net Loss or Net Gain are typically assessed in terms of the area conserved and its species composition, habitat types, ecosystem functions, and people's use and cultural values associated with the biodiversity. Biodiversity offsets can include securing or setting aside land or water areas for conservation, enhanced management of habitats or species, and other defined activities. Core principles of offsets are: additionality, equivalence, permanence.

As a part of the offset efforts, the Biodiversity Offsetting Plan (BOP) must be developed. The BOP must be prepared prior to the commencement of construction activities and implemented as soon as technically feasible. The BOP describes biodiversity offsetting requirements and proposes a roadmap towards implementation, long term management and maintenance of an offset scope. Offset principles must be adhered to (adherence to the mitigation hierarchy, limits to what can be offset, landscape context, additional conservation outcomes, stakeholder participation, equity, long-term outcomes, no net loss, transparency and inclusion of science and traditional knowledge). Offset propositions have been explored and will be detailed further. Biodiversity gains from offsets must be like-for-like or better. The BMP presents general measures in process of minimising the impact and compensating for lost habitats.

The BOP must include the following:

- Introduction - project description, relevant ESAP items,, purpose of the plan, including the goals and objectives for managing biodiversity offsets, roles and responsibilities, summary of legal requirements stipulated by the national and international laws and conventions and Lenders' requirements
- Identification of impacted areas – Identification of the areas that will be impacted by the project and the potential impacts on biodiversity, such as habitat destruction, fragmentation, or degradation, identification of residual impacts to habitats

- Offset requirements – A statement of the requirements for the biodiversity offset, including the amount and type of offset needed to compensate for the impacts of the project, net gain accounting
- Offset design – a plan for the design and implementation of the biodiversity offset, including the location, size, and characteristics of the offset, as well as the species and ecosystems that will be protected or restored. Proposed biodiversity offset options, as given below, must be followed by stakeholder consultations, peer review and analysis of biodiversity offset feasibility in order to determine the optimal offset location and strategy
- Monitoring and reporting – a plan for monitoring the effectiveness of the biodiversity offset, including regular reporting to project stakeholders and documentation of any impacts or changes to biodiversity
- Stakeholder engagement – identification of stakeholders, including government agencies, local communities, and user groups, and a plan for engaging with these stakeholders throughout the planning and implementation process
- Funding and resources – identification of funding and resources needed for the biodiversity offset, including staffing, equipment, and materials
- Adaptive management – a plan for adjusting the biodiversity offset as needed to ensure that it is effective in achieving the desired outcomes for biodiversity conservation

Project-specific guidelines for BOP development and implementation regarding habitats and species under direct impact are provided below. The guidelines and proposals were made based on collected baseline data and expert opinion. They are following the World Bank guidelines[38]. Among the possible methods of implementing offsets, the main methods given in the framework below is enhancing, linking or restoring habitats. They mainly focus on managing adjacent habitats in a way that will enable target species to spread and/or thrive but not by affecting other species' core habitat. As per EBRD's PR 6 Guidance Note, for projects that impact priority biodiversity features or critical habitat, loss-gain analysis will be necessary to establish that no net loss or a net gain is achieved, respectively. The analysis must be specific to the biodiversity features impacted by the planned development – there is no single method that can be applied in all cases. The units of measure for impact assessment must be consistent with those for measuring the benefits of a biodiversity offset. They should reflect both the quantity and quality of the feature. For example, if a threatened species' habitat is measured, its extent as well as its quality relative to the species' optimal habitat requirements are important to consider. In this case, quality (Q) might be expressed as a coefficient (0-1) multiplied by the area (e.g., hectares), providing the unit of measure Qha. For the habitat types and species' habitats where it was possible to estimate the net gain in hectares, the quality and size of the area needed to achieve NNL/NG was provided. The following habitats will need compensation:

[38] World Bank Group (2016). Biodiversity Offsets: A User Guide.

- Habitat type 6210 (PBF): Approximately 0.17 ha of this habitat type located at the very start of the section is going to be lost by construction of the motorway. EBRD E&S Policy requires no net loss for PBFs, therefore compensation is necessary. This habitat type is of very low quality and already disturbed by forest fires that occurred on this habitat and adjacent black pine forests in April 2020. This provides an opportunity to enhance biodiversity and compensate for lost habitat on site. Forest fires usually decrease the total nutrient pool on a site (the total amount of nutrients present) through some combination of oxidation, volatilisation, ash transport, leaching, and erosion. However, this is beneficial for the reinstatement process as vegetation of this habitat is characterised by many species of low stature, which require nutrient-poor soil status. The process of compensation shall start with clearance of damaged black pine trees which can prevent disease and further damage to adjacent habitats. Then, topsoil stripped from the motorway footprint shall be disposed of at the cleared area. This process can be performed in line with construction to avoid multiple disposals of the soil. It should be immediately transferred to the desired location and species already recorded on site planted. The main causes of decline in calcareous grasslands are irrational grazing, afforestation and succession, land-use changes, abandonment. Fertilisers and supplementary fodder are not to be used on this habitat, because the application of fertiliser decreases species richness, enhancing the ability of competitive species to thrive. Seminatural grasslands require low intensity or extensive management to maintain their nature conservation value. Grazing and mowing maintain grassland communities by restricting the growth of shrub and tree species by removing their growing points; preventing coarse grasses and tall herbs from achieving dominance by giving low growing species a chance to compete; removing leaf litter that may further suppress plant growth and increase the soil nutrient status; allowing seedlings of short-lived species to become established in the gaps in the grassland produced by grazing animals. JPAC must try to reach an agreement with farmers in the immediate vicinity (if any, that information shall be available upon completion of LARP) regarding farmers bringing a limited number (up to three individuals) of domestic farm animals to the site to graze on the grass for 10-15 weeks of the year. If that is not possible, mowing of the grass and removal of leaf litter as a part of regular motorway maintenance is to be performed in order to prevent succession. Cattle are generally better than sheep at creating and maintaining structurally diverse grassland of benefit to invertebrates. Sites grazed by horses and ponies can be structurally varied and can support unusually diverse invertebrate fauna due to the patchy effect created by grazing. If there is a choice regarding animals upon meeting with the farmers, optimal animals for grazing in this particular site are sheep as they are best suited only for least productive and very dry areas. Delaying the onset of grazing until sometime after the end of the growing season will allow plants in the sward to flower, seed and start senescing. If an agreement is reached with farmers, the left side of the motorway shall be fenced from 0+000+000 to 0+000+100 to prevent collisions with animals as they will graze at approx. 60 m from the motorway at the closest point. JPAC must actively manage the site for three years with repeated planting of species, grazing/mowing, and removal of leaf litter, to

allow for the establishment of the habitat type. Beyond that, JPAC shall include this area in its regular maintenance activities and mow it regularly. Cut should not take place before breeding birds have hatched or populations of "desirable" characteristic plant species, which depend on seed production for regeneration have set seed. The area should be cut once every year during June. If possible, it would be better to use cutter bar mowers. The use of rotary mowers kills many more animals and it needs to be combined with a change in the usual height of cutting (8-10 cm) and a shift to cutting from the inside towards the outside if the escape of animals from the meadow is to be facilitated. If any scrubs appear, cutting of scrub is carried out in autumn or winter, in order to avoid damaging the wild fauna during the reproductive period. The quality of habitat is estimated at 0.25 Q, meaning that at least 0.17 ha of habitat of the same quality must be restored. However, compensation shall aim to improve the habitat to 0.5 Q, resulting in a minimum of 0.1 ha of compensation. Approximate size of the plot within which compensation would be suitable is 0.31 ha. The BOP is to determine the precise location for offset efforts.

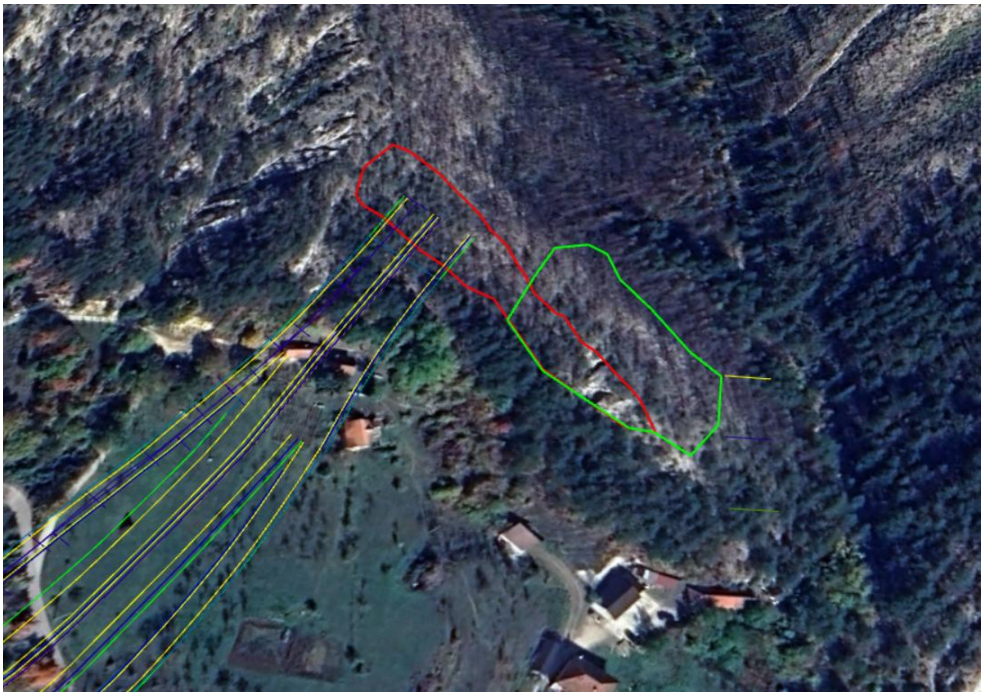


Figure 26: The habitat to be restored (green) in relation to the existing habitat (red) and motorway

- Habitat type 62A0 Eastern sub-Mediterranean dry grasslands (*Scorzoneratalia villosae*) (PBF) – Main pressures and threats are mostly modification of cultivation practices (either agricultural intensification or abandonment of mowing and grazing with subsequent succession), development of infrastructure, erosion, solid waste deposition and conversion to arable land. The size of the PBF affected by the project is approx. 1.1 ha and quality of registered habitat can be considered medium (0.5 Q). The choice of land plot to be subject to biorestoration is not the affected plot. Proposed location was selected based on accessibility and position in relation

to the motorway route. The existing size of the habitat type on this site is 1.71 ha and it shall be enlarged to 2.31 ha by active management of surrounding area. The area to be converted is shrubby, very common and widespread in the area and the management will have a net positive effect on enhancement of the surroundings with Annex I habitat type. The establishment, maintenance and management of the site is comparable to the 6210 habitat type. Grasslands are prone to succession process and regular maintenance and mowing is needed. As the area intended for conversion into grassland is adjacent to the habitat, it can be safely assumed species shall spread naturally as conditions for their establishment are met. Review of satellite imagery has shown that succession and densification of shrubs in the area is evident. By cutting down of the shrubs of low conservation value and doing in regularly in June every year, the succession process shall be stopped, and grassland habitats enhanced.

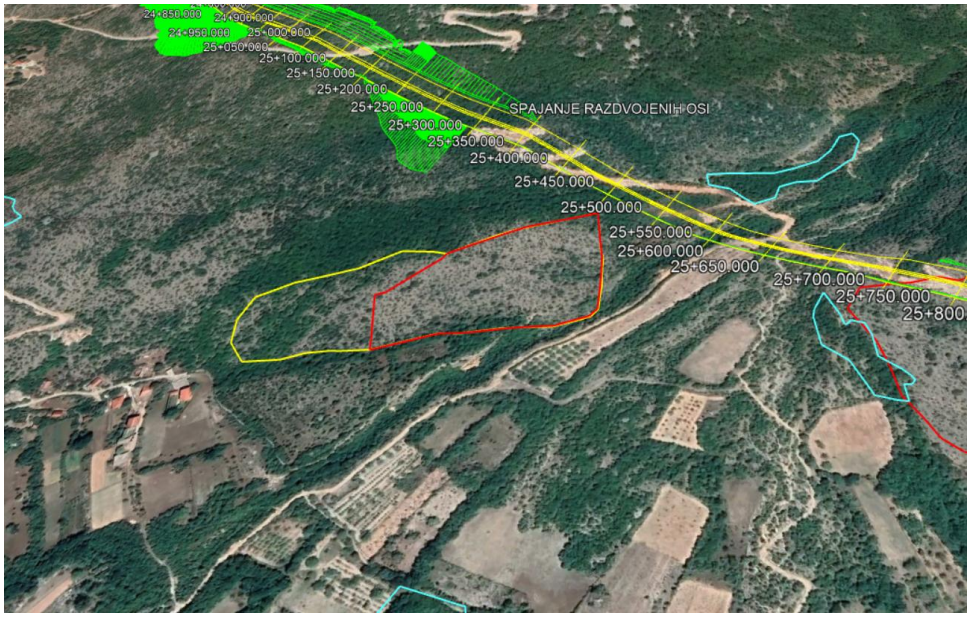


Figure 27: The habitat with potential to be restored (yellow) in relation to the existing habitat (red) and motorway

- *Morimus funereus* (PBF) can be found in well-structured forest habitats abundant in dead wood, large standing tree trunks and also in-ground trunks and large logs or large branches. In the Project area, *M. funereus* is present in forest habitats of Konjicka Bijela (Figure 28**Error! Reference source not found.**). The quality of registered habitat is very good (0.75 Q). Whenever possible, avoid unnecessary cutting of older trees and removal of dead wood in order to avoid direct impact on the species. During cutting down of trees in the belt of the route, at least 5% of all cut down trees is to be stacked in piles that will remain in the area along the route to ensure that individuals developing in the trees complete the cycle. New habitat structures including veteranisation of young trees, installation of deadwood piles is to be provided. Habitat patches must include varied decay stages and tree species. Where feasible, partial girdling or intentional wounding of selected trees may be used to simulate natural decay. These features must be mapped, monitored for insect colonisation, and maintained long-term to ensure

continuity. The LHRP and BOP must determine the optimal locations for trunk stacking. Reinstatement of habitat adjacent to the access roads and motorways disturbed during the construction is required.

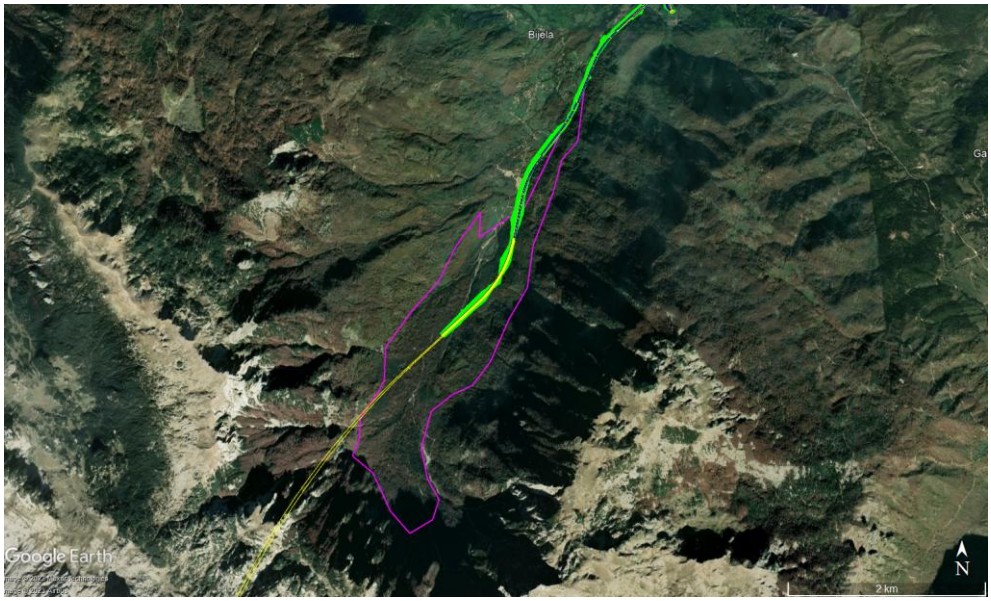


Figure 28: Morimus funereus habitats in relation to the motorway subsection north of Prenj

- The construction of the motorway section requires regulation of the Bijela River along a 600 m stretch in order to safeguard a downstream water source, as requested by the local water utility company. This intervention will result in the loss of approx. 0.12 ha of aquatic habitat. The affected section is characterised by clean, cold and oxygenated water and has been assessed to have a habitat quality score of 0.75 Qha. *Cottus gobio* is present in the impacted stretch and is a known trigger species for the candidate Emerald site Kanjon Bijele, thereby requiring compensation both as a PBF and a trigger species. It is a common and wide-spread species in BiH and Europe. The species is present in the wider Neretva catchment, with occurrences in the Bijela River, Neretva upstream of Konjic, Tresanica near its confluence with the Neretva, and the Drezanka River confirmed as a part of ESIA surveys. Given the measurable residual impacts and the species' conservation significance, compensation is required despite large habitat availability in the area. The Q*ha method has been used to calculate the offset requirement, amounting to 0.09 Qha. The species is known to inhabit Tresanica River, i.e. its lower stretches. As part of the residual impact compensation for *Cottus gobio* associated with the regulation of the Bijela River, the Tresanica River has been assessed as a potential offset location. More specifically, the evaluation focused on the BA_NTRB_Tres_2 waterbody, as defined by the Adriatic Sea Watershed Agency, stretching from the locality of Podorasac to approximately 500 m a.s.l. According to available data and field verification, BA_NTRB_Tres_2 currently maintains a High status for physico-chemical parameters, with Good biological quality elements and Good overall ecological status, as per the criteria set out in the Water Framework Directive (2000/60/EC). The waterbody exhibits favourable conditions for cold-water species, including well-oxygenated water, good

structural diversity, and low nutrient concentrations. The presence of Brown Trout (*Salmo trutta*) and Eurasian Minnow (*Phoxinus phoxinus*) further indicates a functioning aquatic ecosystem with low anthropogenic pressure. These species are often found in sympatry with *C. gobio*. Although *C. gobio* has not been confirmed in this specific stretch during recent surveys, this does not preclude its potential to colonise or be introduced under carefully managed conditions. Its absence may reflect historical distribution limitations or low detectability, rather than a lack of suitable habitat. Given the favourable hydromorphological features, water quality, and ecological integrity of BA_NTRB_Tres_2, this location offers a valuable opportunity to support *C. gobio* through habitat enhancement to improve substrate complexity, flow diversity, and cover and active reintroduction, if supported by a feasibility assessment and stakeholder agreement. Such interventions would contribute to strengthening regional populations and enhancing the resilience of *C. gobio* in the Neretva basin and, in order to compensate for the impact, at least 600 m of habitat quality 0.75 is to be established. It is important to stress that the selection of BA_NTRB_Tres_2 is proposed at this stage, and the final suitability of the site will be determined through the development of the BOP. In accordance with good international practice, the process will require close cooperation with the local fishing society, who will be key partners in determining the site's feasibility, ensuring long-term stewardship, and identifying additional or alternative locations if needed. Should BA_NTRB_Tres_2 be deemed unsuitable following further investigation, alternative sites within the territory of the City of Konjic will be proposed in collaboration with local stakeholders, ensuring that compensation measures remain ecologically relevant, technically feasible, and locally supported.

- *Pseudopus apodus, Podarcis melisellensis, Testudo hermanni, Algyroides nigropunctatus* and *Lacerta trilineata* (PBFs) are widespread and very common and numerous species in Herzegovina and, therefore, the area around the subsection Prenj Tunnel – Mostar North. The species EAAAs have been aggregated for the purpose of NNL/NG accounting as they inhabit habitats of similar characteristics. The size of directly impacted habitat is approx. 26.98 ha (3.48 ha in Dolac, 15.5 ha in Humilisani and 8 ha in Kutilivac). The habitat quality is moderate (0.5 Q[39]) as the presence of human activity in the area is intense.

[39] Residual impact of the project: 26.98 ha * 0.5 Q = 13.49 Qha
Offset minimum: 13.49 Qha / 0.75 Q = 17.98 ha, it can be expected that active habitat maintenance and management of offset site will result in creation of habitat of higher quality for target species.

Figure 29: Aggregated EAAAs of Pseudopus apodus, Podarcis melisellenis, and Lacerta trilineata

One area was recognised as a potential offsetting location for impacts on *P. apodus, P. melisellensis* and *L. trilineata* (PBFs). An area adjacent to the motorway and the regional road R435 towards Humilisani is currently characterised by succession and no maintenance. The habitats valuable for reptiles are slowly decreasing through that process. Additionally, this location might be used as a part of compensation measures for other reptiles impacted by the project as well. *Lacerta viridis* and *Vipera ammodytes* are very common and the most numerous reptile species in BiH and the Project area. The species are tolerant of various changing conditions and inhabit a wide range of habitats: sand dunes, dry areas with shrubs and bushes, steep slopes with rocks and bushes, forest edges and clearings with a certain degree of humidity, road verges or deep river valleys. *Algyroides nigropunctatus* and *Platyceps najadum* prefer dry habitats with garrigue. *Streptopelia turtur* (turtle dove) (PBF) was registered in Zelenika and Humilisani. The species uses a wide variety of woodland types, as well as steppe and semi-desert, frequently relying on agricultural land for feeding. It may use hedges, borders of forest, groves, spinneys, coppices, young tree plantations, scrubby wasteland, woody marshes, scrub and garigue. The species is rare in the project area and a very small number of individuals was recorded. Compensation for aforementioned species can be done on one site as they share a very similar scrubby habitat. The proposed area for offset is shown in yellow in **Error! Reference source not found.** and the size is approx. 32.6 ha. This is an area with overgrown vegetation and going through succession due to change in human activities in the area (especially reduced grazing and agricultural activities). Afforestation and grazing abandonment in steppe-like grasslands alters the characteristics of open natural areas. They rapidly change and species inhabiting such habitats are lost. Species of open habitats have virtually disappeared from the general area surrounding the project due to abandonment. The proposed strategy of clearing tertiary vegetation and trees to revitalise the original habitat and create a mosaic of diverse types of vegetation is a good approach to support the target species and promote biodiversity. Not all trees are to be removed. Mosaic habitats with different type of vegetation are high in species diversity and can

support a high number of species. In this way, species already inhabiting this area will remain, and new ones will appear. Such management must be performed at least 100 m from the regional road and the motorway (besides the thin strip connecting this area to the reptile passage) to prevent fauna fatalities. Through removal of overgrown vegetation and installing at least 100 m of drywalls, net gain of habitats for aforementioned reptiles would be ensured. Habitat connectivity is to be ensured by one of the reptile tunnels that is to be constructed as elaborated in the BMP Chapter 5.3.2. Maintenance programme must be developed and strictly implemented permanently as any non-compliance will result in rapid succession. It is also important to note that vegetation clearance should not be carried out during bird breeding season and should be done progressively with minimal use of machinery to minimise any potential harm to the bird population. Overall, the proposed strategy can result in a positive impact on other species, such as red-backed shrike, short-toed eagle, bunting birds, and northern wheatear (this species not recorded in the Project area but known to inhabit habitats near the Mostar North-Mostar South subsection), and should be implemented carefully and with close attention to detail to ensure success.

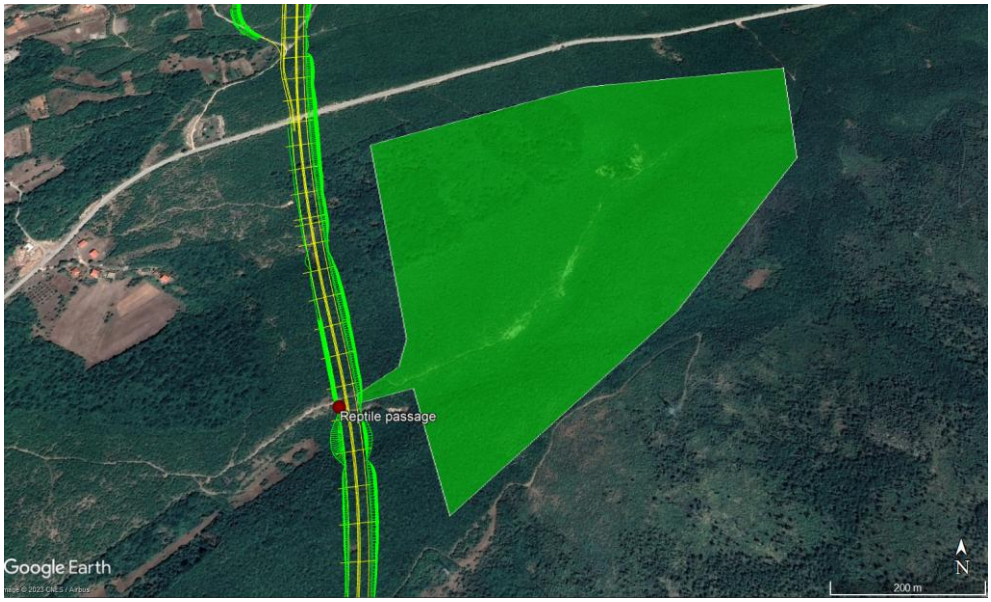


Figure 30: Potential area for implementation of offsetting strategy for reptiles and the turtle dove

- *Dendrocopos leucotos* (white-backed woodpecker) (PBF) was registered in the forest of Konjicka Bijela. Expert opinion is that its territory will not be directly impacted, however, approx. 10 ha of forest and potential habitat of woodpeckers will be removed in its general surroundings. It is important to ensure that the habitat of the white-backed woodpecker is not lost or degraded, even if the territory is not directly impacted. Due to this, no net loss must be assured. Woodpeckers are under the pressure from forest management that is not line with preservation of its habitat, especially extensive logging. Designating a core habitat for the woodpeckers, where logging is forbidden and the forest is managed to meet their conservation needs, is a good strategy to achieve no net loss. This approach will help to maintain the existing habitat of the woodpeckers and prevent any further

loss. It is also important to monitor the effectiveness of the management activities and adjust them if necessary to ensure that the woodpecker population is not decreasing. In addition to this, it is also essential to raise awareness among forest managers, workers, and local communities about the importance of conserving the habitat of the white-backed woodpecker and other threatened species. This will help to promote sustainable forest management practices and ensure the long-term survival of these species.

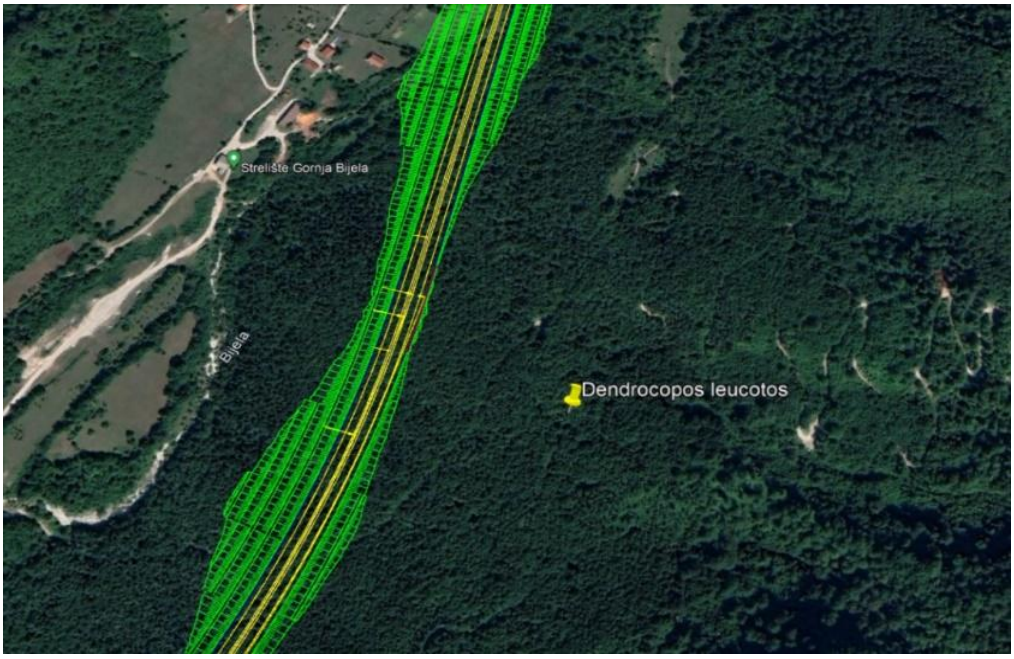


Figure 31: Recorded specimen of white-backed woodpecker

- Bat species (CH) recorded in the project area are distributed in a wide range of habitats in Bosnia and Herzegovina. As the motorway construction will result in unavoidable introduction of artificial light in form of light pollution during construction and installation of lights after the end of project, alternative roosts in forms of dark chambers and dark flight tunnels are to be installed in Zlatar and Kanjon Bijele candidate Emerald sites. Dark chambers must be placed in locations where artificial lights will be used and where lights will be installed for visibility purposes in the tunnel, thereby ensuring the restoration of dark areas. Bosnian and Herzegovinian bats are small and a crevice greater than 50 mm deep and 12 mm wide can be used as a bat roost or allow the bat to access a larger chamber within the structure behind the crevice.
- The JPAC is to support the revision of the protection status of Zlatar and support the process of its official proclamation as a protected area on the cantonal or FBiH level.

9 Implementation Schedule

9.1 Work Schedule

Technical documentation for the project is not finalised as Main Designs for the three subsections (1) Ovcari-Prenj Tunnel, (ii) Prenj Tunnel, and (iii) Prenj Tunnel-Mostar North have not been finalised to date. Therefore, no exact plan of works can be outlined in the BMP and the document should be updated with any new information on construction schedule. The implementation schedule in particular will need to be decided upon and published, taking into account each road subsection within Section Konjic (Ovcari) – Prenj Tunnel – Mostar North being completed, the duration of construction of each section and the methods which will be employed.

Prior to construction, a calendar should be produced so that it details all the required biodiversity mitigation measures for that section.

9.2 Review and Revision of This Management Plan

Due to the complexity of predicting the impacts of this project on biodiversity and ecosystem services over the long term, the aim will be to adopt a practice of adaptive management in which the implementation of mitigation and management measures are responsive to the changing conditions and the results of monitoring throughout the Project's lifecycle. This BMP should therefore be reviewed on an annual basis during the construction phase in order to review the mitigation contained herein.

The plan will be reviewed in conjunction with the following stakeholders:

- JPAC (including Head of Project);
- Contractor's Representative – qualified biologist/ecologist; and
- Supervising Authority.

Any proposed amendments or revisions should then be provided to the following stakeholders for review and approval:

- The EBRD; and
- The Federal Ministry of Environment and Tourism.

10 Monitoring

10.1 Overview of Monitoring Requirements

The monitoring of the quality of the environment in FBiH is covered by national legislation as follows:

- the *Law on Environmental Protection* requires that monitoring should be conducted at least once in three years, except when otherwise stipulated e.g. by relevant laws and by-laws, such as:
  - *The Regulation on the Monitoring of Air Quality and Defining Pollutant Types, Limit Values and Other Standards*.
  - *Law on Protection from Noise*.
  - *Decree on Conditions for Discharge of Wastewater into Environment and into the Public Sewerage System*.
  - *Decree on Construction Site Organisation, Mandatory Documentation on Construction Site and Construction Work Participants.* Regarding biodiversity management, this Plan requires the development of other accompanying documents, such as Construction Environmental Management Plan - suggests detailed measures of environmental management by covering the following aspects (sub-plans): air quality, noise and vibration management, soil management, hazardous material management, spill response management, emergency preparedness and response.
- In addition to this, the 'Decision on the Approval of the EIA Study' issued by the Federal Ministry of Environment and Tourism summarises the requirements of relevant laws and by-laws and includes, among others: limit values for emissions of polluting substances, conditions for the protection of air, soil, water, flora and wildlife, measures for management of waste generated by a plant or facility, measures for the protection from noise and vibration.
- The water permitting procedure in FBiH is regulated by the *Law on Waters* and the *Regulation on Content, Scope, Conditions, Ways of Issuing and Archiving of Water Documents*. The required water acts are:
  - Preliminary Water Consent – defines whether the applicant has met the conditions for (i) exercising water rights; (ii) the manner of exercising this right; (iii) the documentation for the construction of new, reconstruction or removal of existing facilities. It is valid for 3 years.
  - Water Consent – confirms that the documentation attached to the request for the Water Consent is in accordance with the Preliminary Water Consent, local legislation on water and spatial planning documents. It has to be obtained before obtaining the CP. It expires after 2 years if a CP has not been issued and construction works initiated.
  - Water Permit – defines: (i) the purpose, manner and conditions for water use; (ii) the operation of facilities; (iii) the manner and conditions for discharge of wastewater and disposal of solid and liquid waste. It confirms that the conditions defined by the Water Consent have been fulfilled. It is valid for up to 15 years.

- According to the *Law on Motorway on Corridor Vc*, the request for obtaining an Urban Consent (UC) is submitted by the investor to the Federal Ministry of Physical Planning (FMoPP). FMoPP issues the UC within 15 days. For the construction of motorway on Corridor Vc, the UC is valid until the CP is issued. The request for obtaining a CP is submitted to FMoPP which issues the CP within 30 days. CPs are issued for a 5-year period. Motorway sections may be used only after obtaining a Use Permit (UP).

During the construction, and post construction phases, the monitoring of various environmental factors will be covered by the laws and permits listed above. A number of these factors are also relevant to biodiversity, e.g. water quality and noise pollution.

10.2 Monitoring Requirements within the Approvals

JPAC must obtain and comply with all necessary environmental, water and health and safety permits. The permits will cover and stipulate all measures contained in the regulations. Permits to apply for include:

- Preliminary Water Consent (PWC) - application follows the completion of Preliminary Design for the subsection, previously obtained PWC expired in March 2025
- Urban permit - application follows after obtaining the Decision on Approval of EIA
- Construction Permit - application follows the completion of the Main design
- Water Consent - application follows the completion of the Main design
- Operation Permit - the application follows the completion of construction activities
- Water Permit - the application follows the completion of construction for Project subsection

JPAC and Contractor will need to agree on the specific Construction phase monitoring programme (which is to be part of the CESMP) and agree on relevant and specific monitoring locations for all parameters.

Monitoring of the oil separators will be required in accordance with the Water Permit and national legislations, respectively the *Decree on Conditions for Discharge of Wastewater into Environment and into the Public Sewerage System.*

10.3 Key Monitoring Activities

The key biodiversity monitoring activities are considered to be represented by the activities listed in the table below (Table 9).

Table 9: Monitoring activities in preconstruction, construction and operation phases

Phase	Action	KPI[40] Notes
Preconstruction	Habitats, vegetation and invasive plant species: › Monitoring as required for the development of ISMP, LHRP and BOP. Birds: › Monitoring of the inactive nest of the Golden Eagle (*Aquila chrysaetos*). Large mammals: › Monitoring over adherence to the suggested measures by this BMP regarding the planning of the open passages for mammals and type of the fence.	Monitoring to be done before the beginning of the construction to include any potential new findings into project planning. KPI is BMP updated prior to construction.
Construction	Habitats, vegetation and invasive plant species: › During the construction phase, the monitoring of the status of invasive species in natural habitats should be undertaken. › The monitoring of cleared vegetation areas is to be regularly performed during the construction phase. › Success of revegetation – to be undertaken during construction and operation. › Success of the Invasive Species Management Plan. › Environmental supervision of the contractor's work: weekly visual inspections throughout the construction phase to monitor the implementation and effectiveness of prescribed mitigation measures. › Implement monitoring of physico-chemical parameters (conductivity, pH, oxygen, nitrates, oil residues) of groundwater quality, preferably in cooperation with local water supply companies in the springs covered by the *Proteus anguinus* eDNA analysis – Gornja Bijela, Salakovac, Bosnjaci, as it could detect any negative impacts on the drinking water quality and subterranean ecosystems. This is to be included in the Groundwater Monitoring Plan. Invertebrates: › Monitor the implementation of mitigation measures for the species *Lucanus cervus, Cerambyx cerdo* and *Morimus funereus*. Monitoring measures should be applied in the area of Humilisani and Konjic Bijela. › Conduct continuous bio-speleological supervision during excavations along the route. Fish: › Special attention must be paid to the state and condition of critically endangered species: marble trout - *Salmo marmoratus* Cuvier, 1829; and softmouth trout - *Salmothymus obtusirostris oxyrhinchus* (Heckel, 1851)	Construction site well management reported The KPI for the Invasive Species Management Plan will initially be a no net increase in coverage by invasive species from the current baseline Revegetation should be undertaken after construction as soon as possible. The aim is to have at least 50% vegetation coverage within 3 months of cessation of works. If this is not achieved remedial actions may be required, such as additional tree planting if after year 1, 2 or 3, there has

[40] KPI – Key Performance Indicator, in this case, the level at which additional or targeted mitigation would be required.

Phase	Action	KPI[40] Notes
	despite the fact that they weren't confirmed during field surveys. › Together with biomonitoring of fish fauna it would be necessary to monitor physical and chemical water quality. During the construction phase it would be necessary to monitor potential changes in water quality, changes in flow (both quantity and variability), and habitat loss. Amphibians and reptiles: › Every morning, workers engaged on the site must do route monitoring and eventually remove individuals of Hermann's Tortoise (*Testudo hermanni*) from the route under construction. The period of vegetation clearance and excavation and earth works must be undertaken after daily supervision and removal of individuals outside from the route. Monitoring should be undertaken by the biologists employed in the Contractor's team. The data on species should be analysed on a monthly basis and mitigation measures applied accordingly. › Amphibians are among the most sensitive species regarding chemical pollution, so it would be recommended to install oil separators along the project zone, that would be frequently monitored and ensure that oil and chemical spills are controlled in a timely manner. › Environmental supervision of the contractor: weekly visual inspections during the construction phase to monitor the prescribed mitigation measures. › The Contractor shall establish monitoring wells to assess **nitrate concentrations** upstream and downstream of the tunnelling area, with continuous water quality monitoring during and after blasting operations. Place at least 2-3 wells up-gradient (relative to groundwater flow) from the tunnel alignment to establish baseline nitrate levels unaffected by tunnelling at least 3 months prior to the start of tunnelling. Install wells at intervals of 2-3 km along the tunnel, with at least 4-5 strategic locations. Where depth makes vertical wells unfeasible, consider angled or inclined wells reaching the same hydrogeological level. Minimum of 3-4 wells down-gradient of tunnel, following the known or expected groundwater flow paths, to enable early detection of nitrate migration. During active blasting and tunnelling works, the Contractor must conduct weekly measurements of nitrate concentrations in all relevant monitoring wells (both upstream and downstream of the works). In the post-blasting phase, continue bi-weekly monitoring for a minimum of 3 months after blasting activities end, or longer if nitrate levels remain elevated. If nitrate concentrations approach or exceed the threshold, implement daily monitoring and activate mitigation protocols. Monitoring results shall be documented and submitted monthly to the Engineer. Birds: › As stipulated by this report, special mitigation measures have been proposed to be applied during the construction phase at the Ovcari, Neretva Konjic, Mladeskovici sites, as well as at the Rakov Laz, Klenova Draga and Zelenika sites. During the construction phase, supervision of the	been a loss of 30% of planted trees or more, or less than 90% coverage of vegetation (not trees). No fatalities of fauna recorded on site No nests/roost affected Presence of alternative roost sites

Phase	Action	KPI[40] Notes
	implementation of the proposed measures on the spot by the Supervisory Authority is recommended. Bats: › It is necessary that a bat expert checks the abandoned artificial objects (e.g. houses) and old trees which must be removed for the bat colonies (if any). Large mammals: › The viaducts along the motorway route should be constructed as open passages for wildlife. Applicable monitoring measure is to supervise over adherence to the suggested measures by the Supervisory Authority on-site. › Implement monitoring of large and small wildlife species, in order to determine the possible mortality of wildlife along the construction site. Measures need to be implemented by wildlife camera traps and field surveys. › During the construction phase, there will be no significant loss of forest habitats important for large carnivores and other types of high forests. › Recultivate excavation landfills with native species in order to bring the vegetation to the climax phase as quickly as possible.	
Operation	Habitats, vegetation and invasive plant species: › Success of the Invasive Species Management Plan: the monitoring of the status of sensitive habitats and species, and invasive alien species is to be continued and regularly performed during the operational phase. › Success of revegetation: during construction and for three years after construction vegetation monitoring should be undertaken twice a year for the first three years of operation. › Monitoring of soil quality. Invertebrates: › Monitoring of habitat recolonisation for species: *Euplagia quadripunctaria, Zerynthia polyxena* in the cleared and artificially maintained areas along the motorway route. › Monitoring of afforested excavated material landfills for the purpose of adopting measures to improve and accelerate the process of recolonisation of *Lucanus cervus* and *Cerambyx cerdo* species. Fish: › After completion of construction, it would be necessary to carry out monitoring of aquatic habitats and fish species. This should include monitoring of changes in water quality (temperature, sediments, chemicals due to pollution events), and changes to the flow regime. Roads accelerate water flows and sediment transport, which raise flood levels and degrade aquatic ecosystems. Thus, local hydrologic and erosion effects along roads are dispersed across the land, whereas major impacts are concentrated in the stream network and distant valleys. Although gradual sediment transport and episodic landslides are natural processes affecting streams, elevated levels caused by roads tend to disrupt aquatic ecosystems. Buffer strips	Register in place for registering of potential road kill. Number of roadkills per km.

Phase	Action	KPI[40] Notes
	between roads and streams tend to reduce sediments reaching aquatic ecosystems. Amphibians and reptiles: › It is necessary to inspect the route and remove any individuals of the Hermann's Tortoise (*Testudo hermanni*) out of the motorway area after the fencing of the motorway is completed and prior to commencement of operation phase. › Monitoring the effectiveness of mitigation measures by preventing the death of animals in accidents on the highway, e.g., use of underpasses, bridges. These measures are taken by keeping records of the animals killed on each tranche of the highway after construction, through regular patrol checks, e.g., once a week or monthly. Surveillance of parts that allow animals to cross and prevent habitat fragmentation should also be monitored. Birds: › Monitoring of the implementation and functioning of the bird protective panels described in previous Chapter. › After the commissioning of the Corridor Vc, continuous monitoring of bird mortality for at least three years is recommended. In the event that increased mortality of birds occurs on some sections, it is necessary to propose protective measures that would be defined in accordance with the habitat conditions, the species most often killed on the motorway and their behaviour. Bats: › Monitoring the implementation of proposed mitigation measures, such as using red lights for signalisation. › Bat monitoring by bat detectors along the route over a period of three to four years, to determine the effects of the highway on recorded species and the degree of bat aggregation. Large mammals: › Perform continuous monitoring of wildlife during the first three years of operation, in order to analyze the dynamics and structure of the population of mammal species. › It is necessary to conduct monitoring of wildlife mortality on the section, especially representatives of martens and weasels that can pass through the wire fence of the motorway. › If roadkills are registered, analysis of frequency of roadkills and places of accidents must be done in a period of one year. The applicable mitigation measures to avoid road-kills are: placing of prismatic mirrors, and more important, regular maintenance of the safety fence along the motorway. › The second task of the ecologist is to determine the scope of wildlife activity near the motorway section and the use of recultivated areas under viaducts and bridges as passages for animals, and if necessary, implement measures to optimise the conditions for wildlife passage or prevent grouping of species along the motorway fence. This	

Phase	Action	KPI[40] Notes
	means that it is necessary to remove the vegetation along the fence in a belt of 2 m from the fence. › During the operational phase, the disturbed habitats will go through various phases of succession and overgrowth. In the first phases of overgrowth, it is not necessary to carry out cultivation measures, until the stage of formation of bush vegetation and young forest when it will be necessary, according to the needs of the route, to clear bushes and maintain samplings that are native to the area. Recultivation of vegetation under the viaducts aims to mitigate habitat fragmentation that will occur with the construction of the motorway. Therefore, it is necessary to: › Plan the construction of a fence under overpasses and bridges to allow passage under them; › Recultivate the area under viaducts and bridges to ensure continuity of vegetation corresponding to surrounding habitats outside the impact zone.	

10.4 Frequency of Monitoring

Revegetation – during construction and for three years after construction, vegetation monitoring should be undertaken twice a year for the first three years of operation.
Road kill prevention - during operation, a record will be kept of all roadkill (species and location), each section of the road should be driven on slowly or walked on once per month for the first three years of operation.
Invasive Species Management Plan – Monitoring should be undertaken annually for the first three years post-construction, in July – September, and before winter, when the majority of invasive species are at full growth.
Land and Habitat Restoration Plan – Monitor annually during spring and autumn for first three years of operation.
Biodiversity Offsetting Plan – Monitor annually during spring and autumn for first five years of operation.

10.5 Monitoring Review

All of the monitoring proposed above, will be continued during the first three years post-construction. It is then envisaged that the monitoring efficacy and need for continued monitoring of each feature will be reviewed. A future monitoring programme, covering year 4 – 10 post-construction will be developed and implemented accordingly.

11 Training

11.1 Overview

Implementation of mitigation measures during the construction stage will be the responsibility of the Contractor in accordance with the contract specifications and loan requirements. This may be achieved most efficiently if the contractor appoints a suitably qualified biodiversity expert specifically to coordinate the implementation and monitoring of the BMP.

It is also understood that JPAC does not have any biodiversity experts within their team. As with the contractor, it may be necessary for either the Head of Project, or associated engineer to undergo biodiversity training, prior to project implementation so that they understand more fully the reasoning behind the measures proposed in the BMP and how to implement them.

As given in the Capacity Assessment Report (2019) the Consultant has identified that existing and future employees of JPAC attend the following trainings:

- for the Division for Protection and Maintenance: at least monitoring of biodiversity mitigation measures and GHG assessment
- for both the Division for Study Documentation and the Division for Protection and Maintenance: education on interpretation and clarification of ESAP measures.

It is also highly recommended to JPAC to improve internal communication and accountability within the company for the implementation of ESAP measures throughout the **whole project cycle**. This should be the responsibility of the PIU unit.

11.2 Induction Training

Prior to undertaking works on the site, all personnel should be inducted to be made aware of the potential biodiversity issues on the road section. This can be achieved through a presentation of a range of short (20 minutes maximum) toolbox talks. The talks should be delivered by a suitably qualified ecologist and cover topics such as invasive species management, bat roost habitats, prevention of erosion etc. Once the talks have been prepared in the form of short PowerPoint or laminated picture card presentations, they can be given more than once, if required, and presented to the workforce on each section of the road. The induction training will be the responsibility of the Contractor.

11.3 Job-Specific Training

The JPAC Head of Project or associated engineer should undertake training prior to project implementation so that they understand more fully the reasoning behind the measures proposed in the BMP and how to implement them. This training could take the form of a one-day induction, being run by a suitably qualified ecologist, as a site run activity, e.g. to locate invasive plant species, potential bat roost habitats, relocation of *Testudo hermanni* etc.

11.4 Training Requirements

The need for further training should be identified and remedied during the construction process as part of the monthly reporting of the JPAC Head of Project. The need for further or additional training should be identified in consultation with the appointed contractor.

12 Audit and Reporting

12.1 Auditing

The Supervising Authority, responsible for the overall supervision of construction works, will supervise the monitoring of the implementation of mitigation measures during the construction stage.

The Supervising Authority has to submit monthly reports to the JPAC Head of Project. The reports will be analysed and where required, corrective measures and actions will be proposed in order to improve implementation efficiency. The Head of the Project will also supervise the Supervising Authority, i.e. will compile the reports submitted by the Supervising Authority, and will send them to the JPAC Management. As the project will be covered by an Environmental Permit, this carries additional reporting responsibilities. An annual report of activities has to be submitted to the Federal Ministry of Environment and Tourism by the end of June each following year.

12.2 External Auditing

External auditing will be related to the auditing process during regular annual check-ups pertinent to ISO standard 14001:2015 Environmental Management and 9001:2015 Quality Management, as well as during detailed auditing procedure as part of re-certification of these standards every three years. Control will be undertaken by the certification company TÜV Thüringen that has issued the ISO standards to the JPAC Company.

External audit and control are usually conducted in the last quarter of the year.

12.3 Record Keeping

Monthly records will be kept by the JPAC Head of Project and submitted to the JPAC Management. A summary of these records will be available for download by interested parties from the JPAC website.

The biodiversity specific reporting will also be kept by the JPAC Head of Project and submitted to the JPAC Management. These records will also be made available to stakeholders if requested.

13 Document control

This document is a Biodiversity Management Plan. As a result of this, it is anticipated that this document will go through a number of iterations during the construction and operational periods. Each time the BMP is changed and reissued, the issue number on the cover page will need to be changed. All documents will be kept in file by JPAC, so that iterations can be accessed/reviewed over time if required.

If additional project document control measures are to be implemented, they should be detailed here, prior to reissuing of the Biodiversity Management Plan.