Main Road Reconstruction Project, Rehabilitation and upgrade of the Danilovgrad-Podgorica road section

FRAMEWORK BIODIVERSITY ACTION PLAN

European Bank of Reconstruction and Development

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Authorisation

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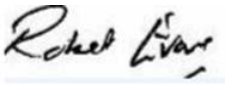
Author	Rob Evans	08/10/2019	
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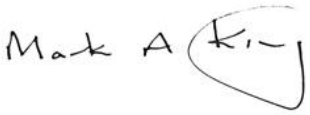
Approved	Mark King	08/10/2019	

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Glossary

ACAs	Additional Conservation Actions
BAP	Biodiversity Action Plan
BMEP	Biodiversity Monitoring and Evaluation Plan
BMP	Biodiversity Management Plan
CESMP	Construction Environmental and Social Management Plan
CHA	Critical Habitat Assessment
EBRD	European Bank for Reconstruction and Development
ECoW	Ecological Clerk of Works
EIA	Environmental Impact Assessment
EPC	Engineering, procurement and construction
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
F-BAP	Framework Biodiversity Action Plan
GIP	Good Industry Practice
GIS	Geographical Information System
IBAT	Integrated Biodiversity Assessment Tool
IPIECA	International Association of Oil and Gas Producers
IUCN	International Union for Conservation of Nature
MFI	Multilateral Financing Institutions
NGO	Non-Governmental Organisation
OE	Owners Engineer
OEES	Owners Engineer Environmental Specialist
PBF	Priority Biodiversity Feature
PR	Performance Requirement
RTA	Road Traffic Accident
SEMPs	Site Environmental Management Plans
SEP	Stakeholder Engagement Plan
TA	Transport Authority
ToR	Terms of Reference

Executive Summary

This document provides the Framework Biodiversity Action Plan (F-BAP) for the Danilovgrad-Podgorica Road Upgrade Project. It is informed by, and should be read alongside, the Project ESIA and associated Critical Habitat Assessment Report. These documents have identified the following species and habitats that require special conservation measures to be put in place for them:

- Designated sites: The Mareza source with Sitnica and area of Velje Brdo
- The Rivers Susica, Sitnica Matica and Mareza
- European Otter *Lutra Lutra* and Bats
- Notable Amphibians including Albanian Water Frog *Pelophylax shqipericus* (EN)
- Notable Fish: Soft mouthed trout *Salmo obtusirostri* (EN) and European eel *Anguilla anguilla* (CR)
- Notable Invertebrates: including endemic freshwater snails and white-clawed crayfish *Austropotamobius pallipes* (EN)

The document includes a set of actions that together will help ensure the conservation or enhancement of these habitats and species. As such it builds on the key mitigation and compensation measures developed as part of the Project ESIA process and is intended to help the Project comply with both national legislation/policy requirements and international environmental requirements, including the EBRD Performance Requirements (PR6).

The F-BAP focuses on those species and habitats that need special management and is based on the use of the "Mitigation Hierarchy". As such impact avoidance is prioritised, followed by reduction and mitigation, with measurable offsets (and/or additional conservation actions) only applied as a last resort where residual impacts are unavoidable. The F-BAP includes a series of objectives and management measures to mitigate residual impacts, that will be used by the Project, to achieve no net loss of these notable habitats and species. Monitoring targets, responsible parties and a time frame are also included.

The F-BAP has been developed with input from a range of stakeholders, including national experts, local/international conservation organisations and project-affected communities. It will be further developed into a BAP once additional information is available as a result of further studies to be undertaken during 2019/2020.

1. Introduction

1.1. Document Purpose

This document is the Danilovgrad-Podgorica Road Upgrade Project **Framework Biodiversity Action Plan (FBAP).** It outlines the approach to be taken by the project to meet its obligations regarding the long-term conservation of "notable" species and habitats of local or greater conservation importance located in and around the Project's direct "Zone of Influence". The document has been informed by, and should be read alongside, the Project Environmental and Social Impact Assessment (ESIA) and associated Critical Habitat Assessment Report, which are provided separately.

1.2. Project Summary

The Project involves the rehabilitation and upgrade of the M-18 Danilovgrad-Podgorica road in southern Montenegro. The section of road affected is approximately 15km long and runs in a south-northwest direction between the municipalities of Danilovgrad and Podgorica, connecting into 11 main settlements. The works will include the widening of the existing 7m road to 21m wide with two-lanes of traffic in each direction plus addition of a 2m safety zone on each side of the road (ie 25m wide in total). Work will also involve reconstruction of 4 bridges, totalling 215 m in length, and construction of one new underpass (18m in length). New pavements/sidewalks will be constructed along the edge of the road in Danilovgrad (1.5m wide) and Podgorica (2m wide) and 7 new roundabouts will be built as well as 3 new road junctions. 23 new bus stops will be constructed, new lighting will be provided along the length of the road; and new pedestrian crossings will be established at road junctions and near roundabouts. New and upgraded stormwater drainage and treatment of road runoff will be provided. Works are due to commence in late 2019 and expected to take 24 months to complete.

1.3. Need for the F-BAP

The proposed Project is located in an area that supports a number of notable species and habitats that are considered threatened, endemic or otherwise of conservation importance. These include the following:

- Designated sites: The road crosses part of the designated site known as the "Mareza source, with Sitnica and Area of Velje Brdo"
- Aquatic habitats around the Rivers Susica, Sitnica Matica and Mareza, which also support wooded corridors.
- A number of notable species are potentially present including mammals (European Otter *Lutra Lutra* and Bats); amphibians (Albanian Water Frog *Pelophylax shqipericus* -EN); fish (soft mouthed trout *Salmo obtusirostris* – EN; and European eel - *Anguilla Anguilla* – CR have been recorded historically nearby). A number of notable invertebrates: including endemic freshwater snails and white-clawed crayfish (*Austropotamobius pallipes* - EN) have also been recorded from watercourses nearby.

A number of Action Plans have been prepared for the above to help ensure that the Project results in "no net loss", or in the case of the freshwater snails where Critical Habitat has been identified, "net gain" to the conservation value of these habitats and species. This document outlines those plans, which are to be developed further once additional information becomes available.

1.4. Legal Basis for the F-BAP

The Project ESIA provides a concise summary of the key regulatory and financing requirements that determine the Project's obligations regarding biodiversity in general and this F-BAP in particular.

1.5. Document Objectives

The plans contained within this document include a set of actions that together will help support the long-term conservation of the specific habitat or species of concern. The actions build on, but do not duplicate, the general biodiversity mitigation and compensation measures included within the Project ESIA and associated Environmental and Social Management Plans (ESMPs)[1]. Each specific action plan includes information on objectives, management measures, resources and monitoring to enable the Project to mitigate residual impacts and achieve no net loss (or net gain where required).

The specific F-BAPs have been developed with input from a range of stakeholders, including external experts, local/international conservation organisations and project-affected communities. They have also been developed taking into account good international practice as outlined in documents such as EBRD PR6 Guidance Note, the MFI Biodiversity Working Group's "Good Practices for Biodiversity-Inclusive Impact Assessment and Management Planning" (2014) and the IPIECA (2005) guidance. The framework BAPs will be developed further into full BAPs following additional survey work as part of an adaptive management programme.

1.6. Data Input to the F-BAP

The BAP has been developed using data obtained through a combination of the following:

- A **desk-based assessment** of the Study Area, defined as a 10 km buffer around the Project site, undertaken using publicly available data and satellite imagery, including input from the IBAT tool. The work resulted in a list of designated sites and potential species that may be present. These were then classified by likelihood of a species being present, based on the known distribution and ecological preferences as well as expert opinion.
- **Terrestrial Ecology and Habitat Surveys** these were carried out in April and June 2019 to assess habitats present near the Project. Representative samples of each of the habitat type were identified and surveyed to assess potential ecological sensitivities (constraints) and conservation concerns. During these surveys, any notable fauna or flora species encountered were identified and recorded.
- **Specific surveys for Bats and Freshwater snails** were undertaken in June and July 2019. Details of these are provided in the ESIA and supporting documents and summarised here.

A precautionary approach has been taken to mitigation and management of Project impacts on notable habitats and species, considered particularly important given the limited availability of seasonal baseline data to date. Further studies are also planned, and this F-BAP will be updated when the results of those studies become available.

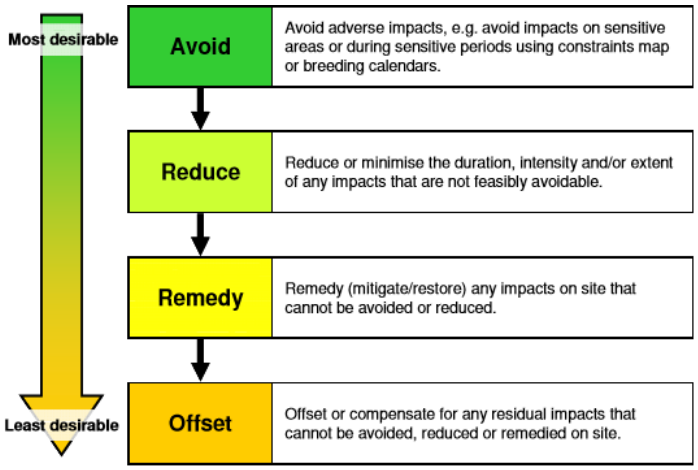
1 The ESMPs themselves will be implemented by the EPC and O&M Contractors- as outlined in the Project ESIA.

1.7. Stakeholder Input to the F-BAP

Stakeholder consultation is an important element of the development of a BAP, both for information collection and to gather opinions on how to implement and coordinate actions. A number of national and international stakeholders (including biodiversity specialists and NGOs) have been consulted as part of the work reported in this document (and the ESIA). Further stakeholder consultation is also proposed as part of this F-BAP to further develop proposed conservation actions and help establish long-term partnerships with the organisations that will implement the actions.

1.8. Application of the Mitigation Hierarchy

The ultimate **objective** of a BAP is to achieve **no net biodiversity loss or, if Critical Habitat is triggered, net biodiversity gain** as a result of the Project. To achieve this the "Mitigation Hierarchy" is applied to potential impacts identified during the ESIA screening and planning process as shown in the figure below. Using this approach avoidance has been prioritised, followed by reduction and mitigation, with measurable offsets only applied as a last resort where residual impacts are unavoidable, or as an additional conservation measure.



Project BAPs can include both short-term site-based mitigation measures linked to construction activities and mid to long-term biodiversity conservation actions. This BAP focuses on longer-term measures and most notably those actions, which can have measurable outcomes during the life of the proposed EBRD Project loan.

1.9. Associated Documents

This document builds on, and should be read alongside, the following Project Documents:

- **Project Environmental and Social Impact Assessment (ESIA)** which further described baseline conditions within the projects area outlines potential impacts of the scheme and details key mitigation to be included in design, construction and operation.
- **Framework Environmental and Social Management Plan (ESMP)**: this document focuses on the proposed project mitigation and includes specific project requirements to be implemented by the EPC Contractor during final project design and construction. As an operational document it will inform the EPC Contractors own Environmental and Social Management Plans, which will be developed prior to construction commencing.
- **Stakeholder Engagement Plan (SEP)**: This provides additional details of the consultation work undertaken to date (including consultations with ecological NGOs) as well as planned future consultation work. It is provided as an Annex to the ESIA.

2. The F-BAP Implementation Process

2.1 Overview

The Project will avoid impacts to notable species and habitats through the:

- Use of the mitigation hierarchy involving a sequential approach of impact avoidance, mitigation, restoration and finally offsetting if no other approach is effective.
- Design of the route to avoid sensitive habitats wherever practical through the use of the existing road and careful siting of laydown areas to avoid areas of natural habitat.
- Commitment to the use Good Industry Practice (GIP) during construction works to further prevent or reduce impacts as far as practical. This includes appropriate timings of works (e.g. to enable work in river beds when they are dry; timing works to avoid impacts to nesting birds or hibernating/nursing bats).
- Commitment to apply the mitigation measures elaborated in the project ESIA.
- Application of the specific species and habitat F-BAPs included in this document.

Together this approach is intended to help ensure "no-net loss" or "net gain" (as appropriate) of biodiversity as a result of the proposed project development and operation.

Implementation of these approaches will be based around the use of the:

- Owners Engineer Environmental Specialist (OEES) responsible for monitoring the works The OEES will further develop this F-BAP into a BAP and will also develop and implement a Biodiversity Monitoring and Evaluation Plan (BMEP) to ensure that the BAP is correctly implemented.

- EPC contractors **Ecological Clerks of Work** (ECoW) responsible for managing the works. The actual BAP activities on the ground involving physical works will be undertaken by the Contractor under the supervision of the ECoW.

Where additional studies are required these may be contracted to relevant universities, NGOs or specialised consultants, where appropriate.

2.2 Obligations of the Owners Engineer

The Owners Engineer is tasked with specific responsibilities to ensure compliance of civil works with the EIA and F-BAP commitments. This includes a particular emphasis on the monitoring of implementation of Project EMPs through the Contractors Site Environmental Management Plans (SEMPs). The Owners Engineer will retain the use of appropriate Environmental/Biodiversity Specialists to ensure that the Contractor is compliant with his environmental obligations.

The Owners Engineer's Environmental/Biodiversity Specialist will be responsible for preparing and implementing detailed environmental action plans. They will also:

- prepare and manage implementation of the Biodiversity Action Plan and Biodiversity Monitoring and Evaluation Plan (BMEP);
- organize any contracted organisations such as universities or NGOs in order to commission surveys to be completed for the BAP through the services of specialists;

- conduct environmental training and briefings to provide environmental awareness on EBRD safeguards and regulatory environmental requirements and standard operating procedures in conformity with project obligations;
- undertake baseline monitoring and reporting of Contractor's compliance with contractual environmental (and biodiversity) mitigation measures during the construction phase;
- review all documents and reports regarding the integration of environmental and biodiversity issues including contractor's environmental action plan; and
- supervise the contractors' compliance with the EMP and prepare monthly compliance reports.

2.3 Obligations of the EPC Contractor

The EPC Contractor will be responsible for the preparation of the project Site Environmental Management Plans (SEMPs). These will be fully compliant with the Project EMPs (including this F-BAP) and the ESIA as a whole. The contractor ESMS and SEMPs will be submitted to Transport Authority 30 days prior to commencement of works on site and approved before start of the works. To do this, the EPC contractor will require a team of Specialists including those described in detail below.

Environmental and Social Officer

The EPC Environmental and Social Officer will implement and continually update the SEMP and oversee and report on the operation throughout the contract period. They will be the Contractors main focal point for all environmental, social, health and safety and cultural heritage issues associated with the Project and will lead the other team members. The Environmental and Social Officer should be full-time member of staff on the Contractors roster and should be on site at least five days per week.

Ecological Clerk of Works (ECoW)

The EPC Contractor will hire an ECoW, who will report directly to the EPC Contractor. An ECoW is necessary as construction through multiple habitat types provides challenges, especially around avoidance and minimization of impacts during works in sensitive sites (e.g. protected areas), sensitive habitats (including e.g. effective control of silt near water) and where protected or notable species may be present in the working corridor. The key roles of the ECoW are therefore to:

- Build on the work undertaken to date to identify any specific areas of particular ecological sensitivity (e.g. supporting protected or notable habitats or species) that may need to be avoided, moved (e.g. plants/amphibians) or disturbed later in the year (e.g. if birds are nesting there).
- Translate mitigation requirements written in the SEMP and its sub-plans (including relevant elements of the Biodiversity Action Management and Monitoring Plans) into practical measures on the ground.
- Advise in a timely manner as to how best to address changeable and less predictable situations on the ground from an ecological perspective (e.g. should new species or populations be encountered).
- Ensure that all staff are fully aware of the environmental sensitivities of the site and their responsibilities, as outlined in the management plans (e.g. via practical toolbox talks ahead

of the construction) and ensure they are appropriately trained in the requirements of the BAP, BMP and BEMP.

- Take field notes and photographs to demonstrate compliance with the management plans.

The ECoW will also undertake pre-construction/enabling surveys a couple of weeks ahead of the site clearance teams and produce hazard maps to show the location of particularly sensitive habitats and species that are to be avoided e.g. by changing timing of works, amendments to construction methods statements, etc. Responses to ecological concerns will be coordinated through the use of appropriate project reporting mechanisms to allow issues to be raised and resolved in an efficient manner.

The ECoW will have at least 5 years of experience in the practical elements of protected species and habitats conservation (including handling of species that they may have to move) and recognitions. They should also have a working understanding of wider environmental issues and the construction/engineering process and will have a demonstrated knowledge of good international practices and Lenders biodiversity Safeguards (namely EBRD PR6).

2.4 Summary

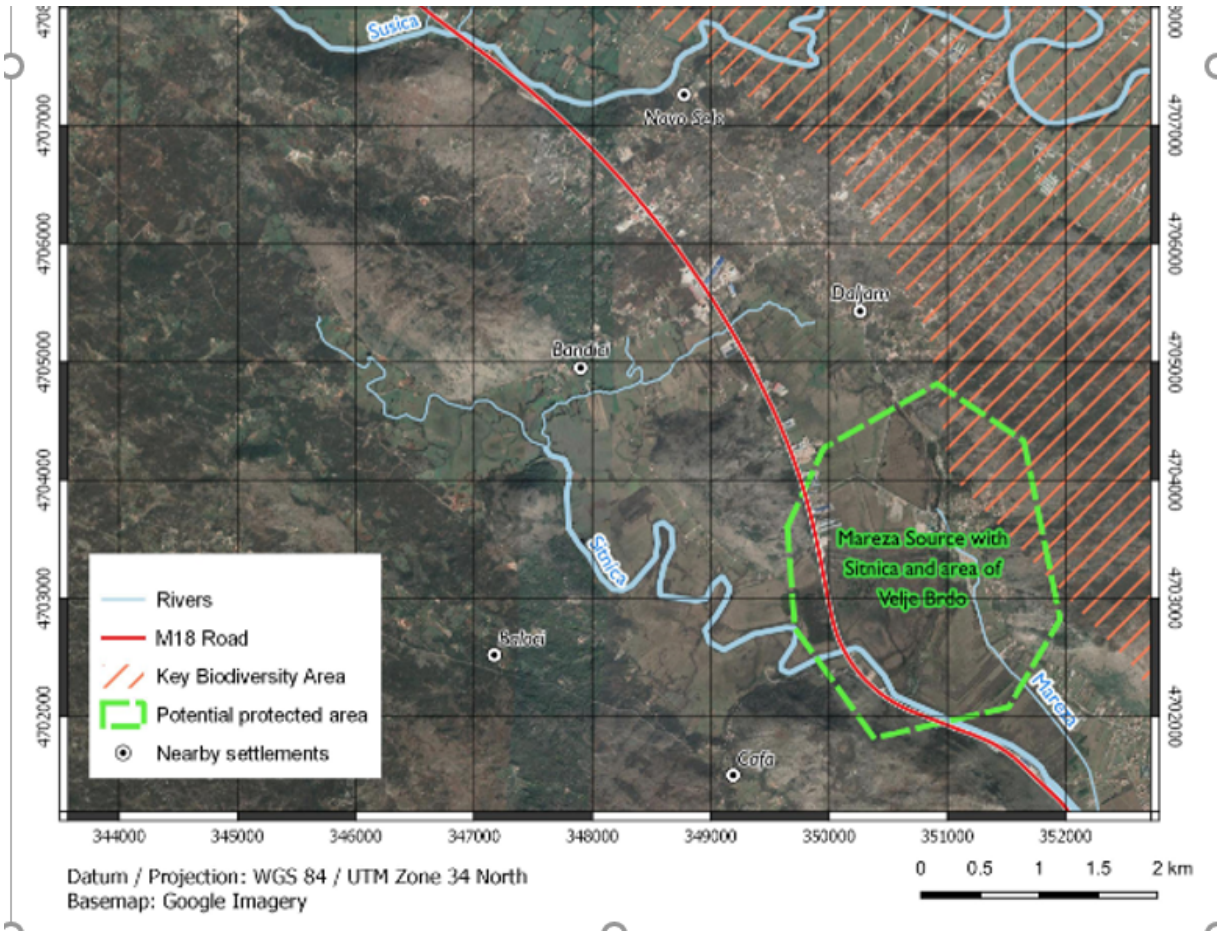
In summary: development of the F-BAP into a BAP and its implementation will be:

- Delivered under the Owners Engineer's Scope by the Environment/Biodiversity Specialist who will also prepare the BMEP and monitor/guide implementation of BAP
- Supported by the ECoW and the EPC Contractor
- Further supported by specific experts (from NGOs/Universities etc.) employed by the Works Contractor with the oversight of the Engineer's International Environment and Biodiversity

3. Action Plan for the Designated Area "Mareza Source with Sitnica and area of Velje Brdo"

3.1 Baseline Studies

The "Mareza source with Sitnica and area of Velje Brdo" is a "potentially protected area" listed within Podgorica's Biodiversity Action Plan. Whilst there has not yet been any official ecological survey of the area, and the procedure to formalise its status has not yet been initiated, the Podgorica Regional BAP compares the diversity of the site and associated Matica River Valley (which it considers forms a single unit) to that of the highly protected Skadar Lake. The BAP goes on to state that a number of Habitat Directive Annex I and II habitats are present (but does not list them) and that several Birds Directive Annex I species have also been recorded here (again unlisted). The area is also said to have significant social, economic, cultural and ambient, as well as ecological significance. For the purposes of this F-BAP the site is considered as designated for conservation protection, and the critical habitat assessment (CHA) has also identified it as a "Priority Biodiversity Feature" (PBF). No boundary has yet been established for the site, but the figure below shows an illustrative boundary based on the current description, which describes it as including parts of the Rivers Sitnica[2] and Mareza (as well as areas crossed by the existing road).



[2] A separate action plan is provided for the Sitnica river in the following sections

The site itself represents **a complex of freshwater, terrestrial and karst habitats and includes flooded and occasionally flooded meadows, canals, streams and springs which together support a number of endemic or otherwise notable species considered unique in the central region of Montenegro** (Ikovic, 2017). Both the aquatic/semi-aquatic habitats and the drier karst/ meadow areas are considered ecologically important with the Karst elevations (not exposed to flooding) considered to be particularly important wintering places for amphibians and reptiles. A range of habitats have been recorded within 150m of the centreline of the existing road in this area, including rivers and river vegetation, *Phragmites* reed beds and dry and seasonally wet meadows. Detailed habitat maps of these areas will be prepared and provided as an update to this F-BAP along with the results of additional site biodiversity surveys proposed for later in 2019/2020.

Existing habitats within the site (and the existing road) are shown in the figure below and impacts are addressed in the next section.

The site also includes the **Mareza River,** a small canalised tributary of the Morača that is partly ephemeral in nature and which is crossed by the scheme alongside the Sitnica at Podgorica. (See next action plan for the Sitnica River itself).

The Mareza near the road and within the Protected Area

The Mareza channel has been identified as Critical Habitat for two IUCN Endangered freshwater snails endemic to the Lake Skadar basin namely:

- ***Valvata montenegrina*** Glöer & Pešić, 2008 (recorded at the Mareza and Komanski Bridges). The species is endemic to the Lake Skadar basin, where it is known from several closely located sites including the river Mareza drainage (canals and pools), but also from a few sites at the vicinity of the Skadar Lake, i.e., Podhum and Karuc spring (Glöer & Pešić 2008). The population from Mareza (which is the **locus typicus**) is considered the most abundant and the snail inhabit lentic parts with a muddy substratum and aquatic vegetation. This species is listed as Endangered by IUCN (see Pešić 2010). Habitat destruction is a key threat for populations of this species and no excavated material, and/or waste material should be deposited in or within 15m of the water habitats where this species lives.

- ***Radix skutaris*** Glöer & Pešić, 2008: (recorded at the Mareza, Komanski and Matica bridges. The species is also endemic to Montenegro, where it is known from a number of sites located in the Lake Skadar basin (Glöer & Pešić 2008). Similarly to *Valvata montenegrina*, *Radix skutaris* inhabits also lentic parts with a muddy substratum and aquatic vegetation. This species is listed as Endangered by IUCN (see Pešić 2010). Habitat destruction is a key threat for populations of this species and any changes to the banks and aquatic habitats during reconstruction of bridges across the rivers (Mareza, Sitnica, Matica, Sušica) must be carefully planned.

A number of other endemic snails have also been recorded during the surveys at one or more of the Komanski, Mareza and Matica bridges, namely:

- *Stagnicola montenegrinus* (NT) Glöer & Pešić, 2009,
- *Viviparus mamillatus* (DD) (Küster, 1852)
- *Bithynia radomani* LC Glöer & Pešić, 2009,
- *Radomaniola curta* (LC Küster, 1853) and
- *Laurogammarus scutariensis* (Schaferna 1922).

3.2 Potential Project Impacts

The proposed Project is expected to result in the loss of some 10.2 ha of natural habitat, of which just under 20% is expected to be within the "Mareza source" protected site. This includes (at worst-case) direct impacts to up to:

- 0.9 ha of *Phragmites* beds with or without normally standing water (up to 0.8ha)
- 0.4 ha of seasonally wet and wet grasslands/flood swards
- 0.6 ha of degraded wetland habitats.

The project also has the potential to adversely affect the quality of local watercourses during both construction and operation (although during operations this will be addressed to some extent through the inclusion of specific pollution prevention technology within the Project drainage

design). Given its small volume and canalised nature the Mareza channel is considered at particular risk. Loss of any lentic parts of the watercourses and/or wetland areas (especially between Matica Bridge and Luznica hill) could significantly affect the populations of the notable endemic gastropods. Storage of excavated soil or other material near watercourses, or its deposition into aquatic/semiaquatic habitats, as well as emission of dust and other pollutants and waste during construction could also further endanger these species but will be managed through the ESMPs.

Habitat degradation could also result from the proposed reconstruction of the bridges across the Rivers Mareza, Sitnica, Matica, and Sušica or where the road crosses streams such as the Crkovnica. This is addressed in the following section and in the Project ESMP.

3.3 Objectives of the Plan

This plan is designed to ensure that the Project has no adverse effects on the conservation value of the "Mareza source with Sitnica and area of Velje Brdo" protected area, and preferably a net benefit for its long-term conservation. In addition it specifically seeks to ensure no adverse impacts on the found within the protected area, notably the endemic snails found within the Mareza channel for which a net conservation gain is required.

3.4 Activities to be Undertaken

To achieve these objectives the following activities are proposed:

Minimisation of impact footprint within the designated site.	Activities within and around the designated site will be minimised and particular care will be taken to avoid impacts here. No laydown areas or camps will be allowed in the area, working areas will be clearly marked and contractors will be fully informed as to the sensitivity of the site in general and of the watercourses in particular. Pollution prevention measures will be strictly applied.
Support with the official designation of the site:	Detailed ecological surveys have not yet been done for this site and its boundaries have not yet been determined. The Project will therefore proactively support additional and seasonally relevant surveys of the mosaic of wetland and meadow habitats present including additional survey work in 2019/2020.
Support with maintenance of the site	This site is regularly used by local hunters for shooting, but the site visit indicated that the wetlands of greatest ecological (and social) value appear to be drying out, in part through natural colonisation of the area with *Salix*. The presence of contractors on site provides an opportunity to reverse this trend by removal of encroaching willow and re-creation of traditional cattle "puddling" in wetter areas using machinery. The project will work with the Podgorica Authorities to develop and implement a proactive management plan to address the long-term conservation of the site using such approaches. This will be used to ensure no-net loss of affected habitats from the scheme.
Specific monitoring and management of endemic snails.	The project will work with national experts to specifically develop and implement a management plan in the area in general and Mareza channel in particular to support the long-term conservation of the endemic freshwater snails. This will include monitoring of both snails populations and local water quality as well as proactive actions to support the long-term conservation of the species.
Other River Conservation	Conservation actions for other rivers (ie the Sitnica) are included in the next Action Plan.

3.5 Additional Studies and Monitoring

Further work will be carried out in 2019/20 to refine the information outlined above. In particular and given that the populations of *Valvata montenegrina* at the Mareza region are the most abundant (core population) and that numbers in other known sites are much lower, the two sites on the Mareza and Sitnica Rivers where the species has been found will be monitored on a regular basis.

Radix skutaris is more abundant and frequent in the study area (Pešić unpublished) but this species is listed as Endangered by IUCN and all the localities where this species has been found on the project affected rivers will also be selected for monitoring of this species.

Monitoring of both species, along with monitoring of restored habitat within the protected area, will continue for a minimum of five years after the works are completed.

3.6 References

A range of references is available for local gastropods as outlined in the ESIA.

3.7 Summary

	Action Plan for site" Mareza source with Sitnica and area of Velje Brdo"			
Approach	Avoid	Reduce	Mitigate	Offset
Objectives	No net-loss in area (or quality) of habitats of conservation value in the site as a result of Project activities. Specific protection of notable species in particular endemic snails.			
Location	Within the area marked on the map as the proposed site (tbc)			
Potential Impacts	Direct loss of habitats from works, loss of notable species through changes in water quality. Opportunities for additional habitat restoration whilst work is ongoing.			
Summary of Approach	The project will primarily avoid impacts to this habitat, through the use of the ECoW to demarcate areas of particular sensitivity. Whilst up to 1.9ha of the habitat mosaic may be lost to the scheme; additional habitat will be created within the project footprint here to supplement any lost. Additional measures will also put in place to reverse current habitat succession and specific approaches will be put in place for notable species, especially endemic snails.			
Monitoring	Any habitat that is translocated or recreated will be monitored throughout the EPC warranty period and over at least a 5-year period to ensure that it survives. Monitoring will be conducted by both the ECoW as well as the Owners Engineer. A specific monitoring plan will be put in place for notable species including snails.			
Responsibility	Contractor ECoW to undertake pre-clearance surveys, clearly demarcate sensitive areas and supervise any translocation/restoration works to be undertaken as early as practical within the construction schedule. Owners Engineer to update F-BAP and manage additional studies as well as supervise contractor. Gastropod monitoring to be subcontracted to specialist.			
Timing	Additional surveys to start in 2019/20 and continue during and post construction including a 5-year post planting monitoring period.			

4. Action Plan for the Susica, Matica and Sitnica Rivers

4.1 Current Status

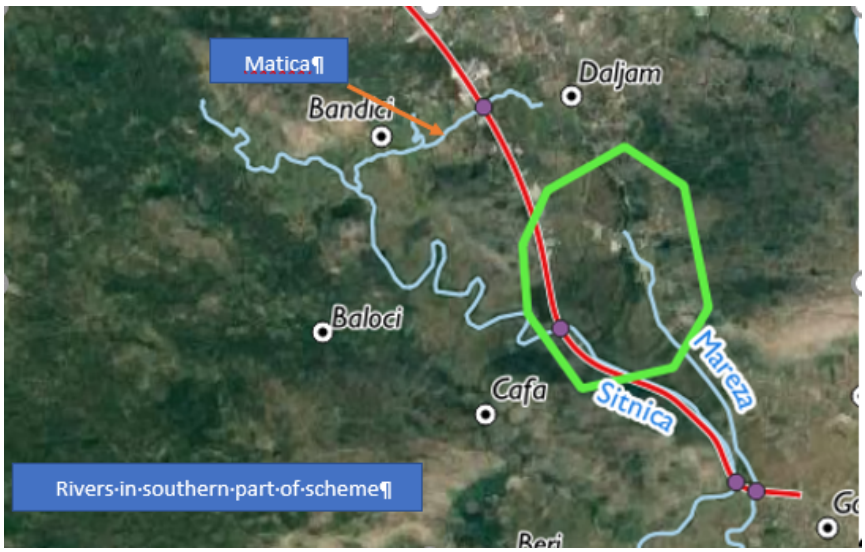
Overview

Overall some 2.5ha of watercourses will be affected at least to some extent by the proposed project. Given the sensitivity of the watercourses in the area, and their importance for a broad range of flora and fauna, (including endemic species) all of the affected watercourses are considered as PBF habitat. The following sections provide a brief summary of the watercourses, with additional information provided within the main ESIA report.

In the northern part of the scheme, the major watercourse is the River Susica, and its tributaries. (The Susica itself is the largest tributary of the River Zeta). The river has highly variable flows - its name "Susica" means "river that dries up" – and after periods of high rainfall (typically November - April) or snow melt (April -June) it can cause extensive local flooding. Even during the summer, when the watercourse is predominantly dry, some areas do retain pools, and these are considered to be of greater ecological value. The river and its tributaries are ***crossed twice in the north of the scheme.***

Figure 1 - NATURA 2000 habitat along Susica River

In the southern part of the scheme the main rivers are the Matica and the Sitnica that it flows into, as shown in the figure below



The **Matica** arises from a number of karst springs located near to the village of Bandici and is also joined by a number of small tributaries in its upper reaches. The river flows year-round with flow volumes increasing until the confluence with the **River Sitnica**. It is heavily vegetated on both banks as shown below.

·Slim·sledge·(Carex·acuta)·in·marsh·near·Matica·bridge¶

The Sitnica River is considered of particular geological importance as it has year-round flow and as such provides important habitat for a wide range of species. This includes the endemic Albanian water frog (*Pelophylax shqipericus – EN* – see later action plan*)* and endemic water snails (see previous plan). It also provides possible otter habitat (see later).

Further surveys are needed to better determine species present in this river, and notable habitats recorded in and around the Matica are shown in the following table.

Species and habitats recorded in and around the rivers Matica and Sitnica

Habitat	Representative Communities
3150: Natural eutrophic lakes with *Magnopotamion* & *Hydrocharition* vegetation	Present in and around **Matica River,** this is a common type of habitat in Montenegro with free-floating surface plant communities (*Nymphaeoalbae-Nupharetumn luteae, Potamogetonetum denso-nodosi, Potamogetonetum lucentis*) Dominant species include (*Nymphaea alba, Nuphar lutea, Potamogeton nodosus, Potamogeton lucens*).
92A0: *Salix alba and Populus alba* galleries	Found along the **Matica, Sušica, Crkovnica Rivers,** small streams and drainage channels. Communities are dominated by *Fraxinus angustifolia* and *Salix alba* (with fragments of *Salicetum albae*). Other species include: • **trees:** *Ulmus glabra, Quercus robur, Ficus carica, Morus alba;* • **shrubs***: Rubus idaeus, Cornus sanguinea, Clematis viticela, Hedera helix; and* • **herbs:** *Lysimachia nummularia, Agrostis alba, Iris pseudacorus, Cardaminae mathiolii, Cyperus sp, Lychnis flos cuculi, Mentha aquatica, Lysimachia vulgaris, Leucojum aestivum, Sparganium erectum, Oenanthe aquatica, Veronica anagallis-aquatica, Aristolochia rotunda, Alisma plantago-aquatica, Rumex conglomeratus, Asparagus tenuifolius, Galium palustre, Carex otrubae, Plantago intermedia, Picris hieracioides.*
C3.21: *Phragmites* beds	Found in places on both banks of the **Matica River,** the community is dominated by *Phragmites australis and Scirpus lacustris* and is an important habitat for fish, amphibians and birds.
C3.22: *Scirpus lacustris* beds	Found along to the **Matica River,** this habitat is completely dominated by *Scirpus lacustris.*
D5.11: (*Phragmites*) beds normally without free-standing water	Located on both sides of the road around 100 m from the bridge on **Matica River,** the habitat is dominated by *Phragmites australis and* also supports *Phragmites australis; Salix alba; Salix purpurea; Cyperus longus, Clematis viticela, Galium palustre, Lychnis flos cuculi, Oenanthe fistulosa, Agrostis castellana, Taraxacum palustre, Rumex conglomeratus, Trifolium fragiferum, Carex otrubae, Knautia integrifolia & Myosotis scorpioides.*
3260 Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho Batrachion*	Found in the **Sitnica River** (close to the Komanski most bridge) and characterised by submerged or floating *Callitricho Batrachion* (low water level or dry during summer) with *Ranunculus trichophyllus*. Other species include *Ranunculus trichophyllus, Myosotis scorpioides, Fontinalis antipyretica, Mentha aquatica, Potamogeton lucens* and *Alisma lanceolatum.* It is probably a relatively common habitat in Montenegro, but information about its distribution is limited.

The **River Sitnica** is a tributary of the Morača but whilst the Matica and Moraca flow year round the Sitnica (at Komanski Most) is an intermittent river that can dry up in the summer months.

This river is crossed by the scheme below Cafa and the road then runs alongside the river to Podgorica.

92A0 - *Salix alba* and *Populus alba* galleries (Sušica River

Sampling at Komanski Most site, Sitnica River

Watercourse with *Ranunculion fluitantis* and Callitricho-*Batrachion* (Komanski bridge)

As described in the previous plan, the rivers are of note for **Endemic freshwater snails** recorded around the Komanski bridge including Valvata montenegrina (EN); Radix skutaris (EN); Stagnicola montenegrinus (NT); Viviparus mamillatus (DD) and Bithynia radomani (LC)

Fish

The Podgorica BAP highlights the importance of a number of rivers in the area for notable fish. These include the Moraca (both as it passes through Podgorica and further upstream), and the Zeta, but also **River Matica and two of its tributaries near Bandići**. All of these river sectors are characterized by relatively good environmental conditions and habitats that are suitable for spawning and development of juveniles of notable fish species.

As part of the Project ESIA specific surveys were undertaken at the four main bridge locations, ie the Mareza bridge on the **Mareza river**; Komanski bridge on the **Sitnica river**; Matica bridge on the **Matica river** and Susica bridge on the **Susica river**. During the surveys only 9 species of fish were recorded, all of which were common, but this may reflect the survey techniques used and the season of sampling. Species recorded, including endemics, are shown in the table below.

Fish species caught during the initial survey

Species	Endemic	IUCN RDB	Where detected
Cobitis ohridana	Ohrid – Drim- Skadar	LC	Matica, Sitnica, Sušica
Barbatula zetensis		LC	Matica
Rutilus prespensis	Ohrid – Drim- Skadar	LC	Matica, Sušica, Sitnica
Squalius platyceps	Ohrid – Drim- Skadar	LC	Matica, Sušica, Sitnica
Telestes montenigrinus	Skadar	LC	Matica, Sitnica
Gobio skadarensis	Skadar	LC	Matica, Sitnica
Cyprinus carpio		LC	Matica, Sitnica
Carassius gibelio		LC	Matica, Sitnica
Pachychilon pictum		LC	Matica, Sitnica, Sušica

No salmonid species or eels were recorded during the surveys, but IBAT records indicate that a number of these species may be present locally, including the endangered *Salmo obtusirostris zetensis* and critically endangered *Anguilla* (see below). Other species include *Salmo faroides (Not evaluated); Salmo marmoratus (LC); Scardinius knezevici (LC*, Endemic*), Alburnus scoranza (LC)* and *Alburnoides ohridanus (LC)*.

The **Matica**, **Sitnica** and **Susica** are reported by fishermen as being used by salmonids as their prey (fish species, smaller aquatic animals, spawn, crayfish, etc) are commonly encountered. Salmonids have been reported to breed in the upper streams of these rivers during the winter months (November until January) whilst Cyprinid species are recorded breeding from mid-March until mid-June. Local fishermen further indicated that low levels of fish stock may be a direct consequence of electrofishing (or other prohibited techniques) or that weather conditions may not have been appropriate to make the fish "active". Of these species the most notable recorded in the wider areas are:

- **Soft-mouthed trout *Salmo obtusirostris zetensis* (EN)** This is the only legally protected fish species in Montenegro and is restricted to Adriatic Rivers. It has only been recorded in

the Krka (very rare), Jadro, Neretva, and Zeta river basins[3]. It is threatened by overfishing (sportfishing and for food) and hybridisation with introduced trout. It is not expected to be found in the rivers in the project area but further surveys are needed to confirm this.

- **European eel *Anguilla anguilla* (CR).** This is an IUCN Critically Endangered species, which has typically been found across much of Europe, although since the early 1980s, a steady and almost continent wide decline of around 90% has been observed in the recruitment of glass juvenile eels. Records indicate that this species has been present historically locally but it has not been recorded in recent years and is not expected to be identified in rivers in the project area now, although further surveys are required to confirm this.

Local fish (and especially the trout) have been badly affected in recent years by poaching. Local fisheries management is poorly funded and policed and this is not helped by local markets for these species. There is also a low level of knowledge about the importance of preserving these fish species, including their potential for supporting fishing tourism.

Indeed the regional BAP states that "*Unfortunately, we have to conclude that the Morača and the Zeta rivers currently have a fish fauna composition that only reminds us of the formerly well-known state and that in a good part of these two rivers (in terms of fish fauna) are literally cleared of noble species*".

Other species

A number of other notable species are associated with the Rivers. These include **endemic gastropods** (see previous section) **otters and bats** (see following sections) and potentially **White-clawed crayfish** *Austropotamobius pallipes* (EN) that has been recorded in the broader area. In the last ten years the crayfish is suspected to have undergone a decline of somewhere between 50–80%, largely attributed to the introduced Signal and Red Swamp Crayfish and the crayfish plague they carry. It has previously been recorded from the Zeta River but not the project-affected rivers, although further surveys are needed to confirm this.

4.2 Potential Project Impacts

The proposed Project is going to result in the loss of some 10.2 ha of natural habitat in total of which a limited amount is expected to be within and around the rivers described above. This includes up to:

- 0.02 ha of mesotrophic vegetation of slow-flowing rivers
- 0.8 ha of *Phragmites* beds with or without normally standing water
- 0.11 ha of *Salix alba* galleries

[3] Note that the Zeta Stream KBA is not expected to be adversely affected by the project

Some small areas of connecting woodland near rivers may also be affected as described in the ESIA.

With regards impacts on fish and aquatic invertebrates, impacts during construction may include the following:

- temporary and permanent loss of aquatic habitats, including riverbank habitat.
- impacts on water quality due to changes of morphology and pollution (including turbidity).
- disturbance by noise and vibration.
- inadvertent introduction of invasive alien plant and animal species.
- degradation of the existing habitats as a result of changes in hydrodynamic conditions.
- Accidental spillage of harmful chemical substances into the environment
- Loss of connectivity between the upstream and downstream habitats.
- Degradation of the flood zone and the surrounding vegetation from the Matica Bridge to Komanski Bridge.

Whilst such impacts are generally expected to be local and temporary in nature (with natural regeneration expected once works cease) impacts that could affect notable species are considered of greater importance. This is particularly the case during the breeding season when spawn and fingerlings are particularly susceptible to pollution, silt deposition and activities that affect water velocity, oxygen levels, and temperature. If temperatures increase (e.g. as a result of shallower water) premature hatching may occur at the time when other conditions, primarily conditions related to feeding, are not satisfactory.

During operation fish and invertebrates may also suffer from decreases in water quality associated with road run-off (e.g. downstream from the bridges) as well impacts arising as a result of loss of connectivity between upstream and downstream habitats. Any impact on water quality could also affect fish stock including impacts affecting places for hatching and laying eggs as a result in changes to the riverbed following bridge construction. Increased water turbidity can adversely affect light levels, oxygen dissolution, water temperature, and availability of food, and can led to suffocation of fish eggs and fry. Increased pH can also lead to a more pronounced effect of toxicity of many metals, aluminium, cadmium, zinc, iron and copper etc which can lead to morphological changes, slow down the spawning process and development of fertilized eggs, and increase the mortality of embryos and fish larvae.

4.3 Objectives of the Plan

This plan is designed to ensure that the Project has no net impact on the conservation value of the **Rivers Sitnica, Matica and Susica** and their tributaries, as well as the Mareza where this has not been addressed in the previous plan. In addition, it specifically seeks to ensure no adverse impacts on the notable fish (and potentially crayfish) found within the rivers, including the two fish species and the crayfish for which (if present) a net conservation gain is required.

4.4 Activities to be Undertaken

A range of specific mitigation measures is proposed in the ESIA to protect the rivers, their in-river and bankside vegetation and the fish and invertebrates that they support. These include the following, which will be further elaborated in the EPC contractors CESMP and will be overseen by the ECoW:

- Minimisation of working areas near watercourses, and specific attention to be paid to pollution prevention near these sensitive areas.

- Bridge works to be undertaken in the dry season (mid-June-mid October) to minimise in channel activity when water is flowing (even in the dry season pollution is to be avoided though so it does not get flushed down river with the first waters).
- Provision of temporary site drainage channels to avoid erosion and environmental impacts.
- Wastewater treatment should be carried out via the system for additional treatment and drainage, which operates through the precipitator and separator.
- Minimise impacts associated with turbidity through use of appropriate sediment trap.s
- Avoid accidental pollution of watercourses (spills of oil, lubricants or oil derivatives into the watercourses).
- Any habitat lost will be replaced using a 3:1 planting ratio for any trees removed.

National legislation also requires provision of conditions for fish migration to ensure that mature fish can migrate up-river during winter for spawning. Works should particularly occur outside of the key wet season of November-February and at all such times fish should be able to pass up permanent rivers. "Pool" fish ladders may need to be constructed at Komanski Bridge and Matica Bridge (to be advised by ECoW), but such a fish ladder is not expected to be required at Susica Bridge as there is no water running under the bridges in the summer.

In addition, during construction and for a period of 3 years after completion of the road works, the Project will;

- undertake additional monitoring for notable species in the affected rivers (see below);
- work with the authorities to improve management of fisheries resources in the affected rivers; and
- work with the community to raise local awareness of the importance of preserving these fish species, including their potential for supporting fishing tourism.

No specific mitigation is required for the operational phase, over and above maintenance of pollution control measures. The construction area will be subject to rehabilitation to ensure that vegetation is restored to its original condition.

4.5 Additional Studies and Monitoring

Further work in 2019/20 will be carried out to refine the information above, to include specific monitoring of fish populations and water quality (e.g. through invertebrate surveys). This will include specific surveys for eel, soft-mouthed trout and white-clawed crayfish. Consideration will be given to supplementing existing fish stocks if monitoring indicates long-term impacts on fish populations (important otter food) as a result of the project. Monitoring will continue for 3 years post project completion. This will include monitoring of areas of restored habitat.

4.6 Summary

	Action Plan for Fish			
Approach	Avoid	Reduce	Mitigate	Offset
Objectives	No reduction in habitat or water quality in the rivers. No impacts on fish diversity or populations			
Location	Rivers Sitnica, Matica, Mareza and Susica and their tributaries.			
Potential Impacts	Loss/deterioration of habitat and water pollution. Mortality of fish and invertebrates.			
Summary of Approach	The project will seek to reduce impacts to riverine habitats and the animals they support (including fish) as far as practical. Works within the river will be managed carefully to avoid pollution and undertaken at less sensitive times of year. Monitoring will be used to inform an adaptive management approach to supporting local fish populations.			
Monitoring	Habitat recreation and fish numbers will be monitored for 3 years post commencement of operations and will inform an adaptive management approach to any additional mitigation.			
Responsibility	Contractor ECoW to supervise in-river and habitat restoration works. OE to agree timing of works and monitor contactor.			
Timing	Throughout construction and for 3 years after.			

5. Action Plan for Otter

5.1 Current Status

The Eurasian Otter (*Lutra Lutra*) is an IUCN LC species but a nationally uncommon and Habitats Directive Annex II species. The species is recovering in some parts of its range but remains in decline in others, associated with loss of fish stocks, habitat destruction (removal of bankside vegetation), and persecution.

Otters prefer relatively undisturbed and vegetated areas along rivers and streams and breed using holes in the riverbank, cavities among tree roots, piles of rock, wood or debris for this. Most otter activity is found in a narrow strip along the water's edge but they may be found up to 1km away from water.

A natural otter holt in tree roots

There has been no direct evidence of otters in the project area to date but no specific surveys have been undertaken to date. They are recorded in IBAT and have also been recorded from the nearby Lake Skadar from which they are likely to travel up the permanent rivers following their main food source, fish. The Project is therefore adopting a precautionary approach for this species and it is assumed that the species could be present in areas with suitable bankside vegetation. This is especially so as otters have large home ranges and may travel over 20 kilometers.

Otters are highly territorial and territories can stretch for several kilometres dependent upon the availability of food. Territories of males tend to be larger than those of females and may overlap with those of several females. Otters use droppings (spraints) to mark their home ranges, which are often left on in-stream boulders, bridge footings and grass tussocks. Otters also use resting sites (couches) and underground denning sites (holts) which maybe up to 1km from the nearest water. An individual otter may utilise a number of holts, which are generally located in natural crevices, or the roots of trees growing along river and lake banks, and they may use burrows made by other animals. Other resting sites are also used, frequently in dense vegetation and may be associated with frequently used runs and slides into the water.

Otters are vulnerable to removal of bank side vegetation, and persecution due to perceived depredation on fish. They are also at risk from pollution from organochlorines, polychlorinated

biphenyls and mercury. Fish typically makes up over 80% of their diet, but may be supplemented with aquatic insects, reptiles, amphibians, birds, small mammals, and crustaceans.

5.2 Potential Project Impacts

Road construction can have a number of potential impacts on otters including:

- **Disturbance.** Given the secretive nature of otters (especially near holts and couches) they are very sensitive to disturbance. Impacts are particularly severe during the breeding season when the cubs may remain in the holt for up to 10 weeks.
- **Accidents.** Otters are nocturnal but also inquisitive animals. They may be attracted at night onto construction sites and can become trapped in pits, piping or other equipment.
- **Water Pollution.** Water pollution can affect both otters and their food supply, e.g. through increased sediment loads or accidental spillages which can have both acute and chronic effects. Hydrocarbons spills can also affect the thermo-regulation qualities of otter's coats.
- **Disruption of home ranges.** Severance or disturbance of an otter's home range can cause it to relocate, placing it in direct competition with other otters. Otters are capable of inflicting serious and potentially fatal injuries on each other during disputes over territory.

During road operations, otters could be subject to the following impacts:

- **Disturbance** from traffic noise and road lighting. Whilst otter may become accustomed to these impacts over time, they could abandon any holts or couches in the immediate vicinity of the scheme.
- **Direct mortality** of otters from drowning in culverts or road traffic accidents. As nocturnal animals they can also be particularly susceptible to night time accidents.
- **Severance of commuting routes and home ranges.** Roads can divide otter home ranges, leading them to either abandon parts or make frequent road crossings, with associated risk of accident.
- **Impacts from water pollution**
- Increased access to otter habitat, increasing risks of **illegal hunting**.

5.3 Objectives of the Plan

This plan is intended to 1) assess the potential for otters to be present in and around the Rivers Sitnica, Matica, Mareza and Susica and their tributaries within the Project affected area and 2) ensure that should otters be present the project has no adverse impacts on this notable species.

5.4 Activities to be Undertaken

Pre construction surveys

Prior to the work commencing additional surveys will be undertaken for otters in the affected areas to determine the need or otherwise for additional mitigation to be put in place.

Design and construction Mitigation (EPC)

The following approaches will be applied near any watercourses as a precautionary measure in case otters are present:

- **Awareness Raising**. Contractors will be provided with an overview of otter ecology prior to works commencing. Any holts and couches identified will be highlighted to contractors in

confidence to ensure that they are not accidentally disturbed and marked so that contractors must not enter.

- **Works in or near rivers** and streams will be minimized and bridge work will be undertaken in the dry season wherever practical to minimize damage to river and stream banks. If mature trees along riverbanks need to be removed, the root systems will be retained where practical to provide potential holt sites. During construction of bridges and other structures near watercourses, one side of the river or stream being bridged will be retained intact for as long as possible to provide safe access, and the area around the water course to be disturbed will be minimised by the provision of temporary barriers and safe working areas.
- **Avoidance night works** (one hour after sunset to one hour before sunrise) where the scheme comes within 30m of a holt/couch or watercourse in order to prevent disturbance to otter and their routines. If **lighting** is used it will be shone away from the river during construction at dusk or in the morning. If needed in the river it should use shrouding to ensure that not all the river is lit up and passage along it is still possible in unlit locations.
- **Avoidance of Water Pollution**. Impacts associated with water pollution will be avoided and mitigated using good construction practices as outlined within the ESIA and associated EMP.

Further mitigation actions are provided in the following table. In addition, the following mitigation will be provided should otters be found to be present.

- **Locating activities away from known otter habitat**, including siting of works compounds, spoil storage and disposal, construction of embankments, access roads, and building of bridges and culverts.
- **Provision of safe commuting routes**. As otters will continue to try and use commuting routes, where otter commuting routes cannot be avoided, fencing will be used to guide otter to safe routes through working areas. Buffers of 30m will be left from watercourses where practical to avoid affecting otter commuting routes.
- **Specific Protection for Holts and Couches.** If a holt or couch is discovered during construction, an exclusion zone of 30m will be established and all works within it suspended. If an occupied breeding site is found, it may require the cessation of work for up to 10 weeks until cubs are mobile and able to leave the area.
- **Use of underpasses.** Temporary or permanent otter underpasses will be provided if they are found to be required (e.g. for site access and haul roads) with a minimum internal diameter of 600mm.

Otter Mitigation Strategy

Sources of Impact	GIP Construction Mitigation	Bespoke Construction Mitigation	Design and Operational Mitigation
Direct Mortality			
Otters are inquisitive animals and may be attracted onto construction sites to investigate machinery or spoil heaps. As a result they can become trapped in pits, piping, chemical containers, wire mesh etc. As nocturnal animals they can also be particularly susceptible to night time accidents. They are also particularly susceptible to Road Traffic Accidents (RTAs) during project operation.	Holes/pits will be covered at night or mammal ramps positioned to allow any trapped animals to escape. Night working will not be permitted where the proposed scheme comes within 30m of any watercourse in which otters may be present to reduce the risk of otters being run over by construction traffic.	Otters to be excluded from dangerous areas by erecting temporary otter proof fencing where they are present (whilst avoiding otter commuting routes). Fencing may be e.g. chestnut paling fence with stakes at 25mm gaps or stiff plastic mesh that otters cannot scale. Temporary fencing to be positioned to guide otter to safe routes through the working areas. This may include underpasses for site access and haul roads, (minimum internal diameter > 600mm)	Construct watercourse crossings to enable safe passage of otters. All bridges or buried structures will have sufficient space between the abutments and the watercourse to enable otter to pass safely during high water levels. Provision will be made for otters to gain access to the water at such structures and ledges will be incorporated in the bridge design as appropriate. The proposed scheme is not expected to cross any smaller watercourses at grade. Should this change, and otters be considered likely to be present, continued access along the watercourse would be maintained through the use of appropriate culverts[4].
Habitat Loss and Fragmentation			
Otters are secretive, and holts and couches are particularly important. Each otter knows where shelter is available in its home range. Loss of holts and other lying-up sites require animals to travel further to find suitable cover. Habitat loss results from direct land take, siting	Compounds etc to be sited at least 30m away from watercourses and to avoid nearby areas of woodland, dense scrub and/or wetland. After temporary loss habitat to be returned to its former quality or	Consider planting of trees such as willow, oak and ash along riverbanks and encouraging dense scrub nearby. Fence-off overgrazed areas of land near watercourses to encourage vegetation growth. Where mature trees along riverbanks need to be removed, retain the root systems, where practical, to provide potential holt sites.	Construct bridges and culverts where the road dissects watercourses to allow safe passage of otters during spate conditions (presence to be confirmed by the ECoW). Should extensive stretches of road be fenced, install dry underpasses to enable otters to move between

[4] Depressed invert box culverts are typically used as they do not fill as rapidly as cylindrical culverts, which helps swimming otters. Culverts should be fitted with dry ledges that are accessible during high water levels. These should be made of solid concrete and integral with the culvert, 500mm wide and accessible both from the bank and the water by the provision of ramps or groups of large boulders. Ledges should be sited at least 150mm above the appropriate high flood level, allowing 600mm headroom. Where appropriate otters can be guided to the ledge by planting dense scrub on the opposite bank or providing the ledge on the appropriate side of the culvert. Further surveys will be undertaken prior to the construction of culverts should they be needed.

Sources of Impact	GIP Construction Mitigation	Bespoke Construction Mitigation	Design and Operational Mitigation
of works compounds and material (including spoil), excavation of cuttings, construction of embankments and access roads, and building of bridges and culverts. Impacts will be greatest where construction requires diversion and re-alignment of watercourses.	better (habitat creation for other species groups will also support otter where close to water bodies). Reinstate any realigned sections of watercourses to as near natural as possible or create new channels with meanders and riparian planting.	Where works result in damage to river and stream banks, protected them e.g. by piling large concrete blocks to create attractive cavities for otters (in areas where the safety of otter can be assured by restricting their access to the carriageway).	habitats.
Habitat Fragmentation			
Works/the road may prevent otter from moving freely within and between existing areas of habitat. Culverts may act as a barrier to migratory fish movements and this could affect e.g. salmonid populations. The scheme could divide otter home ranges, leading them to either abandon parts or make frequent road crossings, increasing the risk of accidents. Severance of an otter's home range can also place it in direct competition with other otter, and otter are capable of inflicting serious and potentially fatal injuries on each other during disputes over territory.		Install temporary or permanent otter underpasses if required (e.g. under access roads). During construction of bridges and other structures one side of the river or stream being bridged will remain intact for as long as possible to provide safe access, and the anticipated disturbed area around the water course will be minimised by the provision of temporary barriers and safe working areas. In addition, if lighting is used, it should be shone away from the river during construction at dusk or in the morning. If lighting is needed in the river it should use shrouding to ensure that not all the river is lit up, allowing safe passage along the river in unlit locations.	
Disturbance			
Includes physical disturbance, noise and light as well as possible obstruction of holts and otter pathways.	Appropriate siting of construction compounds and/or storage sites to minimise such impacts.	Provide relevant contractors with an overview of otter ecology prior to works commencing. Any holts and couches will be identified to contractors in confidence, to ensure that they are not accidentally disturbed, and marked so that contractors must not enter. This is so that the location of holts and couches is not made public, which could leave them susceptible to hunting. Site clearance must be preceded by a thorough survey of the area for holts, couches and otter, and once completed working areas in suitable habitats must be fenced to prevent otter returning. If a holt or couch is discovered during construction, an exclusion zone of 30m must be established and all works suspended. If an occupied breeding site is found, it may lead to	During the operational phase, otter would be likely to suffer disturbance from traffic noise as well as from road lighting. Otter may become accustomed to these impacts over time but could abandon any holts or couches in the immediate vicinity of the scheme. Potential disturbance caused by the operation of the scheme will be partially mitigated through the planting of natural screens along the scheme, which will reduce noise and light disturbance to otter. Areas of lighting should be low where the operational scheme crosses or runs parallel to watercourses thus reducing disturbance to otters.

Sources of Impact	GIP Construction Mitigation	Bespoke Construction Mitigation	Design and Operational Mitigation
		the cessation of work for up to 10 weeks until cubs are mobile and able to leave the area. Night working (one hour after sunset to one hour before sunrise) will not be permitted where the scheme comes within 30m of a holt/couch or watercourse in order to prevent disturbance to otter and their routines.	
Pollution and Other Indirect Impacts			
Water pollution could create long-term damage to the productivity and diversity of nearby habitats, affecting both otters and their food supply. Local rivers already have seasonally high sediment loads but construction works (including gravel extraction and in-river works) can result in sediment deposition downstream. This can impact on both aquatic invertebrates and fish populations (and fish fry) that in turn would affect otter prey availability. Accidental spillages, e.g. from oil and diesel drums, would also impact on prey, and if chronic could lead to bio-accumulation of contaminants which could result in otter mortality. Pollutants such as oil and diesel can also affect water-regulation qualities of an otter's coat and cause mortality.	Contractors to adhere to pollution prevention GIP, as outlined in relevant guidelines on e.g.: Prevention of Water Pollution; Use and Design of Oil Separators; Works In, Near, or Liable to Affect Watercourses etc. Any chemical and oil storage tanks will be set back at least 10m from any watercourse and secondary containment must be provided. Construction vehicles will be prohibited from crossing watercourses used as breeding grounds by salmonid fish and silt traps will be installed as appropriate. Disturbance to streambeds will generally be kept to a minimum to prevent erosion and siltation. During both construction and operation pollution control measures will include installation of drainage systems to divert runoff into drains, soak-aways and detention basins to avoid contamination of watercourses. Detention basins should be fenced for health and safety purposes, which would also act to deter otters from gaining access and becoming trapped. Drainage systems should be grilled to prevent otter entering and becoming trapped.		Pollution from the operational road can be worst following storm water runoff or accidental spillage. Runoff may contain toxic compounds used in the manufacture of cars, including zinc, cadmium and copper, as well as Polychlorinated biphenyls (PCBs) Spillages occurring during the operational phase would have impacts similar to those from construction.

The following mitigation has also been included within the scheme design:

- **Appropriate and timely habitat restoration.** This will include planting of appropriate trees along riverbanks and encouraging dense scrub nearby, as well as fencing off of overgrazed areas near watercourses to encourage vegetation regrowth. Potential disturbance will also be partially mitigated by planting of natural screens in any areas identified as used by otters to reduce noise and light disturbance.
- **Use of sensitive lighting near watercourses.** Lighting will be reduced where practical where the operational scheme crosses or runs parallel to watercourses.
- **Construction of watercourse crossings to enable safe passage of otters.** Bridges or buried structures will be built with sufficient space between the abutments and the watercourse to enable otter to pass safely during high water levels. Provision will be made for otters to gain access to the water at such structures and ledges will be incorporated in the bridge design as appropriate.
- **Additional Habitat Creation**. It is possible to build artificial holts to attract otters to use certain areas. Artificial holts can be built to resemble natural holts, with a resting compartment and multiple entrances, which may be particularly important if natural bank side vegetation has been removed. The Project will consider the creation of artificial holts should this be required to ensure no net loss of conservation status of this species.

5.5 Additional Studies and Monitoring

Further work will be carried out in 2019/2020 to assess if otters are present in and around the affected rivers. Surveys will be undertaken when water levels are low and wet mud is exposed so paw prints can be seen more easily. Surveys will involve walkovers along the affected rivers and will be done by a suitably experienced surveyor. Evidence to be looked for will include spraints, tracks, feeding remains, otter slides, holts and couches. If any otter lying-up sites are found, mitigation will be adjusted as required. If any holts or couches being used for breeding are found all works in that area will need to be suspended until the cubs have left the holt/couch. Where otters are confirmed as present, annual post-construction monitoring is proposed for five years to confirm whether the mitigation measures have been effective or if any alterations and/or enhancements are necessary. Before construction commences the following additional work will be taken to specifically search for otters:

- **Specific surveys of all watercourses** will be undertaken within 100m of the alignment (both upstream and downstream) for signs of otters including holts and couches. If any otter lying-up sites are found, mitigation will be adjusted as required. **If breeding sites are found all works in that area will need to be suspended until the cubs have left.**
- **Pre-clearance surveys** will be conducted immediately prior to construction. For every river crossing or activity within a river there will be a pre-enabling dedicated survey to confirm absence of holts or other resting features within the direct zone of impact of the works. If features are found, exclusion of the features will be ensured prior to works commencing. During works within rivers, movement through the works area by otters will be permitted over the banks.

5.6 Action Plan Summary

Status	**Action Plan for Otters**			
Approach	Avoid	Reduce	Mitigate	Offset
Objectives	No net loss of otters by avoiding project impacts to known otter locations, improving understanding of the local otter population (size and distribution) and working with local NGOs and regulators to raise awareness and develop an otter conservation plan for this species.			
Location	River habitats in project area, notably the Matica and Sitnica Rivers.			
Potential Impacts	Otters may be present within the project area and are known to be vulnerable to a range of impacts within and around their river habitats. This includes removal of bankside vegetation and disturbance as well as impacts associated with changes to fish populations.			
Summary of Approach	Work will involve a mixture of additional surveys, implementation of mitigation as outlined above, additional habitat creation (if appropriate) and raising awareness.			
Monitoring	If otters are found to be present, seasonal monitoring is proposed for five years after construction commences to confirm whether the mitigation measures have been effective or if any alterations and/or enhancements are necessary.			
Responsibility	Owners Engineer responsible for resourcing and monitoring the work. Technical work to be contracted to an appropriate technical organisation.			
Timing	The initial work will be undertaken in 2019/2020. Further monitoring will be undertaken over a 5-year period from the start of project construction.			
Additional Information	There is considerable literature available on road scheme mitigation for otters.			

6. Action plan for Bats

6.1 Current Status

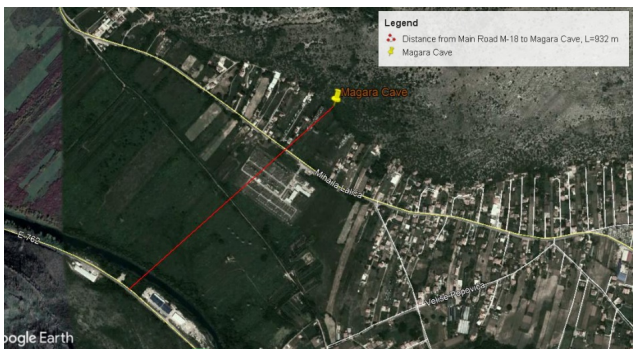
All Montenegrin bat species are protected under the Eurobats Convention. The karst habitats (and caves) of the Project area support roosting and hibernating colonies of several species including greater horseshoe bats (Habitats Directive Annex II). The table below shows the species recorded during the EIA surveys.

Bat Species Recorded from Local Area (HD – Habitats Directive)

Species name (English)	Species name (Latin)	Conservation status (IUCN)	Locality with coordinates
Greater horseshoe bat	*Rhinolophus ferrumequinum*	NT; HD Annex II & IV	Vilina pećina, Ćafa,
Lesser horseshoe bat	*Rhinolophus hipposideros*	NT;	Along the entire route, Vilina pećina, Ćafa
Kuhl's pipistrelle	*Pipistrellus kuhlii*	LC; HD Annex IV	Close to Susica, around lampposts, bushes in karst area along road, close to the Zeta River
Soprano pipistrelle	*Pipistrellus pygmaeus*	LC; HD Annex IV	Near Sušica river, along road around street lamps and shrubs in the karst, near Zeta River
Nathusius' pipistrelle	*Pipistrellus nathusii*	LC; HD Annex IV	Near Sušica river along the road around the streetlamps and shrubs in the karst
Whiskered bat	*Myotis mystacinus*	NT; HD Annex IV	Meadows along the route
Long-fingered bat	*Myotis capaccinii*	NT; HD Annex II & IV	Shrubs in the karst, near the Zeta River
Noctule	*Nyctalus noctula*	LC; HD Annex IV	Semi-swampy part of the bridge on Sitnica)

The karst scenery is considered particularly important for bats and the Magara Cave (located about 1km from the road) is considered a particularly important site. In 2006 the nationally uncommon Blasius' horseshoe bat (*Rhinolophus blasii*; IUCN VU in Europe) was recorded here, although following disturbance it has not been re-recorded here and is now only known from one location at Skadar Lake. Traces on the walls of the cave indicate that the Magara was once a shelter of large colonies of bat, but that they were destroyed some 20 years ago. It is therefore very urgent to take measures to preserve Magara Cave in order to restore these populations

The position of the Magara Cave in relation to the road M18



Six areas were noted as being of particular importance for mammals, including bats. These areas include the Komanski Bridge on **River Sitnica** (meadow and river banks) the **Matica River** Bridge and nearby areas of swamp and semi-marsh, Lužnica, the area between Novo Selo and Tomaševići and the **Sušici River** Bridge. A summary of the results of the transects is provided below.

Despite their protected status, national bat populations are declining due to habitat fragmentation, intensification of agriculture, and cave disturbance. The Podgorica biodiversity action plan highlights that the most important local habitats for bats are:

- the sparsely vegetated dry river beds;
- the sparsely grassed foothills with individual mature oak trees (Zelenika, Grbavci, Farmaci, Doljani, Malo and Velje brdo); and
- pastures concentrated mostly on the Cijevna river (also for small mammals) .

Urban green areas are mostly concentrated on the left bank of the Morača River and further work is needed to improve existing natural habitats in the urban core. The city also has very interesting underground facilities, which are important bat roots.

6.2 Potential Project Impacts

Road construction can affect local bat populations through a range of impacts including habitat loss, disturbance and direct mortality. Impacts associated with construction through areas of karst scenery, as well as disruption of wooded corridors are considered the greatest risks.

Operational roads can also have a number of significant effects on bat populations as outlined in the table below. Larger, fast-flying bat species adapted to foraging in the open appear to be less affected by roads. They typically fly high above the ground and have greater flight efficiency and speed, which means that even if diverted, the consequences are less likely to be important. Smaller, slower flying, woodland adapted species are more manoeuvrable but less efficient flyers. Woodland species are also more reluctant to fly in the open and tend to commute along linear features in the landscape such as tree lines, waterways, and woodland edges. These features provide protection from weather and predators, are sources of insect prey, and provide conspicuous acoustic and visual landmarks for orientation. The species most likely to be affected by roads are the slow-flying, woodland-adapted bats, such as *Rhinolophus* and some *Myotis* species and these have also suffered most from habitat loss.

The detrimental effects of artificial lighting will be reduced where practical by limiting unnecessary installations and using cut-off lighting. This is considered particularly important in areas commonly used by light-averse bats to forage, commute or roost during key times such as reproduction. Bats are also particularly faithful to maternity roosts due to the specific conditions they provide, and so conserving them is important for maintaining bat populations.

Impacts of Operational Roads on Bats

Issue	Effect
Habitat Loss	The proposed road development will involve the removal of trees and buildings that hold potential or actual bat roosts. Loss of trees, hedges, scrub, water bodies and unimproved ('natural') grassland also reduces available foraging habitat[5].
The Barrier Effect	Roads are potential barriers to flight between roosts and foraging sites and between summer mating locations and winter roosts. Bats have been shown to make major detours (with associated energy costs) to avoid roads or to find appropriate crossing points. This can also deny bats access to parts of their habitat, which can reduce home range size and quality and restrict migration. Roads may act as barriers because they interrupt existing linear flight lines because; some species are reluctant to cross open ground, some species avoid lit areas (road and vehicle lights) and, at least initially, because they represent sudden changes in the bats' familiar landscape. Roads may also fragment habitat, decreasing its area and quality. Impacts are however species specific. Studies in Germany have shown that Bechstein's bats (*Myotis bechsteinii*) will avoid crossing roads, whilst barbastelle bats, *Barbastella barbastellus* will fly over roads and Nyctalus species will cross busy roads at heights above 20 m. behaviour that is likely to make them less susceptible to the barrier effects of roads and to collision mortality. Others will use underpasses, if strategically located.
Direct Mortality	Bats that attempt to cross roads also risk collision and hotspots for mortality have been found where there is favourable habitat for bats and flyways cross roads. Although agile and manoeuvrable in flight, most bat species fly at low speeds (< 20 km/h) and many fly close to the ground (0-4 m) particularly when crossing open spaces. These behavioural traits make bats highly vulnerable to moving vehicles when either foraging along roads or when attempting to cross roads on commuting flights. Being small, it is likely that bats can be pulled into the slipstream of passing vehicles.
Light	Lighting tends to deter many bat species, notably slow-flying, woodland-adapted species such as Rhinolophus, Myotis and Plecotus, from approaching roads and probably exacerbates the barrier effect. Both high-pressure sodium and white LED light deter woodland-adapted species, even at low intensity.[6] As light intensity drops rapidly away from the source, effects of isolated sources are not likely to be far reaching, but large arrays of high intensity lights will have a significant effect. Light can also attract some bat species, in particular open-air foragers such as Nyctalus and generalists like Pipistrellus, since short wavelength light attracts insect prey, concentrating them around lights and increasing bat foraging efficiency, although they may also be at greater risk of collision with traffic.
Noise	Most insectivorous bats rely on echolocation calls to orientate, detect prey and communicate. Some also locate and capture prey by listening for sounds they generate (e.g. wing movements or mating calls). Traffic noise may mask all of these sounds and reduce the feeding efficiency of bats (eg *Myotis myotis*). It is likely that habitats adjacent to noisy roads would be unattractive as feeding areas for such species. Vehicle noise may also exacerbate the barrier effect, although noise effects are unlikely beyond 60m away.
Cumulative effects	Most of the factors discussed above are also cumulative. The effects of each factor individually need not therefore be great for the combination to have a profound effect on a bat population. Full effects, however, may not be seen for several decades and this has

[5] Road surfaces alone remove some 7 ha of habitat for every 10 km of 7 m wide, two-lane, single carriageway road. Roadside hard shoulders, verges, junctions, service areas and other structures remove additional potential habitat.

[6] (Stone et al. 2009, 2012).

Issue	Effect
	important implications for monitoring the effects of roads and assessing the effectiveness of mitigation. Data[7] indicates that the decline in diversity and abundance of bats extended to at least 1.6 km from a motorway.

6.3 Objectives of the Plan

The plan is intended to help ensure no net loss of bats conservation by avoiding project impacts to known bat roosts, nurseries and hibernaculae, improving understanding of the local bat population (size and distribution) and working with local NGOs and regulators to support local bat conservation. The work will involve a combination of additional studies, specifically to understand where roosts are located, avoidance of bat habitat where practical, and support for local research into bat populations. Any data obtained on bats will be shared with appropriate research/conservation organisations and regulatory bodies and used to inform regional conservation management strategies. Monitoring is proposed for three years after construction commences and this BAP will be updated based on the results obtained to help ensure that conservation objectives are met.

6.4 Activities to be Undertaken

The Project Construction Environmental Management Plan includes a range of construction mitigation measures, which are to be implemented under the direction of the Ecological Clerk of Works (ECoW) to minimize impacts to bats. These include the following:

- **Precautionary Approach.** Assuming that any potentially suitable nursery, hibernating or roosting sites (caves, houses, mature trees, rock fissures, etc.) within the Project area are important for bats unless cleared by the Project ECoW. If bats are found, the roost will be left undisturbed until vacated by bats.
- **Trees.** Any tree above 100mm in diameter to be checked by the ECoW for the potential of roosting bats prior to removal. If bats are found, the roost will be left undisturbed until vacated by bats. All felled trees with potential to support bats (i.e. with suitable cavities) to be left in situ (on the ground) for 24 hours to allow any bats to move. Where practical, avoid felling trees between April-August.
- **Lighting**. Use of non-UV sources of lighting at working sites, deposits and permanent facilities to avoid attracting nocturnal insects and the bats that feed on them.
- **Planting.** If any habitat corridors are found to be severed, the ECoW will identify key locations for replanting to retain commuting routes and if appropriate raise the height of the planting so that crossings are above traffic
- **Awareness Raising.** The Project will also work with local NGOs and authorities to raise awareness of the importance of bat conservation in the region.

Operational mitigation included within the project design includes commitments to use down lighters where practical and install a minimum of 100 bat boxes at appropriate locations. Planting regimes will also be adapted near known bat commuter routes to support bat flight paths and reduce risk to bats.

[7] Berthinussen & Altringham (2012a, 2013)

6.5 Additional Studies and Monitoring

Further surveys will be undertaken in 2019/2020 to determine the extent to which species-specific BAPs are required, identify roost, hibernation and nursery sites and support plans to install bat boxes within appropriate habitat. Surveys will be continued annually for 5 years after the start of construction. This work will be undertaken by a local ecologist.

6.6 Summary

Status	**Action Plan for Bats**			
Approach	Avoid	Reduce	Mitigate	Offset
Objectives	No net loss of bats by avoiding project impacts to known bat roosts, nurseries and hibernaculae, improving understanding of the local bat population (size and distribution) and working with local NGOs and regulators to support local bat conservation.			
Location	Along the route but particularly foraging areas near rivers, wet grasslands and along flight paths. Caves and other roost sites in karst scenery.			
Potential Impacts	Bats are known to be vulnerable to a range of impacts from road construction and operation. This includes loss of roosting, hibernating and nursery sites as well as disturbance to flyway and feeding areas.			
Summary of Approach	Work will involve a combination of additional studies, avoidance of bat habitat, mitigation through design, installation of bat boxes and raising awareness. If the project is found to bisect a known bat commuting route, the design will be changed where practical, e.g. to raise the height of planting so that crossings are above traffic or through the use of bat "guards" to encourage bats to fly under bridges. In addition, any data obtained on bats will be shared with appropriate research/conservation organisations and regulatory bodies and used to inform regional conservation management strategies.			
Monitoring	Seasonal monitoring is proposed for five years after construction commences to confirm whether the mitigation measures have been effective or if any alterations and/or enhancements are necessary.			
Responsibility	The ECoW is responsible for resourcing and monitoring the work. Technical work to be contracted to an appropriate technical organisation.			
Timing	The initial work will be undertaken in 2019/202. Further monitoring will be undertaken over a 5-year period from the start of project construction.			
Additional Information	There is considerable literature available on road scheme mitigation for bats (e.g. see www.bats.org.uk)			

7. Action Plan for Reptiles and Amphibians

7.1 Current Status

The project area supports a range of amphibians and reptiles, especially in and around the local wetlands. The most important habitats for these species are around Mareza, including the river Matica (known as the Sitnica in its lower parts) as well as around Skadar Lake. River channels through the Zeta Plain, where water is occasionally or permanently retained, are also important reproductive centres and additionally provide refuge for numerous aquatic and semi-aquatic species during intense rainfall as many species that are not adapted to the higher water speeds in the main watercourses are drawn to the irrigation canals here.

The complex of freshwater, terrestrial and karstic habitats with occasional flood meadows, channels, streams and springs of the Mareza and surrounding Matica river area provides a unique complex important for the coexistence of several species in a small area. Continuous connectivity is however prevented by habitat fragmentation (especially along the Sitnica) mostly due to expansion of the urban zone and road infrastructure. Indeed the existing road is considered a major obstacle to both toads (*Bufo bufo*) and Hermann's (or forest) tortoise (*Testudo hermanni hercegovinensis)* during their regular movements and migrations, especially in spring.

Amphibians prefer standing and slow water and are particularly found during September, when the water level of the rivers is low and the river water currents are at their weakest.

The sloping and mild elevations of the left and right shores of Morača and Mala Rijeka are also important for the **Hermann's tortoise** population (Testudo hermanni - NT), which is found across the region at elevations below 500m asl, even in the city parks. The species is listed in Annex II of the Habitats Directive, and has disappeared across much of Europe continent. Fires (including those used for land clearance) and impacts from roads and railways, threaten the locally found subspecies of Hermann's tortoise.

The **Albanian water frog** is a lowland species restricted to western Albania and southern Montenegro at elevations below 500m asl. It has been recorded at several wetland locations within the project area and, whilst common in places, is listed as Endangered by IUCN as it has an Extent of Occurrence of less than 5,000 km2, its distribution is severely fragmented, and there is continuing decline in the extent and quality of its habitat. Locally subject to hunting pressures, it is reported to be present in areas of heavily vegetated aquatic habitats including ditches, swamps, marshes, the edges of slow-flowing rivers and the shoreline of Lake Skadar.

The project area includes several habitats of value to reptiles and/or amphibians including areas of rocks, forests remnants, field edges, hedges and overgrown embankments, wetlands, streams and rivers. Several notable species have been recorded in the literature, and more detailed studies were undertaken during the initial EIA surveys around the Mareza, Komanski, Matica and Susica bridges, as well as between Curilac and Susica bridge (locality Gruda), curilac itself and the area near Bandici (Crkovnica river). The desk study and field survey recorded a number of species as present as shown in the following table[8].

[8] *For raw data see: "Final Report Amphibians and Reptiles"; "Report on fish fauna on the projected route Danilovgrad Boulevard (cicular stream) – Podgorica (bridge on Mareza)"; "Izještaj o flori I staništima na projektov anoj trasi bulevara Danilovgrad (Kružni Tol) – Podgorica (most na Marezi)"*

Notable Amphibians and Reptiles recorded in the project area

Name (Latin)	Name (English)	Sites	IUCN RDB & Endemicity	Habitats directive
Pelophylax ridibundus	Marsh frog	All sites	LC	HD Annex V
Bufo	Common toad	Around Komanski and Sušica bridge	LC	
Hyla arborea	European tree frog	Around Matica bridge	LC	Habitats: Annex IV
Pelophylax shqipericus	**Albanian water frog**	**Around Matica and Sušica bridges**	**EN, Endemic to the Balkans**	
Emys orbicularis	European pond turtle	Gruda and Curilac	NT	Habitats: Annex II, IV
*Lissotriton vulgaris**	Smooth newt	Gruda	LC	
Rana dalmatina	Agile frog	Curilac	LC	Habitats: Annex IV
Podarcis muralis	Common wall lizard	Around Mareza, Matica and Sušica bridges; Curilac	LC	Habitats: Annex IV
Podarcis melisellensis	Dalmatian wall lizard	Around Mareza and Sušica bridges; Gruda	LC Endemic to the Balkans	Habitats: Annex IV
Natrix	Grass snake	Around Matica bridge Crkovnica river	LC	
Testudo hermanni hercegovinensis	Hermann's tortoise	Ch. 120+513.59 to Ch. 121+004.60)	NT	Habitats: Annex IV

IBAT also records the Lizard *Dinarolacerta mosorensis* (VU) and the Meadow viper *Vipera ursinii* (VU) as present in the wider area.

As described earlier, many of the important habitats are fragmented due to the urbanization and expansion of the traffic network, which in addition to direct mortality, results in population separation making reproduction difficult. More frequent fires, wastewater from business facilities, the introduction of foreign species, the absence of protective forests, excessive or unsustainable logging and improper waste management have all been identified as threats.

7.2 Potential Project Impacts

Construction impacts to reptiles and amphibians include death, injury or disturbance during land clearance and construction works and pollution of aquatic habitats. These will be most significant where they affect sensitive species such as Albanian water frog, *Pelophylax shqipericus;* Hermann's Tortoise, *Testudo hermanni;* and European Pond Turtle, *Emys orbicularis*. Potential impacts include:

- Loss of refuges used for breeding, resting and hibernation from clearance works.
- Loss, degradation and disturbance of aquatic habitats especially during reconstruction of bridges across the rivers (Mareza, Sitnica, Matica, Susica) and where the road route which runs across streams (Crkovnica) and irrigation channels (Gruda).
- Degradation and loss of part of the sensitive swampy area, located between the Matica Bridge and Luznica hill, which supports the endangered species *Pelophylax shqipericus*.
- Pollution of habitats through emission of dust, waste, excavated soil or other material along the riverbanks, creeks, or directly into the aquatic and swampy habitats.
- Increased mortality of adult and juvenile fauna when crossing the road, notably for Hermann's tortoise, which has been marked by a high rate of road kill.

During road operation impacts will include further habitat fragmentation, direct mortality from collisions, and impacts associated with road run-off. Several species already suffer high levels of

roadkill including *B. bufo, T. hermanni, and Podarcis Melisellensis,* although new culverts are proposed as part of the scheme.

7.3 Objectives of the Plan

This plan is intended to help ensure no-net conservation loss for notable reptiles and amphibians as a result of project construction and operation. It particularly seeks to promote conservation initiatives for the endangered Albanian water frog. The plan should be read alongside plans for the local rivers and for the "Mareza source with Sitnica and area of Velje Brdo" site, which together provide important habitats for this group of animals.

7.4 Activities to be Undertaken

A number of general protection measures will be applied for reptiles and amphibians (under the supervision of the ECoW) during construction, including the following:

- **Culverts and crossings.** Culverts will be designed to enable passage for terrestrial animals and specific wildlife crossings will be provided for toads and other species (under the supervision of the ECoW) in areas of high roadkill. These crossings will be made from 30x30cm polymer-concrete with small fences (30-50 cm high) to guide the amphibians and prevent them from accessing the road. The ECoW will also ensure that animals are transported across the road route during the migration season.
- **Pollution Prevention.** Accidental pollution of aquatic habitats will be prevented in line with GIP (including ensuring that maintenance and repairing machinery, changing oil, refuelling, etc. is not carried out near watercourses and wetland habitats).
- **Footprint Minimisation.** Use of heavy machinery will be strictly limited to the Project RoW to avoid additional fragmentation and degradation of habitats, as well as subsidence of soil.
- **Temporary areas.** Areas which are temporarily used during construction will be backfilled with soil as soon as possible (after checking for fauna) and open works will have ramps so animals can exit.
- **Vegetation Management.** Vegetation along the road will be cleared near the road to reduce its attractiveness to fauna.
- **Signage.** Traffic signs will be installed at locations, which have been determined as important for crossings.

In addition, the following species-specific actions will be taken:

- **Albanian water frog *Pelophylax shqipericus* (EN).** Works will be carried out during the time of the year when water level in the watercourses is minimal. During the dry periods, some animals migrate from the swampy area (which dries up) to the wetter central area around the Matica River and are further away from the impact area. Special attention will be paid to preserving the swampy area between the Matica Bridge and Luznica Hill, located some 60m away from the project impact area. Information boards will be used to provide information about the endangered species to the construction workers and make it clear that works must take place in the designated area (and that hunting of frogs is not allowed).
- **European Pond Turtle *Emys orbicularis* (NT).** Special attention will be paid to the locations at Gruda and Curilac at which the European pond turtle has been identified, including during reconstruction of the culvert. Particular care will be taken to avoid soil and materials being deposited near the channel.

- **Hermann's Tortoise, *Testudo hermanni* (NT).** Culverts and thick protection fences will be placed at locations where a significant rate of Hermann's tortoise roadkill was recorded. The fence will have the following dimensions: 10 x 10 mm, 50 cm (height) and at least 10cm will be put into the ground.

Underpasses for small animals such as amphibians and reptiles will consist of pipes or rectangular tunnels with a diameter/width of usually 0.4-2 m. The distance between two available passages will not exceed 200m in natural areas or 500m in agricultural areas according to expert judgment.

7.5 Additional Studies and Monitoring

Further work in 2019/202 will be carried out to supplement the information presented here. Populations of key species will be monitored for 5 years from the commencement of construction and the condition of the wildlife crossings will also be regularly monitored during construction and operation of the road, with new underpasses created if needed.

7.6 References

Iuell, B., Bekker, G.J., Cuperus, R., Dufek, J., Fry, G., Hicks, C., Hlavaˇc, V., Keller, V., B., Rosell, C., Sangwine, T., Torslov, N., Wandall, B. le Maire, (Eds.) 2003. Wildlife and Traffic: A European Handbook for Identifying Conflicts and Designing Solutions

7.7 Action Plan Summary

	Action Plan for Reptiles and Amphibians (notably Albanian Water Frog)			
Approach	Avoid	Reduce	Mitigate	Offset
Objectives	Protection of reptile and amphibian habitat and notable species.			
Location	Rivers and wetland areas along the route. Crossing points with high mortalities.			
Potential Impacts	Loss/deterioration of habitat and water pollution. Direct mortality of fauna.			
Summary of Approach	Works within wetland and river areas will be managed carefully to avoid pollution and undertaken to avoid sensitive times of year. Underpasses will be included in scheme design and monitoring will be used to inform an adaptive management approach to road crossings by fauna. Loss of habitat will be compensated at a 3:1 ratio.			
Monitoring	Habitat restoration and notable species population numbers will be monitored for 5 years post commencement of operations and an adaptive management approach taken for additional mitigation should it be required.			
Responsibility	Contractor ECoW to supervise works. OE to agree timing of works and monitor contactor.			
Timing	Throughout construction and for 3 years after.			

8. Achievement of No-Net Loss / Net Gain for Key Habitats

Despite application of the mitigation hierarchy, the proposed road expansion will still result in the loss of around 10.2 ha of natural habitat, including both areas that qualify as Critical Habitat (CH) and areas that qualify as Priority Biodiversity Features under PR6. To meet EBRD PR6 requirements the project must clearly demonstrate how it will enable "net gain" of CH or "No Net Loss" of PBF for each of the priority species/habitats. This section outlines the approach to achieving this and will be further developed once the detailed BAP is developed.

8.1 Net Gain of Critical Habitat

The **Mareza channel** is a small-canalised tributary of the Morača and has been identified as Critical Habitat for the two IUCN Endangered freshwater snails *Valvata montenegrina* and *Radix skutaris*. The snails are found in the slower moving parts of the channel where there is a muddy substratum and aquatic vegetation, and have a highly restricted distribution. It is estimated that some 200m^2 of slow-flowing river vegetation will be affected by the works and suitable areas for appropriate habitat extension/creation will be specifically identified by an appropriate species expert. Such works may include creating improved conditions in the Mareza and associated watercourses (eg through remediation of existing pollution), widening of appropriate channel areas to create areas of slower flow, and/or encouragement of appropriate vegetation in channels. All works will be done under the guidance of a species expert and **at least 600m^2** of new or improved habitat will be created.

8.2 No Net Loss of Priority Biodiversity Features

A number of areas have also been identified where no-net loss of PBF is required.

- The most important of these is considered to be the "Mareza source with Sitnica and area of Velje Brdo", a "potentially protected area", that includes the Mareza channel as outlined above. The site includes a complex of freshwater, terrestrial and karst habitats with flooded and occasionally flooded meadows, canals, streams and springs. The area supports a number of Habitat Directive Annex I and II habitats and species considered unique in the central region of Montenegro. A detailed survey of the site will be undertaken and habitats and species mapped. During the site visit it was noted that the wetlands of greatest ecological (and social) value appear to be drying out, in part through succession with Salix sp. The scheme is expected to result in the loss of up to 1 ha of habitat here, consisting of a mix of strongly degraded wet habitats (up to 0.6 ha) seasonally wet and wet grasslands (up to 0.2ha) and flood swards and related communities (up to 0.2ha). Following the detailed surveys specific plans will be put in place to create up to 3ha of improved conservation habitat by removal of encroaching willow and re-creation of traditional cattle "puddling" in wetter areas using machinery. The work will be done in conjunction with Podgorica Authorities and the project will also work with them to develop and implement a proactive management plan to address the long-term conservation of the site using such approaches.
- Despite the mitigation outlined in this document, some **2.5ha of watercourses and surrounding vegetation** are expected to be affected (at least to some extent) by the proposed scheme, mostly as a result of the proposed bridge crossings. These habitats support a broad range of flora and fauna, including endemic species, with the Sitnica considered the most ecologically important given its year-round flow. The watercourses support endemic species such as the Albanian water frog (*Pelophylax shqipericus)* and various water snails, as well as providing possible otter habitat. Specific surveys will be undertaken for all these species upstream and downstream of watercourse crossings before construction commences, with

particular attention paid to the Albanian water frog. The Project will work with a species expert to identify key habitats that may be affected by the scheme and should any be lost they will be replaced on a **3:1 ratio by** careful habitat creation in adjacent areas. This is expected to include the areas of ***Phragmites* and *Typha* reedbeds of which 0.9ha is expected to be lost** to the scheme. Surveys will also be undertaken in the river channels through the Zeta Plain, where water is occasionally or permanently retained, and which are known as important reproductive centres and refuges for such species, to identify opportunities for habitat creation in this area.

- The karst scenery through which the road passes is important for bats, which also frequent the dry riverbeds, grassed foothills and riverine pastures. Specific work will be undertaken to understand if any bat flight paths are to be severed by the scheme and if replanting will be undertaken where practical to reconnect the routes. Overall some 8.3 ha of woodland and grassland mosaic will need to be compensated for as shown in the table below, and this will be restored at a **3:1 ratio** within the footprint of the road and using appropriate local species.

Eunis classification	Description	Area to be lost permanently
Mosaic G1.7C2, E1.55	Oriental hornbeam woods G1.7C2, Eastern sub-Mediterranean dry grassland	5.4
G1.7C2	Oriental hornbeam woods	1.6
E1.55	Eastern sub-Mediterranean dry grassland	0.7
G1.33	Mediterranean riparian ash woods	0.5
G1.1	Salix alba galleries	0.1
Total		**8.3**

All of the above will be further developed as part of the final BAP.

9. Biodiversity Monitoring and Evaluation Programme and Additional Conservation actions

9.1 Aim and Objectives

A **Biodiversity Monitoring and Evaluation Programme (BMEP)** will be designed and implemented to confirm that this BAP has both:

i) been implemented by the responsible parties as expected; and
ii) achieved the desired conservation outcomes.

The monitoring will also seek to confirm that no unexpected impacts are occurring to notable species and habitats as a result of the project (including associated cumulative or induced impacts) for which an "adaptive management" approach may be required. The Owners Engineer will be responsible for writing and implementing the BMEP, which will build on the tasks previously outlined.

In addition, given that the Project will take place in close proximity to a protected area and an area of designated international conservation importance, EBRD PR6 requires that the project implements a series of programmes to promote and enhance the conservation objectives of the affected protected areas. Such **additional conservation actions (ACAs)** are to focus on those species/habitats associated with the protected areas. This includes those species for which species-specific action plans have been developed but also a number of other species (such as Birds Directive Annex 1 species) for which the protected area is important but which are not expected to be affected by the Project (see ESIA for details).

The biggest constraint currently limiting the effective management of the protected area is a lack of baseline data on notable species and habitats. The Project will share relevant information obtained with the authorities to support the overall understanding of, and management design for, the protected area. The proposed approach will also help consolidate the results of the individual monitoring and survey tasks.

The BMP and ACAs will be the responsibility of the Owners Engineer (reporting to the TA) but elements of it may be tendered out to suitable external organisation(s). As part of the BMEP the Project will monitor the nature, extent, quality and spatial configuration of notable habitats and species within both the direct project area, and the wider area. Rapid and cost-effective habitat monitoring approaches (e.g. remote sensing) will be implemented to enable initial baseline monitoring and allow any significant changes in the biodiversity of the project area to be detected and an "adaptive management" approach to the required conservation outcomes to be implemented should this be required. The studies will focus on the key biodiversity elements discussed in this BAP and associated sources of threats rather than trends in local biodiversity *per se*.

It will also specifically seek to support conservation measures to be implemented by the authorities by providing additional data that can help them to:

- Prepare a baseline habitat map for the Protected Areas;
- Detect any significant changes in the nature, extent, quality and spatial configuration of the key habitats and species present and identify the reasons for them; and
- Develop and implement measures to mitigate for any significant changes, in consultation with specialists, local communities and other stakeholders.

9.2 Monitoring Indicators

The BMEP/ACAs will include monitoring targeted at the Species/Population Level. This will seek to provide further information on species distribution, population size and demographics for the BAP and notable species. Indicators will be developed in consultation with local experts as part of this F-BAP.

9.3 Monitoring Methodologies

Monitoring will involve a combination of:

- Linking to **existing recording systems** such as "Observado", "ebird", and "inaturalist" to allow incorporation of data from other sources.
- **Remote Sensing** to determine overall habitat types and use by notable species.
- **Habitat Ground Truthing.** To be undertaken as needed based on the remotely sensed data and using sample transects, with a focus on ecotones (i.e. transitional areas). Habitat type will be recorded in the field using the standard EU classification.
- **Habitat Quality.** Dominant plant species will be recorded at sample sites, along with species listed on the IUCN and national red lists, and endemic species. Non-native and invasive species will be also recorded. The relative abundance will be recorded for example using the DAFOR scale (D=dominant, A=abundant, F=frequent, O=occasional, R=rare). Plant species will be identified in the field or subsequently using detailed photographs or samples collected in the field. Habitat types and their boundaries will be confirmed or defined in the field using the preliminary habitat classification prepared by interpretation of satellite imagery. The actual habitat areas will be calculated in GIS after field surveys;
- **Environmental disturbance.** E.g. data will be collected on artificial barriers, pollution, overgrazing, timber extraction, trampling, drainage, burning and fishing. Associated management recommendation will also be collected: e.g. reducing grazing level, reducing fishing pressure, and invasive species control.
- **Fauna populations.** Monitoring methodologies will be developed in conjunction with key specialists. For reptiles, the use of artificial refuge will be considered, as this method will collect more objective data on the population size, demographics and species distribution.

9.4 Monitoring Timescale and Reporting

An annual report will be prepared to include all sets of data, analysis, conclusions and recommendations for management interventions. A final report including a more detailed analysis of trends will be prepared in 2024. The monitoring will continue up until the end of the defect liability period. At that point, the Owner's Engineer will make an assessment of the situation and provide recommendations if necessary.

9.5 Evaluation

This F-BAP and its monitoring, including that outlined above, will be periodically evaluated to determine its effectiveness in meeting its objectives and identifying any necessary remediation. The findings of the monitoring programme will be evaluated every year with the Project Lenders and the outcomes used to adapt the management and on-going mitigation measures. Management interventions will need to be identified when there is a negative trend in the areas of natural habitat and/or the connectivity of the habitats. The threshold for interventions will be when the area of any natural habitat has decreased by more than 5%. The outcome of the evaluation and any management interventions required will be fed to the relevant managers and landowners.

9.6 Dissemination

This BMEP will contribute directly and significantly to the achievement of Podgorica Biodiversity Action Plan including its objectives of developing a biodiversity monitoring system and an active and integrated biodiversity database to ensure sustainable use and conservation of biological resources. A number of government agencies are likely to be interested in the data and outcomes from this monitoring and will be consulted on the results to enable local authorities in the region to use this information in planning. In addition, the habitat information and GIS database will provide the starting point for research projects to be undertaken by academic institutions and NGOs in the region.

9.7 Resources

The Owner's Engineer will prepare the full terms of reference (ToR) for the BMEP/ACAs and will start implementation in 2019/2020. It is intended that implementation of the BMEP/ACAs will also receive additional local capacity and resources from other bodies as available. Staff resources required to implement this plan will be assessed at the completion of the BMEP/ACAs ToR. At this stage they are expected to include appropriate resources for:

- Habitat ground truthing and quality assessment;
- Analysis of habitat field data and reporting;
- Any relevant socio-economic and ecosystem services surveys;
- Analysis of socio-economic and ecosystem services data and reporting; and
- GIS analysis (interpretation of satellite imagery, habitat classification, calculation of landscape areas and landscape indices).

The equipment needed to implement this plan should be available from the specialists to be engaged but is likely to include: fieldwork equipment, cameras, GPS, binocular, and computer with relevant GIS software. Costs of much of the work should be covered by the Owner's Engineer and by the EPC Contractor, although a full financial estimation will be carried out when the BMEP is fully developed. This will include: staff cost for fieldwork, data analysis (including GIS) and reporting,

cost of equipment (or hire) including maintenance, software licence, satellite imagery purchase, training and capacity building etc.

Involvement/engagement of local communities will be considered in the BMEP because:

- the plan will be more sustainable if communities are involved;
- local communities have useful information on the relationships between threats and effects; and
- stakeholder involvement can contribute to the development of a sense of ownership of the resource management regime and responsibility for biodiversity health.

The draft and final BMEP/ACAs will need to be approved by the EBRD.

10. Summary of Key Actions Table

Objectives	Location	Potential impacts	Summary approach	Monitoring	Responsibility	Timing
Action Plan for site" Mareza source with Sitnica and area of Velje Brdo"						
No net-loss in area (or quality) of habitats of conservation value in the designated site as a result of Project activities. Specific protection of notable species in particular endemic snails.	Within the area marked on the map as the proposed site (tbc)	Direct loss of habitats from works, loss of notable species through changes in water quality. Opportunities for additional habitat restoration whilst works are on-going.	Avoid impacts where practical through the use of the ECoW to demarcate areas of particular sensitivity. Whilst up to 1.9ha of the habitat mosaic may be lost to the scheme, additional habitat will be created within the project footprint to counteract some of the losses. Additional measures will also put in place to reverse current habitat succession and specific approaches will be put in place for notable species, especially endemic snails.	Habitat that is translocated or recreated is to be monitored throughout the EPC warranty period and over at least a 5-year period. Monitoring is to be conducted by both the ECoW as well as the Owners Engineer. Specific monitoring plans are to be put in place for notable specie including snails.	Contractor ECoW to undertake pre-clearance surveys, demarcate sensitive areas and supervise any translocation/restoration works (to be undertaken as early as practical within the construction schedule). OE to update F-BAP, manage additional studies and supervise contactor. Gastropod monitoring to be subcontracted to specialist.	Additional surveys to start in 2019/20 and continue during and post construction including a 5-year post planting monitoring period.
Action Plan for Fish						
No reduction in habitat or water quality in the rivers. No impacts on fish diversity or populations	Rivers Sitnica, Matica, Mareza and Susica and their tributaries.	Loss/deterioration of habitat and water pollution. Mortality of fish and invertebrates.	Project to reduce impacts to riverine habitats and the animals they support (including fish) as far as practical. Works within the river to be managed to avoid pollution and undertaken at less sensitive times of year. Monitoring to be used to inform an adaptive management approach to supporting local fish populations.	Habitat recreation and fish numbers will be monitored for 3 years post commencement of operations. Data will inform an adaptive management approach to any additional mitigation.	Contractor ECoW to supervise in-river and habitat restoration works. OE to agree timing of works and monitor contractor.	Throughout construction and for 3 years after.
Action Plan for Otters						
No net loss of otters by avoiding project impacts.	River habitats in project area, notably the Matica	Otters are vulnerable to a range of impacts within and around their river	Work will involve a mixture of additional surveys, implementation of detailed mitigation as outlined in plan, additional	If otters are present, seasonal monitoring for five years after	Owners Engineer responsible for resourcing	The initial work will be undertaken in

2.1 Improving understanding of the local otter population (size and distribution). Working with local NGOs and regulators to raise awareness and develop an otter conservation plan.	and Sitnica Rivers.	habitats. This includes removal of bankside vegetation, and disturbance as well as impacts associated with changes to fish populations and direct mortality.	habitat creation (if required) and raising awareness.	construction commences to confirm whether mitigation measures have been effective or if any alterations and/or enhancements are necessary.	and monitoring the work Technical work to be contracted to an appropriate technical organisation.	2019/2020. Further monitoring will be undertaken over a 5-year period from the start of project construction.
Action Plan for Bats						
No net loss of bats by avoiding project impacts to known bat roosts, nurseries and hibernaculae. Improving understanding of the local bat population (size and distribution) and working with local NGOs and regulators to support local bat conservation.	Along the route but particularly in foraging areas near rivers, wet grasslands and along flight paths. Caves and other roost sites in karst scenery.	Bats are known to be vulnerable to a range of impacts from road construction and operation. This includes loss of roosting, hibernating and nursery sites as well as disturbance to flyway and feeding areas.	2.1 Combination of additional studies, avoidance of bat habitat, mitigation through design, installation of bat boxes and raising awareness. If the project is found to bisect a known bat commuting route, the design will be changed where practical, e.g. to raise the height of planting so that crossings are above traffic or through the use of bat "guards" to encourage bats to fly under bridges. 2.1 Any data obtained on bats will be shared with appropriate research/conservation organisations and regulatory bodies and used to inform regional conservation management strategies. Appropriate habitat restoration at 3:1 ratio.	Seasonal monitoring is proposed for five years after construction commences to confirm whether the mitigation measures have been effective or if any alterations and/or enhancements are necessary.	ECoW is responsible for resourcing and monitoring the work. Technical work to be contracted to an appropriate technical organisation.	Initial work in 2019/2020. Further monitoring to be undertaken over a 5-year period from the start of project construction.
Action Plan for Reptiles and Amphibians (notably Albanian Water Frog)						
Protection of reptile and amphibian habitat and notable species.	Rivers and wetland areas along the route. Crossing points with high mortalities.	Loss/deterioration of habitat and water pollution. Direct mortality of fauna.	Works within wetland and river areas will be managed carefully to avoid pollution and undertaken to avoid sensitive times of year. Underpasses will be included in scheme design and monitoring will be used to inform an adaptive management approach to road	Habitat restoration and notable species population numbers will be monitored for 5 years post commencement of operations. An adaptive management approach will be taken to	Contractor ECoW to supervise works. OE to agree timing of works and monitor contactor.	Throughout construction and for 3 years after.

			crossings by fauna. Loss of habitat to be compensated at a 3:1 ratio.	additional mitigation should it be required.		

In addition to the above, where any sensitive habitats are subject to residual impacts, they will be replaced at a 3:1 ratio as outlined in Section 8 of this plan.