

Bosnia and Herzegovina: Category A Road Project - Corridor Vc in RS

RIVER BOSNA BIODIVERSITY SCREENING

Draft Report

Prepared in Conjunction with



Society for Research and Protection of Biodiversity
DIZB Društvo za istraživanje i zaštitu biodiverziteta
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Abbreviations & Acronyms:

BiH	Bosnia and Herzegovina
EBRD	European Bank for Reconstruction and Development
EIA	Environmental Impact Assessment
EHSS	Environmental, Health & Safety and Social
E&S	Environmental & Social
ESDD	Environmental and Social Due Diligence
ESIA	Environmental and Social Impact Assessment
EU	European Union
FBiH	Federation of Bosnia and Herzegovina
IFI	International Finance Institution
PR	Performance Requirement
RBRP	River Bosnia Regulation Project
RS	Republika Srpska
RSM	Republika Srpska Motorways
ToR	Terms of Reference

Executive Summary

A biodiversity Screening Exercise was conducted on the Project area to better understand the Project risks in accordance with the EU Habitats Directive and EBRD's *Performance Requirement 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources (PR6)*. The exercise involved a team of ecologists from Republika Srpska supported by an international biodiversity specialist, and included fieldwork to confirm the presence of *priority biodiversity features* (as defined by PR6) in the area, and consultation with stakeholders on the protection status of the River Bosna.

The Project area includes fifteen small, isolated patches of willow-popular or alder woodland which are *priority biodiversity features* because they are islands of relatively natural vegetation in an otherwise modified landscape. One of these lies close to the Motorway alignment in Project 2, and must be avoided because it is an example of an Annex 1 Priority Habitat under the EU Habitats Directive. The river itself does not appear to host flora or fauna or habitats of conservation significance. However the river banks may also be a *priority biodiversity feature* and damage to them must be minimized. Some protected animal species occur in the area. Otters and beavers (listed on Annex IV of the EU Habitats Directive) use the small streams which flow into the River Bosna (as well as intervening areas). These streams are therefore also *priority biodiversity features*, and must be protected. Some nationally protected and globally threatened birds species fly over the area and use habitat within it in small number as part of a wider range. None of these species nest in the Project corridor and Project effects are expected to be negligible due to the low numbers and densities of the birds concerned, their high mobility and their wide distribution throughout the Project corridor. Two areas where mammals may cross the road corridor were identified. Access across these must be preserved as far as possible.

The inclusion of the River Bosna as a site for consideration as a potential proposed protected area was investigated. The Bosna River is not an Emerald Site or Natura 2000 site, and has not been formally proposed as such by the authorities. In the Spatial Plan for Republika Srpska (RS) 2015 - 2025, the River Bosna is not planned for designation as a nature conservation area, nor is it included as one of 130 sites proposed for protection, at least as far as 2025. An expert opinion on the status of the River Bosna as a potentially protected area, sought from the Institute for Cultural and Natural Heritage confirmed that there are no current or planned protected areas in the Study Area, and that, as of the present date (May 2017), there are no plans to implement a Regulation of Establishing the Ecological Network in Republic of Srpska, which would include the Project area. Finally, the Public Institution "Vode Srpske" (River Basin Authority) does not consider the River in this Study Area to have particular water quality value or to have areas marked as significant for survival of aquatic species, and the Forest Enterprise "Doboj" is not aware of any confirmed conservation-significant natural forests in the Project area.

As well as measures to restrict the working area of the contractor, the Screening Exercise stipulated that the following actions be taken: 1. Confirm (and amend if necessary) that the alignment avoids damage to the small area of alder forest identified in relation to Project 2; 2. Add culverts to maintain and preserve the flow and habitats of the small watercourses which drain into the River Bosna in both Projects 1 and 2, and animal movements through them; and 3. Provide adequate crossings for wildlife at Kožuhe (Project 2) and Kostajnica (Project 1). These actions will be included in a Biodiversity Management Plan (BMP) to be developed before construction begins.

The Screening Exercise therefore concluded that there are no imminent plans to designate any part of the Study Area as 'protected', and that provided that several specific steps are taken, the Project

effects on biodiversity resources will be acceptable and will not contravene the requirements of the EU Habitats and Birds Directives, or of EBRD's PR6.

1. Introduction

1.1 Background

The European Bank for Reconstruction and Development (EBRD) is considering providing a sovereign-guaranteed loan of up to EUR 70.0 million to Republika Srpska Motorways (RSM). The EBRD Loan will be used to finance the construction of two motorway interchanges, Johovac (Tovira) and Rudanka (Kostajnica), and a 6 km long motorway section between the interchanges, plus a two lane connecting road of around 1km to the link to the existing trunk road including a crossing of the River Bosna. This is known as “Project 1”, and would be the first 6 kilometres out of total 46.6 kilometres of Corridor Vc that need to be constructed within RS territory.

A parallel loan from another international financing institution will be used to finance the construction of 14 km long adjoining northbound section from interchange Johovac (Tovira) to interchange Podnovlje (excluding the Johovac interchange). This is known as “Project 2”.

EBRD has commissioned the UK consulting company Zylwood Consulting to conduct an Environmental and Social Due Diligence (ESDD) of the Projects. As part of this ESDD, it has been identified that the River Bosna was discussed as a possible candidate for future environmental protection at an EU level. Given this interest, the level of information available in the Environmental Impact Assessments of the Projects already carried out, is not sufficient to give assurances that the requirements of the EU Habitats Directive, and Performance Requirement 6 (PR6) of the EBRD, can be met. A Screening Exercise on the River Bosna was therefore requested by EBRD to better understand the potential project related risks and impacts in accordance with the EU Habitats Directive and *Performance Requirement 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources*.

The Screening Exercise was carried out by the Society for Research and Protection of Biodiversity (DIZB), with the support of Zylwood Consulting.

1.2 Objectives of the Assignment

The objectives of the Screening Exercise were:

- To discuss with relevant stakeholders the biodiversity significance, and potential reasons for interest in the Bosna River, and to clarify the significance of its identification by the EU Project as a site for possible protection in the future.
- To confirm the presence of “natural” habitat or other important or priority biodiversity features that could be affected by the Project.
- To establish the risk that the Project could give rise to “likely significant effects” on any feature that could potentially be identified for future protection within the Natura 2000 network, or the integrity of the “site” as a whole, i.e. the River ecosystem.
- To produce a short report for public disclosure and consultation with relevant stakeholders in order to reach consensus on whether the Project could have an adverse effect on any features of concern/interest, that could potentially be identified as designated interest features at an EU level in future.

The Study Area is the River Bosna between Rudanka (Kostajnica) and Podnovlje, taking into account the wider upstream and downstream context.

1.3 Project Team

The Screening Exercise was carried out as part of the Environmental and Social Due Diligence Exercise, conducted by Zylwood Consulting (UK), in conjunction with two biodiversity experts from the Banka Luka-based *Society for Research and Protection of Biodiversity*.

2. Approach

The following approach was taken to the assessment.

2.1 Study Area

The Study Area is shown in Figure 1 and encompasses the River Bosna between Rudanka (Kostajnica) and Podnovlje and its associated floodplain habitats, taking into account the wider upstream and downstream context. The southern limit is the southern bank of the Bosna River bank, and the northern extent is the survey Site 12 marked on the Map. The Study Area takes in the entire stretch of the Motorway Projects 1 and 2, including the approach sections to the bridge and the Johovac (Tovira) Interchange, and the two crossings of the River Bosna.

2.2 Review of Available Data

A search was made for available data on the biodiversity of the Study Area. The following documents were identified and reviewed:

- EIA Report for the “LOT3: Johovac-Doboj Jug”.
- EIA Report for LOT2: “Vukosavlje-Johovac”.
- Unpublished data from the *Society for Research and Protection of Biodiversity*, obtained from various site surveys in which the Society has been involved, and from the International Waterbird Census (IWC).

Other data and anecdotal information were obtained from the stakeholders listed below, on hunting game, fish species and the water quality of the River Bosna.

2.3 Consultation with Stakeholders

Consultations were held with the following institutions:

- Republic Institute for Natural and Cultural Heritage; (12th of May 2017, Banja Luka);
- Forest Enterprise “Doboj”; (22nd of May 2017, in Doboj);
- Public Institution “Vode Srpske” (River Basin Authority); Representatives from the Institution were not able to meet in person, but data was obtained in written form on the quality of the watercourse of the River Bosna on the subject section, see Annex 4, pages 4 and 5;
- Fishing Society “Optima”, from Modriča; (11th of May 2017 in Modriča);
- Fishing Society “Doboj” from Doboj; (11th May 2017 in Doboj);
- Hunting society “Fazan” from Doboj (11th of May 2017 in Doboj).

The purpose of the consultations was to ascertain stakeholders’ views concerning the biodiversity features of the Study Area, and to understanding the features of interest of the River which may have led to its inclusion in the list of possible sites for future protection.

Data on the River Bosna ecosystem in the area of Doboj and Modriča and its associated fish fauna was obtained from the Fishing Societies from Doboj and Modriča, in the form of the “Program of Using the Fishing Area” and “The Report on Qualitative and Quantitative Composition of Ichthyofauna on the River Bosna” for the area of Modriča Municipality.

In addition, information on terrestrial fauna was obtained from the Hunting Society from Dobo in the form of “The Annual Plan for Using Hunting Sites of Dobo for the period from 2017 to 2018”.

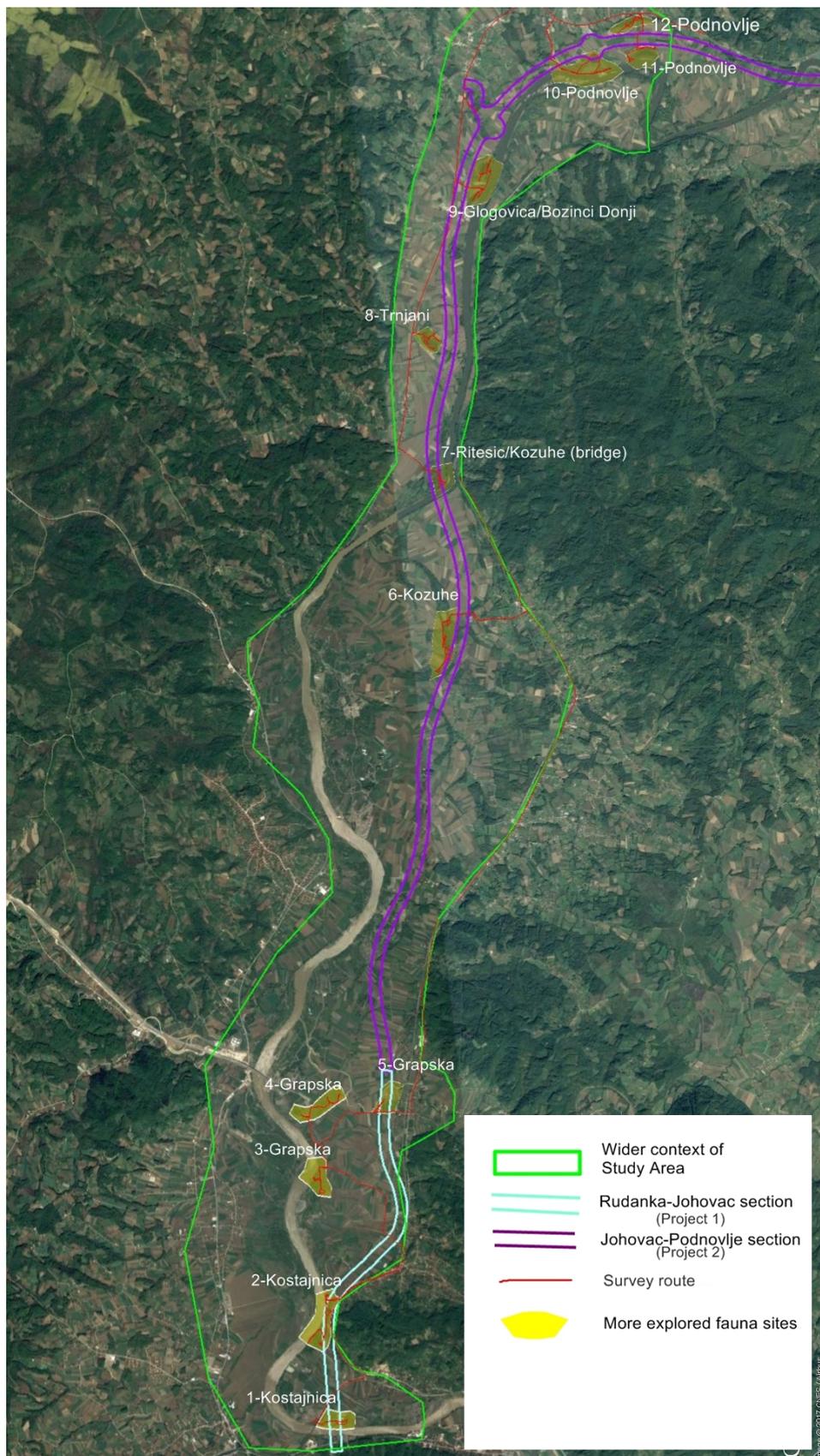
2.4 Site Visit & Surveys

A site visit to the Study Area and a field survey focusing on habitats, flora and fauna was conducted from 12-15 May 2017. An initial scoping visit was conducted over the wider project area (by vehicle and by forays on foot), to identify key biodiversity features and identify areas worthy of a more focused investigation. This was supported by a review of *Google Earth* aerial photographs. Special attention was paid to identification of the biodiversity features around the locations of the two planned bridges. A follow up survey visit focusing on fauna, was conducted from 19-22 May 2017.

The extent of the survey, and the localities explored in more detail, are shown on Map 1 below. Twelve specific areas of survey focus – Sites 1 - 12 - are marked, and coordinates recorded in Annex 1. The main element of the two Motorway sections are also shown, and marked as ‘Project 1’ (coloured in blue) and ‘Project 2’ (coloured in purple). Although the approaches to the Johovac (Tovira) Interchange and the Rudanka Bridge are not marked, the survey work did cover these areas.

During the survey, areas considered to support priority biodiversity features according to the PR6 definition were identified and mapped, as well as all other areas considered to be of conservation interest. GPS locations of features of interest were marked, and are listed in Annex 1.

Map 1. Survey Extent and Areas of Focus



2.5 Analysis and Reporting

The results of the data review, fieldwork investigations and consultations were analysed, and written up by the Project team. Maps were produced. The following criteria were used to determine key biodiversity features:

Criteria for Identifying Key Biodiversity Features

The following criteria were used to identify the key biodiversity features (habitats and species) that are of conservation significance.

Habitats:

- Included in the EU Habitats Directive – Annex 1 Priority Habitats.
- Core and suitable habitats for species that meet the criteria indicated below, including priority biodiversity features and/or critical habitat as defined by PR6.

Species:

- Listed in EU Birds Directive (Annexes 1, 2.1 and 2.2).
- Birds of Conservation Concern (Red/Amber list and not based on IUCN criteria).
- Convention on Migratory Species if any relevant species likely to be present (Appendices 1 and 2, AEWA, ASCOBANS, EUROBATS).
- Included in the IUCN Global Red list at Vulnerable or above and including Data Deficient.
- Included in EU Habitats Directive (Annexes 2, 4 and 5), noting any priority species (priority species means species for the conservation of which the Community has particular responsibility in view of the proportion of their natural range which falls within the territory referred to in Article 2; these priority species are indicated by an asterisk (*) in Annex II).
- Nationally rare or declining species (also with an IUCN status): National or regional endemic species.
- Priority biodiversity features and/or critical habitat as defined by PR6.

2.6 Comment on the Existing Documentation

It should be noted that the EIA Reports on LOT2 and LOT 3 provide information about general vegetation characteristics of the region of northern Bosnia. The list of recorded plant species proposed for conservation listed in the EIA Report for the “LOT3: Johovac-Doboj Jug” is not fully representative of this Project area, and none of the species listed inhabits a significant area in the lower Bosna River valley. In the same EIA study, the fauna associated with the Study Area is described only superficially. Literature sources used are not indicated, and the majority of the species mentioned are not representative of the habitats and context of the Project area (for example some belong to other biogeographical areas such as steppe, Mediterranean, high-mountains etc.).

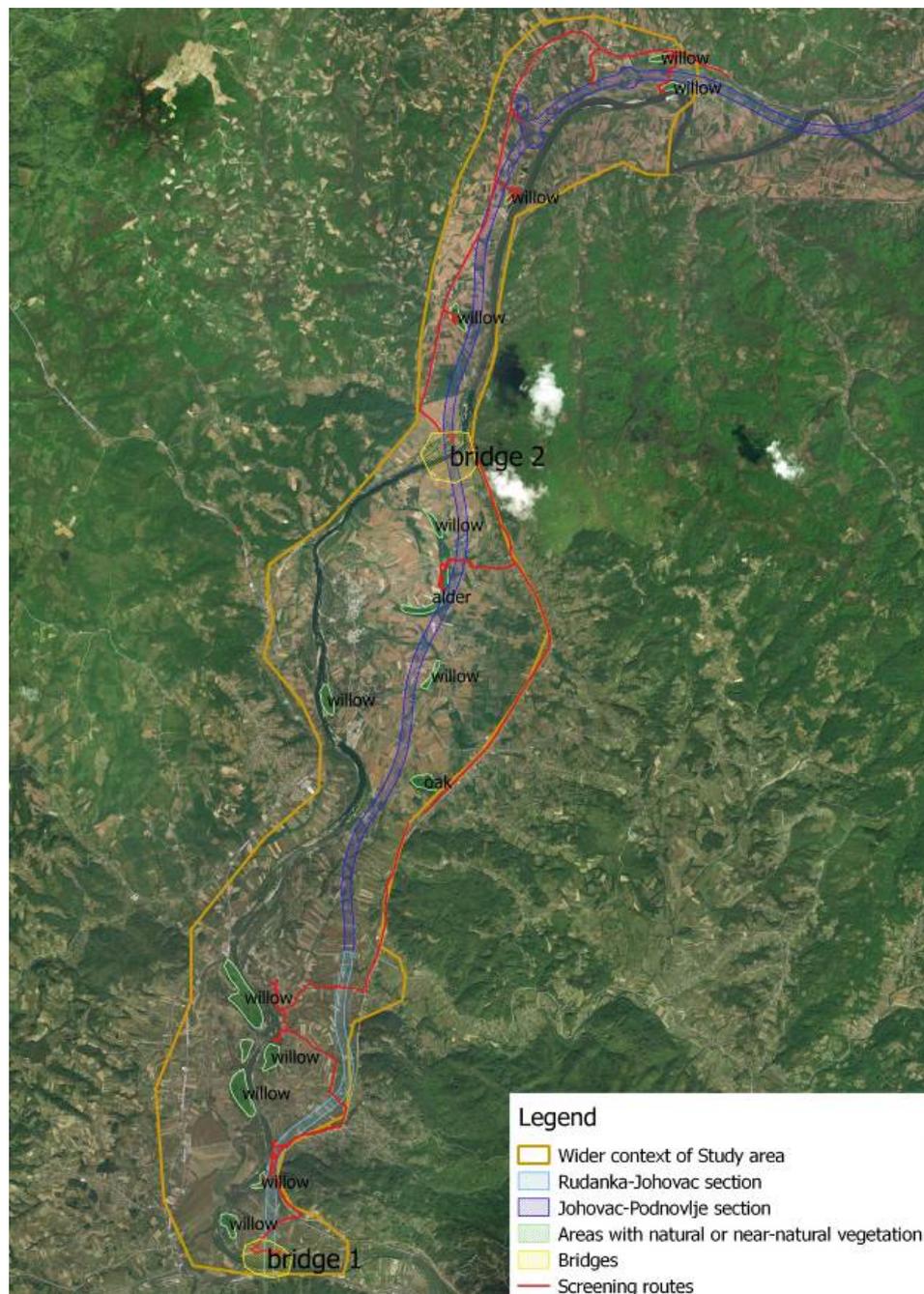
In the EIA Report for LOT2: “Vukosavlje-Johovac” study, the fauna has been more appropriately assessed, but a key omission was the waterbirds potentially affected by the Projects. No explanation is provided of the methodology which was used to collect the data of the presented species.

3. Terrestrial Vegetation Coverage/Habitats

3.1 Overview

The Study Area is situated within the wider context of the River Bosna and its associated floodplain. It is predominantly used for farming, primarily arable crops but there are also areas that have been significantly affected by gravel extraction activities. Some small areas of natural vegetation remain in the Study Area as isolated/fragmented patches. These are mainly structurally and floristically degraded riparian willow-poplar or alder woods, but provide important habitat islands in an otherwise modified landscape. The key vegetation features of the Study Area are marked on Map 2. These are described in subsequent sections. The red lines marked on Map 2 and labelled 'screening routes' indicate the main traverses done by the survey team.

Map 2. Overview of the Study Area



3.2 Woodlands

Fifteen isolated patches of structurally and floristically degraded riparian willow-poplar or alder woods. were identified, as shown on Map 2. These represent priority biodiversity features, according to the definition of EBRD's PR6. Thirteen are predominantly willow, one is dominated by oak, and one by alder. This alder stand conforms to the habitat type listed in Annex 1 of the EU Habitats Directive – 'Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior*, 91E0*. These features are shown at a larger scale in the Maps in Annex 2.

Alder Woods: Alder woods are represented by one well developed stand in an old riverbed near the village of Kožuhe, as marked on Map 2 above, and Map 2.2 in Annex 2. See also Photo 1 below.

Photo 1. Alder Woods Near Kožuhe Village



The stand is representative for the habitat type, with very characteristic or typical species including: *Alnus glutinosa*, *Frangula alnus*, *Rubus caesius*, *Carex riparia*, *C. vesicaria*, *C. remota*, *C. strigosa*, *Iris pseudacorus*, *Caltha palustris*, *Ranunculus repens*, *Galium uliginosum*, *Circaea lutetiana*, *Peucedanum aegopodioides*, *Ficaria verna* etc. **Although the study area is not planned to be included in the Natura 2000 network (see Section 6 below), this habitat is listed on Annex I of Habitats Directive and is considered to represent priority biodiversity features as per EBRD PR6, thus steps should be taken to preserve the site.**

Willow-Poplar Woods: Willow-poplar woods are represented by several small patches near the River Bosna, as shown in Map 2, and on Maps 2.1 – 2.3 in Annex 2. These are mainly very degraded by illegal logging, gravel extraction, invasive species and trash accumulation, see Photos 2 and 3 below, but are considered to constitute potential priority biodiversity features according to EBRD PR6.

Photo 2. Degraded Willow Woods



Photo 3. Willow Woods Showing Trash Accumulation



Typical species in these include *Salix alba*, *S. fragilis*, *Populus nigra*, *Rubus caesius*, *Urtica dioica*, *Galium aparine*, *Phalaris arundinacea*, *Carex remota*, *Glechoma hederacea*, *Rumex sanguineus*, *Lycopus europaeus* etc. They also contain a number of invasive species such as *Acer negundo* which is abundant in understory layer of almost every surveyed stand, *Fraxinus americana*, *Morus alba*, *Parthenocissus quinquaefolia*, *Fallopia japonica*, *Echinocystis lobata* etc.

These willow sites in the Study area are not recognized as priority biodiversity features in this area, since they are degraded and unrepresentative of the habitat type. In addition, these sites are mainly far from the motorway corridor, and lie between the river and motorway, so are not likely to be directly impacted by the Project.

3.3 Early Stages of Hay Meadow Grassland

One other example of “near natural” vegetation in the Study area is a number of small patches or narrow strips of early successional stages of mesophilous grassland on abandoned cropland, see Photo 4. Apart from its nearly-natural nature, this has no conservation significance.

Photo 4. Early Successional Stages Towards Mesophilous Grassland on Abandoned Cropland



3.4 Natural Riverine Habitat

There are also very likely to be some smaller areas of a riverine habitat type characterised as ‘Muddy river banks with annual pioneer nitrophilous vegetation of the *Chenopodium rubri* p.p. and the *Bidention* p.p. alliances’. This is also listed in the EU Habitats Directive (code: **3270**). (*Annex 3, Photo 1*). Photo 5 below shows a likely site of this habitat, although as this kind of vegetation only develops later in the year, its presence could not be confirmed during the survey, and the species checklist could not be made. This would also represent a priority biodiversity feature according to EBRD PR6.

Photo 5. River Bank. Possible site of Annex 1 Habitat Type 3270 (Muddy river banks with annual pioneer nitrophilous vegetation of the *Chenopodium rubri* p.p. and the *Bidention* p.p. alliances)



4. Terrestrial Species

4.1 Flora

The list of recorded plant species is given in Annex 3.

Based on the survey work and literature search, none of the plant species found in the Study Area are of conservation interest/concern at a national, EU or global level.

4.2 Fauna

The data on fauna were collected within the Study Area, and particularly from the twelve Survey Sites marked in Map 1.

Invertebrates: The data collected for invertebrates (dragonflies, butterflies, moths, snails) do not indicate the presence of species of conservation interest, except for sporadic sightings of *Lycaena dispar* (Large Copper Butterfly) which is listed in the Annex II of the Habitats Directive. However, this is insufficiently represented in the Study area for it to be considered of conservation significance. Data on recorded terrestrial invertebrates are given in Annex 4.

Reptiles & Amphibians: Data on recorded amphibians and reptiles are given in Annex 6. This data is not quantitative. Several areas within the wider area potentially influenced by the Motorway Project could have significance as special places for reproduction for amphibians and reptiles. All wetland sites along the river, are potentially favorable for reproduction of amphibians due to the absence of fish species.

With regards to reptiles, the only recorded species of conservation interest is *Emys orbicularis* – the European Pond Turtle - (EN according to IUCN Red list, and listed in Annex II of the Habitat Directive). This was found at Site 11, near Podnovlje, which is outside the area where direct habitat destruction could occur as a result of either Project. The fieldwork also suggested this species could have a sporadic presence in the small river branches near to the River Bosna, although they are

much more likely to inhabit wetlands and stagnant water along the river, and not the watercourses, habitat types which were not recorded during the survey. Therefore, their presence in the Study Area itself is not confirmed, even if they are present, the likely habitats of Pond Turtles would not be directly threatened by the Motorway. Nevertheless, as a precautionary measure, the need for mitigation has been considered in Section 8.

Birds: The list of birds recorded in the area is found in Annex 7. From the data collected on the bird species present along the planned route of motorway, it is clear that there are no sites that contain significant populations of protected species nor are there any individual nesting places that could be particularly endangered by the Motorway construction. Habitats which could have potential importance for birds include the riverbanks, river branches and the backwaters, however, none of these are within the area where vegetation will be disturbed by Motorway construction. Photo 6 shows an island within the river channel, which could be a suitable habitat for birds.

Photo 6. Island Within the River Channel



Some nesting bird species were recorded in the area. These include: *Lanius collurio*, *Fringilla coelebs*, *Lanius minor* and *Sylvia nisoria*. These are recorded as Least Concern on the IUCN Global Red List, but listed in Annex I of the EU Birds Directive. *Streptopelia turtur* was also recorded, which is Vulnerable (IUCN Red List), and listed in Annex II of the Birds Directive. During the field survey, none of these were found to be nesting within the zone of direct influence of the motorway. These birds are all common and widespread in the Republic of Srpska and are not unique to the Bosna River valley. These species usually inhabit a variety of habitats, including degraded habitats, agricultural areas, shrubby areas and small fragments of forests like the ones along the Valley of Bosna River. Removing limited areas of vegetation for construction of the Motorway will not harm their populations because they are far more widespread and far more numerous in other habitats in the surrounding area (forests and many other areas throughout the Republic of Srpska). The vegetation that will be lost due to the construction of the Motorway and the surrounding area of wider impact is not at all significant nor essential for this species. During the Biodiversity screening only a few pairs were recorded, none within the area where vegetation will be cleared for the Project. The habitats in the Study Area where these species were recorded are poor in quality and unrepresentative for them.

The non-nesting species of conservation interest recorded in the area include: *Ciconia nigra*, *Ardea alba*, *Egretta garzetta*, *Nycticorax nycticorax*, *Sterna hirundo*, *Dryocopus martius*. Photo 7 shows the Black Stork (*Ciconia nigra*), one of the protected bird species that visits the River Bosna during

its daily searches for food. Although spotted in the overall Study Area, these species are just as likely to be found outside of the Project corridor, as within it. These birds often fly over the Project area or visit sites within it during the daily search for food.

Photo 7. Black Stork Sighted in Study Area



Two other bird species of international conservation interest - *Falco vespertinus*, *Grus grus* – were spotted in the Project Area. *Falco vespertinus* is thought to pass through the Bosna River Valley during migration. *Falco vespertinus* is Near Threatened according to the IUCN Red List, while *Grus grus* is of Least Concern. *Grus grus* passes over at higher altitudes (over 300 m). There is no data on the numbers of these species flying over the area but none were recorded as stopping or congregating at any location along the river. These both generally nest at distant sites outside of Bosnia and Herzegovina. There is unlikely to be any Project effect on these species. All these bird species of conservation interest are shown in Annex 7.

Mammals: Annex 8 lists the main species of mammals recorded in the area of the Bosna River Valley. This includes 8 species that are most commonly encountered along the valley of the river Bosna, and 3 additional species which previous fieldwork indicates are present in the area, backed up by information from the hunting association. Despite the recorded presence of bats, there are no significant roosting or foraging habitats for bats, and no specific hunting areas that stand out as significant in the Study Area. In fact, the Bosna River Valley itself is not a key habitat for bats. Any bats that do exist in the Study Area are most likely to roost in abandoned residential buildings and church towers, and in the wider area, in the mountainous areas on either side of the Bosna River Valley. None of these are within the Motorway corridor, and no bat roosts will be disturbed by the Project. The most likely flight paths for bats foraging in the area are the forests and the river channel, which are not bisected by the route of the Motorway. With regard to other mammals, the zone of direct impacts from destruction of vegetation - does not threaten any of the clearly defined important habitats for mammals.

Potential Wildlife Crossing Zones: The mammal species related to watercourses which have a protection status are: *Castor fiber* and *Lutra lutra*. *Lutra lutra* is included on Annexes II and IV of the EU Habitats Directive and should therefore be protected wherever it occurs. A number of conservation measures have contributed to the recovery of *Castor fiber* in Europe, including reintroductions and translocations, hunting restrictions, and habitat protection. It is listed under the Bern Convention (Appendix III) and the EU Habitats and Species Directive, being included on Annex II and IV.

Both species have been recorded close to the river Bosna and also in the smaller tributaries as shown on Maps 2.1 – 2.3 in Annex 2. The Projects could affect their access to habitat if effective wildlife crossings are not provided.

Several species of mammals noted in the Study Area are considered game for hunting - *Lepus europaeus*, *Canis vulpes*, *Canis aureus*, *Martes foina*, *Meles meles*, *Capreolus capreolus*. Based on information from the survey and confirmation from local hunters, these are particularly represented at two points:

- At Site 2 (Kostajnica), in the area between the wooded Trebava Mountain and the river Bosna. This is in the Project 1 area; and
- In the wider zone around Site 6, (Kožuhe), in the wooded area at the relict ox bow lake, which is in the Project 2 area.

These locations are marked in red in Maps 3 and 4 below, and are illustrated in Photos 8 and 9.

The conservation status of these mammals is shown in the table below.

Species	English Name	HD	IUCN	Bern	Status in BiH/Balkans
<i>Lepus europaeus</i>	European Hare	-	LC	III	Temp protection in RS, although they are hunted in some seasons.
<i>Canis vulpes</i>	Red fox	-	LC	-	None
<i>Canis aureus</i>	European Jackel	V	LC (NT in EU25)	-	None
<i>Martes foina</i>	Beech Marten	-	LC	III	None
<i>Meles meles</i>	Eurasian Badger	-	LC	III	None
<i>Capreolus capreolu</i>	European Roe Deer	-	LC		Temp protection in RS, although they are hunted in some seasons.

Map 3. Wildlife Crossing Zones at Site 2. Kostajnica



Map 4. Potential Wildlife Crossing Zones at Site 6. (Kožuhe)

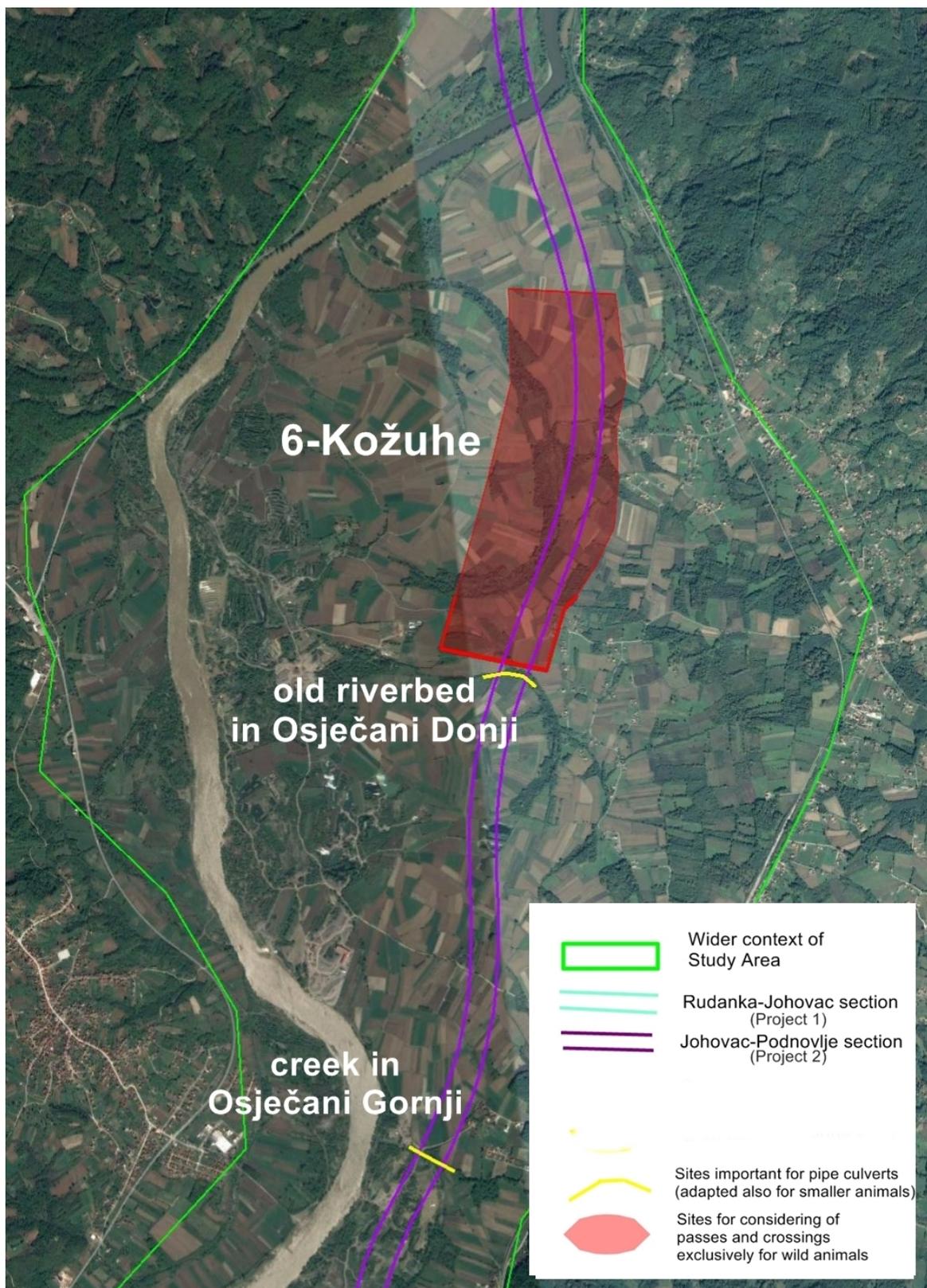


Photo 8. Site 2, Potential Animal Crossing Zone at Kostajnica



Photo 9. Site 6, Potential Animal Crossing Zone at Kožuhe



5. Riverine Habitats, Flora & Fauna

Almost all the riverine habitats recorded in the area are heavily degraded, and are not representative of good quality riverine habitats, and they do not invite particular actions to protect

them, with the exception of the one area of good quality relict riverine alder forest near Kožuhe village, as discussed earlier.

The river banks at the proposed location of the two bridges are not of conservation significance regarding fauna, flora or habitats. The location of the bridge crossing at Rudanka (Kostajnica) (Map 2.1, Annex 2) is covered by cropland and gravel extraction facilities, while the location in Kožuhe (Maps 2.2 and 2.3 in Annex 2) is covered by cropland on the right river bank and on the left bank, by a complex vegetation pattern of cropland, small poplar plantations and remnants of riparian forests now presented by several trees of *Ulmus effusa*, *Salix alba* with a lot of *Acer negundo*, *Morus alba*, *Fraxinus Americana* and *Parthenocysus quinquefolia*.

None of the macroinvertebrates which have been recorded in the River Bosna are species indicative of conservation interest.

Annex 5 contains a list of fish recorded along the stretch of the river Bosna in the Dobož and Modriča area. This data originated from the collection of caught species by the fishermen, as listed in the "Fishing Waters Programme" for Dobož and Modriča, and from reports from the Public Institution "Vode Srpske" related to monitoring of surface water quality in the Republic of Srpska for 2015 and 2016. No site specific fisheries baseline research is known to have been conducted in this area of the River Bosna. The most common species of fish in the Dobož and Modriča areas are common to lowland rivers and stagnant waters in BiH, and they tend to be the species more tolerant to pollution, e.g. *Esox Lucius*, *Squalius cephalus*, *Silurus glanis*, *Perca fluviatilis*, *Barbus barbus*, and *Alburnus alburnus*. In the area of direct influence of the Motorway between Rudanka (Kostajnica) and Podnovlje, there are no wetlands which could be considered of significant importance for fish. Furthermore, the abandoned quarries in the area which are filled with water – see Map 2, Sites 4, 9, 10 on the map 5; and Photo 10 below - which intersect, the Motorway route, are not considered to be of conservation importance for the survival of fish.

Photo 10. Abandoned Quarries Filled with Water (Site 4, Grapska)



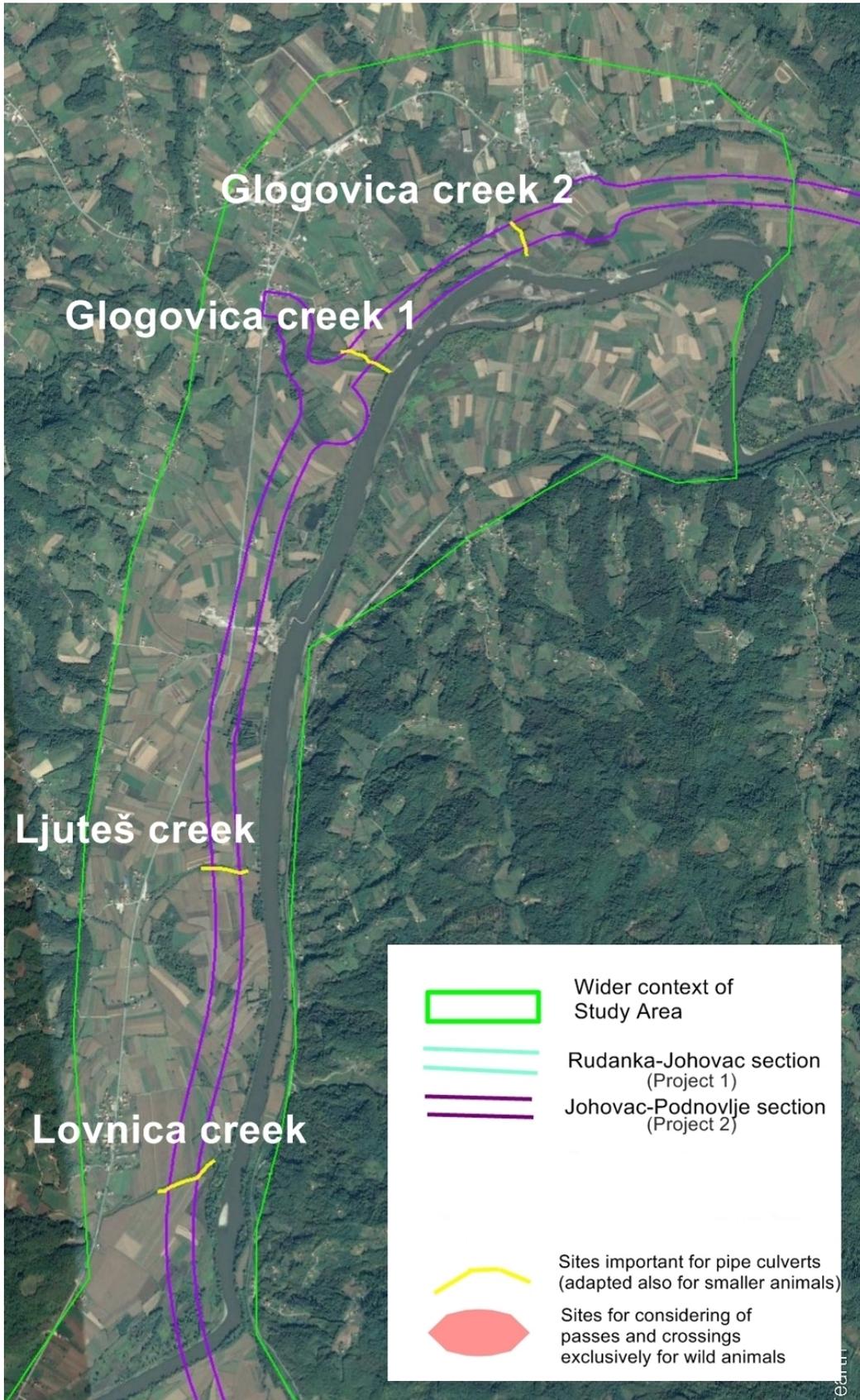
This stretch of the River Bosna is not protected and has no biodiversity features of conservation significance. The fish species found in the area – such as *Esox lucius*, *Rutilus rutilus*, *Squalius cephalus*, *Chondrostoma nasus*, *Barbus barbus*, *Alburnus alburnus*, *Abramis brama*, *Vimba vimba*, *Carassius gibelio*, *Cyprinus carpio*, *Silurus glanis*, *Ameiurus nebulosus*, *Lepomis gibbosus*, *Sander lucioperca* and *Perca fluviatilis* - are common to the entire watercourse of the River Bosna flowing through the Dobož and Modriča area. It is therefore concluded that the Project construction (in particular the works in the river related to the establishment of bridge piers and bridge construction) would not have a significant impact on fish fauna of the Bosna river.

Species such as *Leucaspis delineatus*, *Squalius cephalus*, *Chondrostoma nasus*, *Gobio obtusirostris* and some others fish species are believed to use small tributaries/ streams that flow into the river Bosna, some of which will be intersected by the Motorway. These locations include the following streams:

- Grapska Creek (Gornja Grapska);
- River Lukavica (Bušletić);
- Lovnica (Majevac) Creek;
- Ljuteš (Trnjani) Creek; and
- Glogovica Creek (Glogovica).

The locations of these can be seen marked on Maps 3 and 4 shown earlier, and on Map 5 below. Species such as *Romanogobio uranoscopus* (listed in Annex II of the Habitats Directive), *Romanogobio kessleri*, *Barbus balcanicus* (listed in Annex V of the Habitats Directive) and *Cottus gobio* (listed in Annex II of the Habitats Directive) were recorded downstream in the municipality of Modriča and it is possible that these could also use certain tributaries of Bosna River and their upper reaches. The presence of these species could be a potential reason for interest in the Bosna River as a system which needs a degree of protection, as the Habitats Directive requires steps to be taken to manage the core habitats of these species. However, provided that adequately sized culverts are provided in the places where the Motorway intersects these streams/tributaries and other watercourses to maintain the flow and connectivity between these streams and the River, and that the natural state of sediments is maintained in all these tributaries, negative impacts that could affect the natural movement of fish between the mentioned watercourses and Bosna river is considered to be negligible.

Map 5. Suggested Crossing Points in Northern Section



6. Status of River Bosna

6.1 Information on Status of Bosna River

The following statements summarise the information available on the protection status of the River Bosna.

1. The Bosna River is not an Emerald Site or Natura 2000 site. It has not been formally proposed as such by the authorities in either part of Bosnia.
2. In the Spatial Plan for Republika Srpska (RS) 2015 - 2025, the River Bosna is not planned for designation as a nature conservation area, and was not included as one of 130 sites 'proposed' for protection in the planning period (up until 2025). These sites were identified by biodiversity experts from RS.
3. The natural and cultural heritage resources of the area of the Corridor Vc Motorway construction were evaluated by the Institute for Cultural and Natural Heritage in 2009, and proposed the conservation and mitigation measures, which have been included in the EIA and Ecological Permit. Additionally, the Registry of Designated Nature Conservation Areas does not indicate presence of any designated natural values along the two road sections.
4. An EU-funded Project *Support to Implementation of the Birds and Habitats Directives in Bosnia and Herzegovina* – identified the River Bosna as one of 62 sites in Republika Srpska which are to be considered for future protection. The Institute for Cultural and Natural Heritage has confirmed verbally that the reason for listing was the terrestrial vegetation adjacent to the river. Certain other stretches of the River Bosna – outside of the Study Area - are being considered for future protection: upstream of Doboј (in FBiH) and downstream of Modriča. The River stretch in the Study Area is not being considered for protection.
5. The River Bosna (in its entirety in RS, we understand), was also included in a draft *Decree on the Ecological Network*, developed by the same Project. However this is an internal document only, and the Institute for Cultural and Natural Heritage has confirmed that, as a legislative tool, this draft Decree is at a very early stage of development, and that it is unlikely that all sites listed in the draft Decree will end up in any final Decree.
6. An expert opinion was requested from the Institute for Cultural and Natural Heritage about the status of the River Bosna as the potentially protected area, about the data on habitats and species on the river section in question, as well as on plans in respect to adopting a Regulation on Establishing the Ecological Network in Republic of Srpska. The Institute's response is cited in Annex 9, which confirms that there are no current or planned protected areas in the Study Area, and states that as of the present date (May 2017), there are no plans to implement a Regulation of Establishing the Ecological Network in Republic of Srpska.
7. A statement was requested and obtained from the Public Institution "Vode Srpske" (River Basin Authority) regional office in Banja Luka, on the quality of the River Bosna watercourse in the Study Area. The statement is included in Annex 9, and confirms that according to data from continuous monitoring of the quality of the River Bosna, and based on the analysis of physical and chemical, microbiological and biological parameters, the river water quality in the stretch between Rudanka (Kostajnica) and Modriča, mainly ranges from Class II to III (in accordance with Decree on classification and categorization of watercourses (Off. Journal of RS, No. 42/2001). In addition, there are no areas marked as significant for survival of aquatic species such as phytobenthos, macrozoobenthos (macroinvertebrates) and ichthyofauna.

8. A statement was requested and received from the Forest Enterprise “Doboj” from Doboj, see Annex 9. This statement notes that the Forest Enterprise is not aware of any confirmed conservation-significant natural forests on the subject area of the planned motorway section (*Annex 4, page 6*).

6.2 Conclusions Regarding Bosna River Protection Status and Plans

From these consultations, and from the fieldwork conducted during this study, it is concluded that there are no imminent plans to designate any part of the Study Area as ‘protected’. Furthermore, with the exception of the small area of Annex I priority habitat identified in this Report and occurrence of some threatened species, there are no significant areas of biodiversity interest in the Study Area, which are considered to merit protection. It appears, therefore, that the reasons for including the ‘River Bosna’ as one of the sites to be studied for future protection, are not primarily related to this Project Study Area.

Notwithstanding this conclusion, priority biodiversity features potentially impacted by the Project are considered worthy of protection from Project effects, as described in the Sections below, and mitigation measures have been proposed to address this during Project construction and operation.

7. Project Effects

Based on the survey of the area, and an examination of the Project details, the following significant impacts can be identified. These are in addition to those impacts identified in the EIA documents:

7.1 Damage to Alder Wood (Priority Biodiversity Feature)

After an analysis of the biodiversity features identified in the Study Area, it can be concluded that there is one potentially affected area which could be considered to constitute a *priority biodiversity feature* within the definition of PR6, namely the isolated clump of alder woods near Kožuhe, as shown on Map 2.2 of Annex 2, and Photo 1. As already stated, this habitat is listed as a Priority Habitat on Annex I of the Habitats Directive (code 91E0*), but this example is small and isolated. The EU Habitats Directive lists threatened Natural Habitats in Annex I (“Annex I Habitats”). Annex I priority Natural Habitat types are indicated by an asterisk in Annex I and are considered to be particularly threatened and in “danger of disappearance”, making them a priority for conservation within their range. Because these habitat types are defined as being in danger of disappearance from their range in the EU, they are considered to be priority biodiversity features.

A comprehensive survey for this habitat type throughout the wider River ecosystem outside the Study Area was not possible within the scope of this Study. However it is considered appropriate to avoid its destruction unless this is unavoidable. The copse is close to the proposed Motorway corridor, and could be at risk from direct destruction from land clearance for the road, its embankment, or access requirements. From the design drawings available to date, the road corridor passes immediately to the east of this copse, and will likely avoid it. However, more detail on the detailed design and construction drawings is needed to ascertain the degree of risk from the scheme in its current form. This is related to Project 2 which is not scheduled to go ahead until mid 2018, so this will be confirmed (and the design altered if necessary) before the design documents are finalised. Because of the limited extent of this copse, and its representative nature, any removal of the trees or associated vegetation would have a significant detrimental effect and should be avoided.

7.2 Effect on Potential Wildlife Corridors at Kožuhe and Kostajnica

The data collected on the fauna movements in the area suggest two zones of greater faunal diversity, and an increased presence of important species of hunting interest, most likely associated with a higher frequency of movement between the nearby forests and the River Bosna. Animals likely to use these areas which have a protection status are: *Lepus europaeus*, *Canis vulpes*, *Canis aureus*, *Martes foina*, *Meles meles*, *Capreolus capreolus*. The zones in question are those mentioned at Kostajnica (Site 2), and Kožuhe (Site 6), as mapped on Maps 3 and 4. The presence of the new Motorway in these areas will impinge upon animal movements to and from the river. One of these animals is protected under Annex V of the Habitats Directive, and three under Appendix III of the Bern Convention. Two have temporary protection in RS but are hunted during part of the year. Although not strictly protected, as good practice, steps should therefore be taken where practical, to provide safe crossing points for animals at these areas, during operation, and if possible, during the construction phase also.

7.3 Effect on Small Tributaries Flowing into Bosna River (Priority Biodiversity Feature)

The small watercourses which act as tributaries to the River Bosna, some of which will be crossed by the Motorway, have been identified as important for a number of terrestrial and aquatic species. Mammal species which have a protection status which are likely to use these watercourses are: *Castor fiber* and *Lutra lutra*, which were recorded close to the river Bosna and also in the smaller tributaries as shown on Maps 2.1 – 2.3 in Annex 2. *Lutra lutra* is listed in Annex II of the Habitats Directive.

These streams may also be used by fish, amphibians and other smaller animals moving between the upper reaches of these streams, and the main river.

These tributaries have been identified on Map 3, 4 and 5, and are known to the Project designers. It is understood that the design will incorporate culverts as necessary at these streams, to allow continued drainage to the river. These culverts will also allow passage of animals, so the overall residual effect should be minor. However, flow and animal passage through these must also be maintained during construction and the specific requirements of otters must be considered to ensure that designs allow their safe passage during all conditions, including when rivers are in flood. For otter, installation of ledges within the culverts should be considered, for example. These measures are necessary to ensure there is no net loss of biodiversity as a result of the Project, which is a requirement that is applied to priority biodiversity features.

7.4 Degradation of Riverine Habitat (Priority Biodiversity Feature)

Although not confirmed by the surveys, parts of the river banks may contain the habitat type listed in the Habitats Directive as 3270 'Muddy river banks with annual pioneer nitrophilous vegetation of the *Chenopodium rubri* p.p. and the *Bidention* p.p. alliances'. Since this is listed as an Annex I habitat type, it would be considered to be a Priority Biodiversity Feature. As a precaution, damage to the river banks must therefore be avoided where possible and minimised where necessary. Some temporary damage to the river banks will be unavoidable at the two short sections of river bank where the bridge construction will occur. Although this habitat type is not yet confirmed at these locations, steps should be taken to confine the construction works to the area where work is strictly necessary, and to ensure that a full reinstatement of the river banks is performed once the works are complete. In addition, steps should be taken to ensure that no other section of the river banks are damaged, or even accessed by the contractor during the works.

7.5 Effects Determined to be Not Significant

Effect on Habitat of Large Copper Butterfly

The sporadic sightings in the area of the *Lycaena dispar* class (Large Copper Butterfly) suggest that it has suitable habitat in the Study Area. Since this species is listed in Annex II of the Habitats Directive, its habitats could be considered a Priority Biodiversity Feature. However, the assessment has concluded that it is insufficiently represented in the Study area for it to have a conservation significance. In addition, the Project construction is unlikely to have any significant effect on its habitats. A significant impact from the Project can therefore be discounted.

Effect on the European Pond Turtle

Emys orbicularis – the European Pond Turtle – has an Endangered status (according to IUCN Red list), and is listed in Annex II of the Habitats Directive. This turtle was spotted at one location near Podnovlje, but not in an area where Project-related direct habitat destruction could occur. Although the species could be present in the small river branches near to the River Bosna, it is much more likely to inhabit wetlands and stagnant water along the river, and not the watercourses - habitat types which were not recorded during the survey. Given its IUCN Red List status, habitats for this species could be considered as Critical Habitat, and as a precaution, the streams linking to the river should therefore be preserved as functioning tributaries, even though the turtle was not found in the Study Area during the survey work. Even if it is present in the area, the Project is unlikely to have any significant residual effects on this turtle or its associated Critical Habitats required for its conservation of this species.

Effect on Bird Habitats

Birds: As stated earlier, some nesting bird species recorded in the area have a conservation interest. These include: *Lanius collurio*, *Fringilla coelebs*, *Lanius minor* and *Sylvia nisoria*. These are recorded as Least Concern on the IUCN Global Red List, but listed in Annex I of the EU Birds Directive. *Streptopelia turtur* was also recorded, which is Vulnerable (IUCN Red List), and listed in Annex II of the Birds Directive. However, none of these species were found to be nesting within the zone of direct influence of the motorway. These birds are all common and widespread in the Republic of Srpska and are not unique to the Bosna River valley. Removing limited areas of vegetation for construction of the Motorway will not harm their populations because they are far more widespread and far more numerous in other habitats in the surrounding area (forests and many other areas throughout the Republic of Srpska). The vegetation that will be lost due to the construction of the Motorway and the surrounding area of wider impact is not at all significant nor essential for this species. During the Biodiversity screening, only a few pairs were recorded, none within the area where vegetation will be cleared for the Project. The habitats in the Study Area where these species were recorded are poor in quality and unrepresentative for them.

The non-nesting species of conservation interest recorded in the area include: *Ciconia nigra*, *Ardea alba*, *Egretta garzetta*, *Nycticorax nycticorax*, *Sterna hirundo*, *Dryocopus martius*. See Photo 6 below, which shows the Black Stork (*Ciconia nigra*), one of the protected bird species that visits the River Bosna during its daily searches for food.

By collecting data on bird species present along the planned route of motorway, it was clear that there are no sites that contain significant populations of protected species nor as individual nesting places that could be particularly endangered by the Motorway construction. Habitats which could have potential importance for birds include the riverbanks, river branches and the backwaters, however, these are scattered outside the inner zone of influence of the motorway. Photo 6 shows an island within the river channel which could be a suitable habitat for birds.

Other Not-Significant Effects

The entire zone of direct effect of the Motorway route from Rudanka (Kostajnica) to Podnovlje, does not include any key terrestrial habitat for protected fauna. No significant direct effects on fauna will occur from habitat destruction caused by the Project. Additionally, given that most of the Motorway will be formed on an embankment, the Motorway will not threaten any aquatic fauna habitat, neither those directly linked to the Bosna River during flooding, nor the ones which are fed by groundwater.

Any changes of the hydrology characteristics of the Bosna river during the building of the bridges and the highway will have a local and short-term character. Since there will be no long term, permanent changes to the hydraulic performance of the river (apart from possibly during short term flood events), no negative effects on fish and aquatic macroinvertebrates, or water quality, are expected.

Any potential negative effects on the fish migration, amphibians and other smaller animals are avoided by building the culvert crossings as proposed below, and other than these, there are no known established wildlife corridors which act as a route for protected species of amphibians and reptiles, which would be intersected by the Motorway.

Additionally, there is not likely to be a significant effect on locations that are important for nesting birds. No nesting birds were found within the Project corridor. The potential nesting habitats outside of the direct Project corridor are sufficiently represented and connected with the river to ensure unimpaired daily and seasonal movements and feeding of birds.

The two species of migratory birds which were spotted in the skies over the Project area are not known to stop or congregated in the Study Area, and both generally nest outside of Bosnia and Herzegovina. There is unlikely to be any Project effect on these species.

In general, since birds naturally avoid infrastructure, physical barriers, and noise and vibration, bird collisions with vehicles are not likely. However, any fencing and noise barriers should be designed so as to be clearly visible.

7.6 Summary of Significant Effects

The following table summarises the significant Project effects discussed above, which need specific mitigation.

Feature/Resource	Characterisation	Project Effect	Mitigation
Alder wood at Kožuhe	HD Annex I Priority Habitat (91EO*), PBF	1 copse of alder trees close to Motorway at Kožuhe, could be damaged during construction.	Revision of alignment and access plans (if necessary) to achieve strict avoidance and No Net Loss.
Mammals using Wildlife Corridors at Kožuhe and Kostajnica			
• <i>Lepus europaeus</i>	Bern III, protected for hunting in RS	Disruption of access to river during construction and operation.	Creation of large box culvert to allow access underneath Motorway.
• <i>Canis vulpes</i>	-		
• <i>Canis aureus</i>	-		
• <i>Martes foina</i>	Bern III		
• <i>Meles meles</i>	Bern III		
• <i>Capreolus capreolu</i>	Protected for hunting in RS		
Animals using small streams			
• <i>Castor fiber</i>	HD II, IV, PBF	Disturbance to watercourse habitats during construction and disruption of access during operation.	Eight watercourses identified to be preserved by culverts designed to allow passage.
• <i>Lutra lutra</i>	HD II, IV, PBF		
Muddy River Banks	HD Annex I Habitat (3270), PBF	Unclear if present in Project area.	Strict avoidance of river bank areas, except for limited extent necessary to create bridge crossings, full rehabilitation.

<i>Lycaena dispar</i>	HD II, could be PBF but not sufficiently represented in area.	Not sufficiently represented in area.	Vegetation removal will only occur as necessary, with rehabilitation of all disturbed areas.
<i>Emys orbicularis</i>	Could trigger PBF if found in area.	Not found in Project area.	Eight watercourses identified to be preserved by culverts designed to allow passage.

PBF = Priority Biodiversity Features (according to PR6).

8. Mitigation of Project Effects

Based on the above examination of Project effects, the following specific measures are required to comply with PR6, in addition to those already identified in the EIAs and the Ecological Permit. A Biodiversity Management Plan (BMP) will be developed to include these.

8.1 Steps to Avoid Damage to the Alder Copse at Kožuhe

Where feasible, avoid any damage to the trees and vegetation at the copse of alder wood near Kožuhe, by:

- Reviewing the alignment, detailed design, and land take (for construction and operation) at this location, to ascertain whether any of the current orientation of the embankment, land clearance or access activities require any of this copse of trees to be removed.
- If the current design interacts with the alder copse as identified in Map 2.2, take steps to amend the design to avoid removal, destruction or damage to the trees. Such measures could include: 1. Realigning the Motorway by the necessary number of metres to the east, or 2. Adding a section of vertical retaining wall for this stretch, rather than a sloped embankment, to reduce the aerial land take and avoid the copse.
- In all cases, ensure that the location of copse is marked in the design documents, and its location and importance made known to the contractor. Add requirements to the tender documents to ensure the contractor completely avoids any access and ingress to this area, and also avoids any actions which would cause damage or disturbance (including of the surrounding soil, vegetation and water table).
- Include in the monitoring requirements for construction and operation, a requirement to monitor the health and status of the copse.

8.2 Provide Wildlife Crossings at Kožuhe and Kostajnica

Add to the Project design a number of additional box culverts to run under the Motorway embankment. These culverts should be at least 2.5 m high and 10 m in width, and should be designed for the target species to ensure they have safe passage. At least one to be provided within the red area marked on Map 3 at Kožuhe (Project 2), and one at the red area marked on Map 4 at Kostajnica (Project 1). The advice of a local ecologist should be sought for the final location, sizing and design. These should be designed to comply with the requirements of the forthcoming Regulation on Animal Crossings (expected in later 2017).

During the post-construction rehabilitation, the advice of an ecologist should be sought to ensure that suitable vegetation is planted on the approaches to these culverts, to signal their presence to animals.

8.3 Ensure that Culverts are Adequately Sized at all Watercourses

All eight watercourses which cross the Motorway to be provided with adequately sized culverts to ensure that flow can continue unimpaired to the river at all times during construction and operation. It is understood that these are already planned as part of the current Project design. These should be designed to maintain the natural state of the sediment in the larger streams, aiming to maintain continuity and connection as well as fish migration between the river channel and smaller tributaries. These culverts should be further designed to target other terrestrial species (e.g. *Lutra lutra*) to ensure they have safe passage even when streams are in flood. This may mean installing ledges to allow otters to walk through the culvert, out of the water at such times, which is standard practice. Specialist input is likely needed to the design of these. These should be designed to comply with the requirements of the forthcoming Regulation on Animal Crossings (expected in later 2017). The required locations are:

Project 2:

- Glogovica Creek 2 (Map 8)
- Glogovica Creek 1 (Map 8)
- Ljutes Creek (Map 8)
- Lovnica Creek (Map 8)
- Old riverbed at Osjecani Donji (Map 7)
- Creek at Osjecani Gornji (Map 7)

Project 1

- Lukavica River (Map 6)
- Grapska Creek (Map 6)

8.4 Confine Work at the Riverbank to Areas at Two Bridges

Steps should be taken to confine the construction works at the river banks to the areas where work is strictly necessary. An area should be delineated in the tender drawings for work at the river banks, and all contractor access to the river banks outside of these areas should be prohibited. Where possible, the river banks at the bridges themselves should remain undisturbed, unless access is absolutely necessary.

The tender documents should also stipulate a complete reinstatement of the river banks affected by the construction works, with advice from local ecologists on the suitable vegetation to use in the reinstatement.

8.5 Measures for Birds

The height and density of all fencing should be adjusted to the terrain and local conditions so as to minimise the effect on mammal and bird species.

All fences and noise barriers should be made visible to birds and animals, especially where the Motorway follows the river or goes over it.

No large trees that could act as feeding, nesting or resting places for birds, should be planted along the Motorway embankments.

8.6 General Measures

Although the Project does not represent a significant risk to other habitats or fauna, the above assumes that other general measures as outlined in the EIAs, the Ecological Permit, Biodiversity Management Plan (BMP) and the ESAPs, will be taken to prevent and mitigate impacts to habitats, and to maintain the populations of key fauna species in the floodplain and riparian areas.

Additionally, once the forthcoming Bylaw on special technical measures for undisturbed and safe communication of wild animal species - due to be passed by the Ministry for Physical Planning, Civil Engineering and Ecology of the Republic of Srpska – is published, RSM should review its provisions and ensure that the Project conforms.

8.7 Monitoring Measures

The following monitoring measures will be included in the Biodiversity Management Plan.

Monitoring subject (parameter)	Location	Time	Note
During Construction			
Alder Wood	Near Kožuhe	During construction	To confirm that none of the wood area is damaged during construction.
Large mammals and other mammals	Kožuhe and Kostajnica	Before construction	To determine the species types and frequency of wildlife crossing the proposed Motorway alignment.
During Operation			
Large mammals and other mammals	Kožuhe and Kostajnica	Annually during operation	To determine the species types and frequency of wildlife crossing the Motorway.
Species which use tributaries of river Bosna – small watercourses (otters, beavers, fishes) and possibly European pond turtle)	At the intersection of small streams with Motorway	During operation	To determine the frequency of using the pipe culverts and possibly need for more frequent maintenance or adaptation. Also in order to determine whether <i>Emys orbicularis</i> uses these streams.
Wildlife mortality	Along the entire Motorway section Project 1 and Project 2	During operation	To record the number and types of animals killed from collisions on the Motorway.
Old riverbeds, wooded areas, including alder woods.	As mapped in Map 2	During operation	Visual inspection to identify any effects on health of vegetation, e.g. from dust, change in hydrological regime, etc.

8.8 Biodiversity Management Plan (BMP)

To ensure that these actions are developed, planned and implemented in a comprehensive manner, a Biodiversity Management Plan should be developed by experts commissioned by RSM, which will include all measures related to biodiversity, and combine those listed here with those listed in the EIAs and the Ecological Permit. A separate BMP should be developed for Project 1 and Project 2, although the post-construction/operation sections may be combined at a later date if the two Projects are to be maintained and monitored together. The BMP should be developed by biodiversity experts following good practice, and include the following:

- Summary of biodiversity context including specific resources to be protected.
- Legal and policy context, including any relevant good practice guidance.
- Objectives and targets of the BMP, including intended outcomes for specific species.
- Approach to mitigation, including how mitigation hierarchy is applied to each habitat/species.

- Management Actions
 - Before Construction (for Project 1 and Project 2)
 - During Construction (for Project 1 and Project 2)
 - After Construction/During Operation
- Completion Indicators.
- Biodiversity Monitoring Actions.
- Details on Implementation (including expertise needed and stakeholders to be consulted).
- Budget and timeline.
- Reporting Arrangements.
- Maps.

9. Summary of Findings and Recommendations

The key findings of the biodiversity Screening Exercise are as follows:

1. Status of the River Bosna:

The Bosna River is not an Emerald Site or Natura 2000 site, and has not been formally proposed as such by the authorities. Nor is it planned for designation as a nature conservation area, and is not included as one of 130 sites proposed for protection in the Spatial Plan for Republika Srpska (2015 – 2025).

The Institute for Cultural and Natural Heritage confirmed that, in its view, there are no current or planned protected areas or any designated natural values in the Study Area. As of May 2017, there are no plans to implement a Regulation of Establishing the Ecological Network in Republic of Srpska, which would include the Project area. The Institute evaluated the natural and cultural heritage resources of the Project area in 2009, and proposed the conservation and mitigation measures, which have been included in the EIA and Ecological Permit.

Neither the Public Institution “Vode Srpske” (River Basin Authority) nor the Forest Enterprise “Doboj” consider the River to have particular water quality value, or are aware of any confirmed conservation-significant natural forests in the Project area.

2. Priority Biodiversity Features in Project Area:

The Project area includes the following features which are considered to be *priority biodiversity features* according to EBRD’s Performance Requirement No 6.

- Fifteen small, isolated patches of willow-popular or alder woodland, one of which lies close to the proposed Motorway and must be protected.
- Certain stretches of the river banks (possibly, although this was not confirmed in the survey due to the lack of vegetation), unavoidable damage to which must be minimised.
- The small streams (eight were identified) which flow into the River Bosna, which host certain protected species of fauna, which must be preserved.
- Some protected birds species are known to fly over the area, but none nest in the Project corridor and the Project effects should be minimal. Two areas where small mammals may cross the road corridor were identified, so access across these must preserved as far as possible.

The river itself does not appear to host flora or fauna or habitats of conservation significance.

3. Likely Effects from Project 1 (Rudanka (Kostajnica)– Johovac (Tovira)) and Measures to Address

The following effects on biodiversity are expected to arise from Project 1 (Rudanka (Kostajnica) – Johovac (Tovira)), and implementation of the stated measures is required to address them:

1. Potential Wildlife Crossing Zone at Kostajnica

Certain mammals are likely to cross the road corridor at a particular zone identified at Kostajnica. These are: *Lepus europaeus*, *Canis vulpes*, *Canis aureus*, *Martes foina*, *Meles meles*, *Capreolus capreolus*. The presence of the Motorway will impinge upon these animal movements, and steps must be taken to provide safe crossing points for animals at these areas, during construction and operation.

An additional box culvert will be added to the Project design, which will run under the Motorway embankment. This culvert will be at least 2.5 m high and 10 m in width, and should be designed for the target species to ensure they have safe passage. At least one will be provided at the red area marked on Map 3 at Kostajnica (Project 1). The advice of a local ecologist should be sought for the final location, sizing and design. These should be designed to comply with the requirements of the forthcoming Regulation on Animal Crossings (expected in later 2017). Suitable vegetation should be planted on the approaches to these culverts, to signal their presence to animals.

2. Habitats and Connectivity at Small Tributaries Flowing into Bosna River

Two small watercourses, which are important for a number of protected mammal species such as *Castor fiber* and *Lutra lutra*, and may also be used by fish and amphibians moving between the upper reaches of these streams, and the main river.

These are:

- Lukavica River (Map 6)
- Grapska Creek (Map 6)

These watercourses must be provided with adequately sized culverts to ensure that flow can continue unimpaired to the river during construction and operation. These are already planned as part of the current Project design, but must be designed to maintain continuity and connection for these terrestrial species, as well as fish migration between the river channel and smaller tributaries, to ensure they have safe passage even when streams are in flood. This means installing ledges to allow otters to walk through the culvert, out of the water at such times, which is standard practice. Specialist input will be needed for the design of these, and they should be designed to comply with the requirements of the forthcoming RS Regulation on Animal Crossings (expected in later 2017).

3. River Bank Habitats

Parts of the muddy river banks may contain a habitat type protected under the EU Habitats Directive. Damage to the river banks must therefore be avoided where possible and minimised where unavoidable. Some temporary damage to the river banks will be unavoidable at the two short sections of river bank where the bridge construction will occur, although the presence of this habitat type was not confirmed at these locations.

The contractor must confine the construction works at the river banks to the areas where work is strictly necessary, i.e. at the bridge crossings. An area will be delineated for work at the river banks, and all contractor access to the river banks outside of these areas will be prohibited. The river banks at the bridges themselves should remain undisturbed, unless access is absolutely necessary, and should be rehabilitated with expert advice from local ecologists.

4. Likely Effects from Project 2 (Johovac-Tovira – Podnovlje) and Measures to Address

The following effects on biodiversity are expected to arise from Project 2 (Johovac- Tovira - Podnovlje), and implementation of the stated measures is required to address them:

1. Alder Wood at Kožuhe

An isolated clump of alder woods near Kožuhe, is of a type protected under the Habitats Directive, and is close to the proposed Motorway corridor, and therefore at risk from direct destruction from land clearance for the Motorway, its embankment, or access requirements. Damage to the copse should be avoided.

From the available design information, the road corridor passes immediately to the east of this copse, and will likely avoid it. However, alignment, detailed design, and land take must be reviewed at this location, to ascertain whether any aspect of the current design requires any of these trees to be removed. If so, steps will be taken to amend the design to avoid removal, destruction or damage to the trees, e.g. by realigning the Motorway or modifying the embankment to reduce the aerial land take and avoid the copse. The location of the copse will be marked in the design documents, and its location and importance made known to the contractor. The health and status of the copse will be monitored during and after construction.

2. Potential Wildlife Crossing Zone at Kožuhe

Certain animals with a protected status are likely to cross the road corridor at a particular zone identified at Kožuhe. These are: *Lepus europaeus*, *Canis vulpes*, *Canis aureus*, *Martes foina*, *Meles meles*, *Capreolus capreolus*. The presence of the Motorway will impinge upon these animal movements, and steps must be taken to provide safe crossing points for animals at these areas, during construction and operation.

An additional box culvert will be added to the Project design, which will run under the Motorway embankment. This culvert will be at least 2.5 m high and 10 m in width, and should be designed for the target species to ensure they have safe passage. At least one will be provided at the red area marked on Map 4 at Kožuhe (Project 1). The advice of a local ecologist should be sought for the final location, sizing and design. These should be designed to comply with the requirements of the forthcoming RS Regulation on Animal Crossings (expected in later 2017). Suitable vegetation should be planted on the approaches to these culverts, to signal their presence to animals.

3. Habitats and Connectivity at Small Tributaries Flowing into Bosna River

Six small watercourses, which have been identified as important for a number of terrestrial and aquatic species, will be crossed by the Motorway. These are:

- Glogovica Creek 2 (Map 8)
- Glogovica Creek 1 (Map 8)
- Ljutes Creek (Map 8)
- Lovnica Creek (Map 8)
- Old riverbed at Osjecani Donji (Map 7)
- Creek at Osjecani Gornji (Map 7)

These are used by protected mammal species such as *Castor fiber* and *Lutra lutra*, and may also be used by fish, amphibians and other smaller animals moving between the upper reaches of these streams, and the main river.

These watercourses must be provided with adequately sized culverts to ensure that flow can continue unimpaired to the river during construction and operation. These are already planned as

part of the current Project design, but they must be designed to maintain continuity and connection for these terrestrial species, as well as fish migration between the river channel and smaller tributaries, to ensure they have safe passage even when streams are in flood. This means installing ledges to allow otters to walk through the culvert, out of the water at such times, which is standard practice. Specialist input will be needed for the design of these, and they should be designed to comply with the requirements of the forthcoming RS Regulation on Animal Crossings (expected in later 2017).

6. Next Steps

The above recommendations are included in the Environmental and Social Action Plans (ESAPs) developed for Project 1 and Project 2. The following are the next steps to be taken by RSM.

1. RSM to ensure that the relevant ESAP recommendations are incorporated into the Tender Documents, before the procurement process begins.
2. RSM to engage a biodiversity specialist to develop a Biodiversity Management Plan (BMP) for Project 1 and Project 2, incorporating the biodiversity-related recommendations in the ESIAs, the Ecological Permit and the ESAP.
3. RSM to conduct a design check on the land take requirements at the alder wood, related to Project 2.

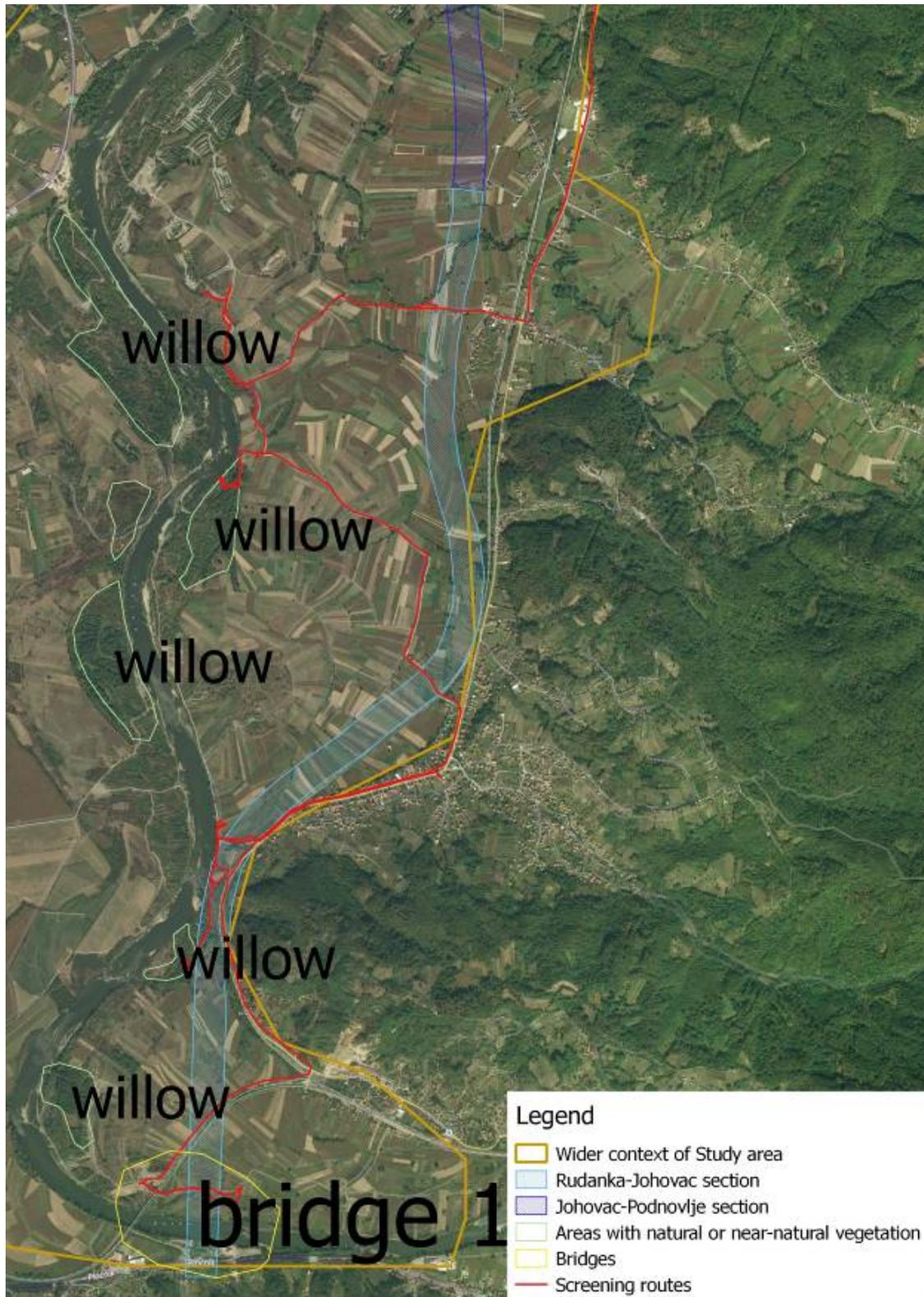
Annex 1. GPS Coordinates of Survey Sites

These refer to the locations marked on Map 1.

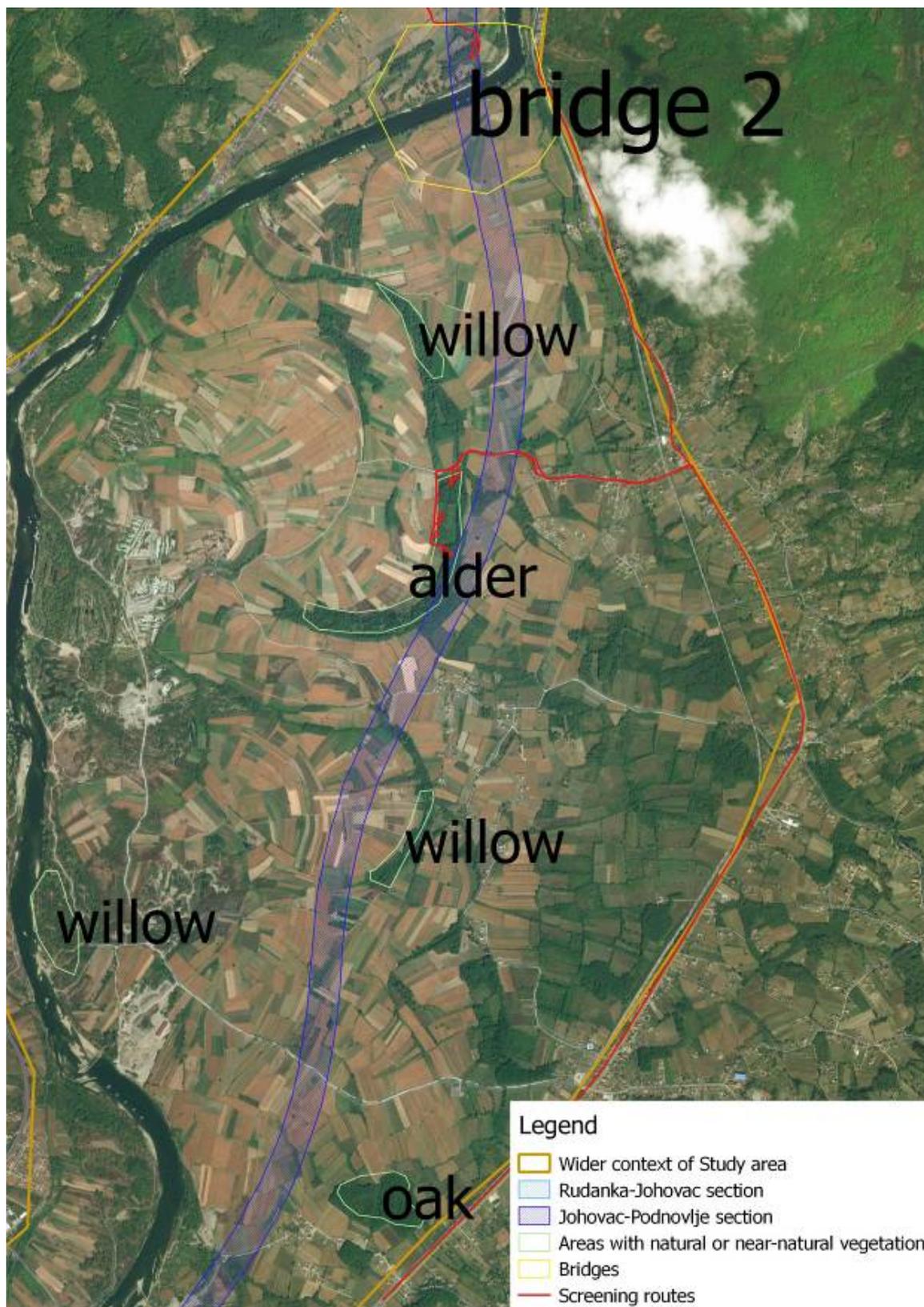
No	Site Name	Coordinates N	Coordinates E
1	Kostajnica, gravel extraction site	44°45'35.60"N	18° 3'46.59"E
2	Kostajnica, narrowing	44°46'19.32"N	18° 3'40.30"E
3	Grapska, old riverbed	44°47'23.06"N	18° 3'47.00"E
4	Grapska, abandoned excavation sites - ponds	44°48'0.22"N	18° 3'54.78"E
5	Grapska, Lukavica river	44°47'55.01"N	18° 4'33.82"E
6	Kožuhe, old riverbed	44°51'24.16"N	18° 5'46.32"E
7	Ritešić/Kožuhe, bridge	44°52'39.49"N	18° 5'55.59"E
8	Trnjani, old riverbed	44°53'47.12"N	18° 5'53.51"E
9	Glogovica/Božinci Donji, backwater and gravel excavation sites	44°55'1.57"N	18° 6'47.43"E
10	Podnovlje, gravel extraction site Narić	44°55'42.20"N	18° 8'3.21"E
11	Podnovlje, backwater	44°55'51.14"N	18° 8'40.12"E
12	Podnovlje, old riverbed willow thicket	44°56'3.35"N	18° 8'27.86"E

Annex 2. Maps

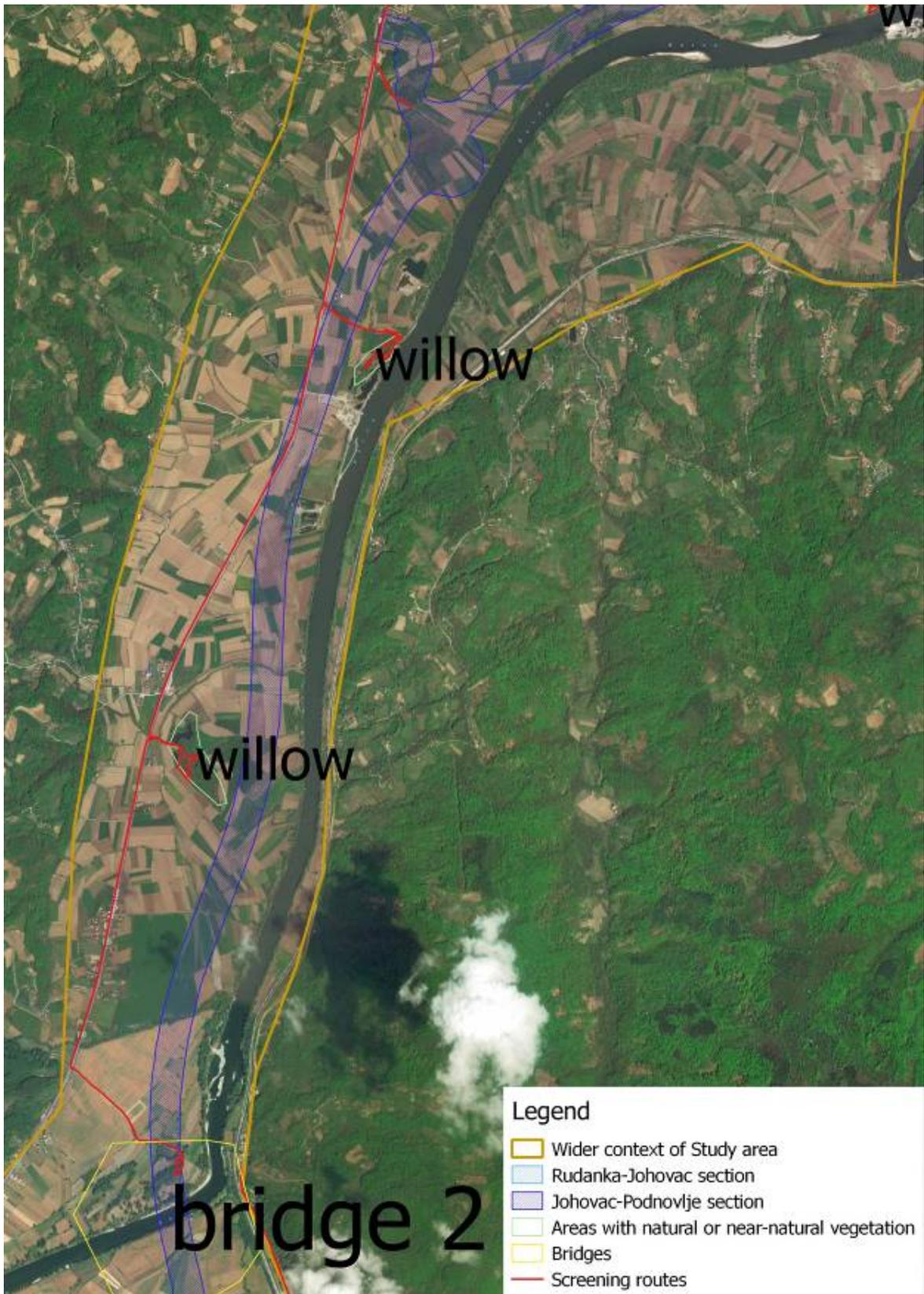
Map 2.1 Vegetation in South Part of Study Area (Rudanka (Kostajnica)– Bušletić)



Map 2.2. Vegetation in Central Part of Study Area (Osječani-Kožuhe)



Map 2.3. Vegetation in Northern Part of Study Area (Kožuhe-Podnovlje)



Annex 3. List of Flora Species

NEO: Neophyte; INV: Invasive

No	Species	Status	No	Species	Status
1	<i>Acer dasycarpum</i>	NEO	93	<i>Heracleum sphondylium</i>	
2	<i>Acer tataricum</i>		94	<i>Holcus lanatus</i>	
3	<i>Acer negundo</i>	INV	95	<i>Humulus lupulus</i>	
4	<i>Achillea millefolium</i>		96	<i>Iris pseudacorus</i>	
5	<i>Aegopodium podagraria</i>		97	<i>Juncus articulatus</i>	
6	<i>Agrimonia eupatoria</i>		98	<i>Juncus effusus</i>	
7	<i>Agropyron repens</i>		99	<i>Lamium album</i>	
8	<i>Agrostis stolonifera</i>		100	<i>Lamium purpureum</i>	
9	<i>Ajuga reptans</i>		101	<i>Leucanthemum vulgare</i>	
10	<i>Alisma plantago-aquatica</i>		102	<i>Ligustrum vulgare</i>	
11	<i>Allium scorodoprasum</i>		103	<i>Lotus corniculatus</i>	
12	<i>Allium vineale</i>		104	<i>Lychnis flos-cuculi</i>	
13	<i>Alnus glutinosa</i>		105	<i>Lycopus europaeus</i>	
14	<i>Amorpha fruticosa</i>	INV	106	<i>Lysimachia nummularia</i>	
15	<i>Anchusa officinalis</i>		107	<i>Lysimachia vulgaris</i>	
16	<i>Angelica sylvestris</i>		108	<i>Lythrum salicaria</i>	
17	<i>Anthoxanthum odoratum</i>		109	<i>Malva sylvestris</i>	
18	<i>Arabidopsis thaliana</i>		110	<i>Medicago arabica</i>	
19	<i>Arctium lappa</i>		111	<i>Medicago sativa</i>	
20	<i>Aristolochia clematidis</i>		112	<i>Mentha aquatica</i>	
21	<i>Arrhenatherum elatius</i>		113	<i>Molinia caerulea</i>	
22	<i>Artemisia verlotiorum</i>	INV	114	<i>Morus alba</i>	
23	<i>Artemisia vulgaris</i>		115	<i>Myosotis arvensis</i>	
24	<i>Asclepias syriaca</i>	INV	116	<i>Oenanthe aquatica</i>	
25	<i>Bellis perennis</i>		117	<i>Oenanthe banatica</i>	
26	<i>Berula erecta</i>		118	<i>Oenanthe fistulosa</i>	
27	<i>Bidens frondosa</i>	INV	119	<i>Oenothera biennis</i>	INV
28	<i>Brachypodium sylvaticum</i>		120	<i>Ornithogalum umbellatum</i>	
29	<i>Bromus hordeaceus</i>		121	<i>Papaver rhoeas</i>	
30	<i>Bromus sterilis</i>		122	<i>Parthenocissus quinquaefolia</i>	INV
31	<i>Calamagrostis epigejos</i>		123	<i>Pastinaca sativa</i>	
32	<i>Caltha palustris</i>		124	<i>Petasites hybridus</i>	
33	<i>Calystegia sepium</i>		125	<i>Peucedanum aegopodioides</i>	
34	<i>Capsella bursa-pastoris</i>		126	<i>Phalaris arundinacea</i>	
35	<i>Cardamine hirsuta</i>		127	<i>Picris hieracioides</i>	
36	<i>Cardamine pratensis</i>		128	<i>Plantago lanceolata</i>	
37	<i>Carex acuta</i>		129	<i>Plantago major</i>	
38	<i>Carex distans</i>		130	<i>Poa pratensis</i>	
39	<i>Carex hirta</i>		131	<i>Poa trivialis</i>	
40	<i>Carex otrubae</i>		132	<i>Polygonum hydropiper</i>	
41	<i>Carex remota</i>		133	<i>Polygonum mite</i>	
42	<i>Carex riparia</i>		134	<i>Populus alba</i>	
43	<i>Carex spicata</i>		135	<i>Populus nigra</i>	
44	<i>Carex strigosa</i>		136	<i>Potentilla reptans</i>	
45	<i>Carex vesicaria</i>		137	<i>Quercus robur</i>	
46	<i>Carex vulpina</i>		138	<i>Ranunculus bulbosus</i>	

47	<i>Centaurea jacea</i>		139	<i>Ranunculus polyanthemus</i>	
48	<i>Cerastium brachypetalum</i>		140	<i>Ranunculus repens</i>	
49	<i>Cerastium glomeratum</i>		141	<i>Reseda lutea</i>	
50	<i>Cerastium sylvaticum</i>		142	<i>Reynoutria japonica</i>	INV
51	<i>Chaerophyllum bulbosum</i>		143	<i>Rhinanthus rumelicus</i>	
52	<i>Chenopodium album</i>		144	<i>Robinia pseudoacacia</i>	INV
53	<i>Callitriche cophocarpa</i>		145	<i>Rorippa amphibia</i>	
54	<i>Circaea lutetiana</i>		146	<i>Rorippa austriaca</i>	
55	<i>Cirsium arvense</i>		147	<i>Rorippa sylvestris</i>	
56	<i>Clematis vitalba</i>		148	<i>Rubus caesius</i>	
57	<i>Clinopodium vulgare</i>		149	<i>Rumex acetosa</i>	
58	<i>Conium maculatum</i>		150	<i>Rumex crispus</i>	
59	<i>Convolvulus arvensis</i>		151	<i>Rumex sanguineus</i>	
60	<i>Corylus avellana</i>		152	<i>Salix alba</i>	
61	<i>Cornus sanguinea</i>		153	<i>Salix fragilis</i>	
62	<i>Crataegus monogyna</i>		154	<i>Salix triandra</i>	
63	<i>Crepis biennis</i>		155	<i>Sambucus nigra</i>	
64	<i>Dactylis glomerata</i>		156	<i>Scrophularia scopolii</i>	
65	<i>Daucus carota</i>		157	<i>Scutellaria hastifolia</i>	
66	<i>Echinocystis lobata</i>	INV	158	<i>Silene alba</i>	
67	<i>Eleocharis palustris</i>		159	<i>Silene vulgaris</i>	
68	<i>Equisetum arvense</i>		160	<i>Sinapis alba</i>	
69	<i>Equisetum palustre</i>		161	<i>Solanum dulcamara</i>	
70	<i>Erigeron annuus</i>	INV	162	<i>Solidago gigantea</i>	INV
71	<i>Eryngium amethystinum</i>		163	<i>Sorghum hallepense</i>	INV
72	<i>Euonymus europaeus</i>		164	<i>Stachys palustris</i>	
73	<i>Eupatorium cannabinum</i>		165	<i>Succisa pratensis</i>	
74	<i>Euphorbia cyparissias</i>		166	<i>Symphytum officinale</i>	
75	<i>Euphorbia esula</i>		167	<i>Taraxacum officinale</i>	
76	<i>Euphorbia helioscopia</i>		168	<i>Taraxacum paludosum</i>	
77	<i>Festuca pratensis</i>		169	<i>Thlaspia alliaceum</i>	
78	<i>Ficaria verna</i>		170	<i>Trifolium pratense</i>	
79	<i>Frangula alnus</i>		171	<i>Trifolium repens</i>	
80	<i>Fraxinus americana</i>	NEO	172	<i>Tussilago farfara</i>	
81	<i>Fraxinus angustifolia</i>		173	<i>Ulmus laevis</i>	
82	<i>Galeopsis speciosa</i>		174	<i>Ulmus minor</i>	
83	<i>Galium aparine</i>		175	<i>Urtica dioica</i>	
84	<i>Galium elongatum</i>		176	<i>Veronica arvensis</i>	
85	<i>Galium mollugo</i>		177	<i>Veronica chamaedrys</i>	
86	<i>Galium uliginosum</i>		178	<i>Veronica persica</i>	INV
87	<i>Geranium dissectum</i>		179	<i>Viburnum opulus</i>	
88	<i>Geum urbanum</i>		180	<i>Vicia hirsuta</i>	
89	<i>Glechoma hederacea</i>		181	<i>Vicia sativa</i>	
90	<i>Glyceria fluitans</i>		182	<i>Viola alba</i>	
91	<i>Hedera helix</i>		183	<i>Vulpia myuros</i>	
92	<i>Helianthus tuberosus</i>	INV			

Annex 4. List of Invertebrates

No	Species	Sites	Status	No	Species	Sites	Status
Dragonflies				Moths			
1	Anax imperator			1	Acontia trabealis		
2	Calopteryx splendens			2	Autographa gamma		
3	Coenagrion puella			3	Chiasmia clathrata		
4	Enallagma cyathigerum			4	Ematurga atomaria		
5	Erythromma viridulum			5	Euclidia glyphica		
6	Erythromma najas			6	fam. Geometridae		
7	Gomphus vulgatissimus			7	Idaea ornata		
8	Ischnura elegans			8	Ostrinia nubilalis		
9	Libellula depressa			9	Scopula immorata		
10	Orthetrum cancellatum			Snails			
11	Platycnemis pennipes			1	Arion fuscus		
12	Sympetrum sp.			2	Arion rufus		
Butterflies				3	Cepea sp.		
1	Aglais io			4	Fruticola fruticum		
2	Apatura iris			5	Helicella sp.		
3	Celastrina argiolus			6	Helix pomatia	1,2,10,12	HD - V;
4	Coenonympha pamphilus						
5	Coenonympha rhodopenensis						
6	Coenonympha glycerion						
7	Lycaena dispar	1,4,9	IUCN - NT; HD - II				
8	Maniola jurtina						
9	Melitaea athalia						
10	Melitaea phoebe						
11	Ochlodes sylvanus						
12	Pararge aegeria						
13	Pieris sp.						
14	Pieris rapae						
15	Pyrgus malvae						
16	Polyommatus icarus						
17	Vanessa atalanta						

HD – II: Listed in Habitats Directive Annex II
Sites: Refers to Survey Sites Marked on Map 1.

Annex 5. List of Fish

No	Species	Status	Remark
1	<i>Esox lucius</i>		
2	<i>Rutilus rutilus</i>		Data for Bosna downstream from Podnovlje
3	<i>Rutilus virgo</i>	HD -II	
4	<i>Leucaspis delineatus</i>		Besides from river Bosna it thrives in its smaller tributaries
5	<i>Squalius cephalus</i>		Besides from river Bosna it thrives in its smaller tributaries
6	<i>Leuciscus idus</i>		
7	<i>Ctenopharyngodon idella</i>	ALO	
8	<i>Aspius aspius</i>		Data for Bosna downstream from Podnovlje
9	<i>Tinca tinca</i>		Mostly in ponds and backwaters of the wider area of Doboj and Modriča municipalities
10	<i>Chondrostoma nasus</i>		Besides from river Bosna it thrives in its smaller tributaries
11	<i>Gobio obtusirostris</i> <i>Romanogobio</i>		Mainly small tributaries of Bosna River
12	<i>uranoscopus</i>	HD -II	Mainly small tributaries of Bosna River
13	<i>Romanogobio kessleri</i>		Mainly small tributaries of Bosna River
14	<i>Barbus barbus</i>	HD - V	
15	<i>Barbus balcanicus</i>	HD - V IUCN - EN; HD	Mainly small tributaries of Bosna River
16	<i>Chalchalburnus chalcoides</i>	- II	Data for Bosnia downstream from Podnovlje
17	<i>Alburnus alburnus</i>		
18	<i>Abramis brama</i>		
19	<i>Abramis sapa</i>		
20	<i>Ballerus ballerus</i>		
21	<i>Vimba vimba</i>		
22	<i>Rhodeus amarus</i>	HD -II	Data for Bosna downstream from Podnovlje
23	<i>Carassius carassius</i>		
24	<i>Carassius gibelio</i>	ALO IUCN -	
25	<i>Cyprinus carpio</i>	VU	
26	<i>Pseudorasbora parva</i>	ALO	Data for Bosna downstream from Podnovlje
27	<i>Misgurnus fossilis</i>	HD -II	Mostly in ponds and backwaters of the wider area of Doboj and Modriča municipalities
28	<i>Cobitis elongatoides</i>		Mostly in ponds and backwaters of the wider area of Doboj and Modriča municipalities
29	<i>Silurus glanis</i>		
30	<i>Ameiurus nebulosus</i>	ALO	Mostly in ponds and backwaters of the wider area of Doboj and Modriča municipalities
31	<i>Lota lota</i>		
32	<i>Lepomis gibbosus</i>	ALO	Mostly in ponds and backwaters of the wider area of Doboj and Modriča municipalities
33	<i>Gymnocephalus sp.</i>		Data for Bosnia downstream from Podnovlje
34	<i>Zingel zingel</i>		
35	<i>Sander lucioperca</i>		
36	<i>Sander volgensis</i>		Uncertain data for Bosnia downstream from Podnovlje

- 37 *Perca fluviatilis*
 38 *Cottus gobio* HD -II Mainly small tributaries of Bosna River

ALO: Allochthonous species
 HD - II, IV, V: Species from Annexes of EU Habitat directive
 IUCN: Species with threatened category at global level according to IUCN

Annex 6. List of Amphibians and Reptiles

Amphibians				
No	Species	Sites	Status	Remarks
1	<i>Pelophylax kl. esculentus</i>		-	
Reptiles				
No	Species	Sites	Status	Remarks
1	<i>Emys orbicularis</i>	11	IUCN - NT; HD -II	
2	<i>Lacerta viridis</i>			
3	<i>Podarcis muralis</i>			
4	<i>Zamenis longissimus</i>			
5	<i>Natrix natrix</i>			
6	<i>Natrix tessellata</i>	4,10,	HD - IV	

HD - II, IV: Species from Annexes of EU Habitat directive
 IUCN: Species with threatened category at global level according to IUCN

Annex 7. List of Birds

No	Species	Sites	Status	Remarks
1	Tachybaptus ruficollis			
2	Phalacrocorax carbo			
3	Ardea cinerea			
4	Ardea alba	1	WBD -I	Nesting species of the surroundings; does not nest in the wider area of the motorway impact
5	Egretta garzetta	1,2, 9,10	WBD -I	Nesting species of the surroundings; does not nest in the wider area of the motorway impact
6	Nycticorax nycticorax	9.11	WBD -I	Nesting species of the surroundings; does not nest in the wider area of the motorway impact
7	Ciconia nigra	7,9,12	WBD - I; CMS -II;	Nesting species of the surroundings; does not nest in the motorway route area
8	Cygnus olor		CMS -II;	
9	Anas platyrhynchos		CMS -II;	
10	Accipiter nisus		CMS -II;	
11	Buteo buteo		CMS -II;	
12	Falco tinnunculus		CMS -II;	
13	Falco vespertinus	10	IUCN - NT; WBD -I; CMS -II;	Nesting species of the remote surroundings; does not nest in the area of the motorway route but can be registered as migrant
14	Phasianus colchicus			
15	Gallinula chloropus			
16	Fulica atra			
17	Charadrius dubius		CMS - II;	
18	Actitis hypoleucos		CMS - II;	
19	Larus michahellis			
20	Larus ridibundus			
21	Sterna hirundo	2.9	WBD -I	Nesting species of the surroundings; does not nest in the wider area of the motorway impact
22	Columba livia domestica			
23	Columba palumbus			
24	Streptopelia turtur	1.11	IUCN - VU	Species is common; Bosna River valley is not its typical habitat
25	Cuculus canorus			
26	Asio otus			
27	Alcedo atthis	9	WBD -I	Nesting species of steep river banks of Bosna River; it does not nest at or around the planned route area
28	Merops apiaster		CMS - II;	
29	Dendrocopos minor			
30	Dendrocopos major			
31	Dryocopus martius	9	WBD -I	Nesting species of the surroundings; does not nest in the

32	<i>Picus viridis</i>	9.11	Spec 2	motorway route area Species is common; Bosna River valley is not its typical habitat Nesting species of the surroundings; does not nest in the motorway route area
33	<i>Picus canus</i>	8,10,	WBD -I	
34	<i>Riparia riparia</i>			
35	<i>Hirundo rustica</i>			
36	<i>Motacilla alba</i>			
37	<i>Motacilla flava</i>			
38	<i>Turdus merula</i>		CMS - II;	
39	<i>Turdus philomelos</i>		CMS - II;	
40	<i>Locustella sp.</i> <i>Acrocephalus</i>		CMS - II;	
41	<i>schoenobaenus</i>		CMS - II;	
42	<i>Acrocephalus palustris</i> <i>Acrocephalus</i>		CMS - II;	
43	<i>arundinaceus</i>		CMS - II;	
44	<i>Hippolais icterina</i>		CMS - II;	
45	<i>Phylloscopus collybita</i>		CMS - II;	
46	<i>Sylvia atricapilla</i>		CMS - II; WBD -I; CMS	
47	<i>Sylvia nisoria</i>	1	- II;	One nesting pair recorded at site 1
48	<i>Sylvia communis</i>		CMS - II;	
49	<i>Erithacus rubecula</i>		CMS - II;	
50	<i>Luscinia megarhynchos</i>		CMS - II;	
51	<i>Phoenicurus ochruros</i>		CMS - II;	
52	<i>Saxicola rubicola</i>		CMS - II;	
53	<i>Aegithalos caudatus</i>			
54	<i>Poecile palustris</i>			
55	<i>Parus major</i>			
56	<i>Cyanistes caeruleus</i>			
57	<i>Sitta europaea</i>			
58	<i>Certhia brachydactyla</i>			
59	<i>Oriolus oriolus</i>			
60	<i>Lanius collurio</i>	1,2,3,4,6, 8,9,10,	WBD -I; Spec2; WBD -I;	Species is common; Bosna River valley is not its typical habitat One nesting pair recorded at site 3, far from the planned route
61	<i>Lanius minor</i>	3	Spec2;	
62	<i>Garrulus glandarius</i>			
63	<i>Pica pica</i>			
64	<i>Corvus cornix</i>			
65	<i>Corvus corax</i>			
66	<i>Sturnus vulgaris</i>			
67	<i>Passer domesticus</i>			
68	<i>Passer montanus</i>			
69	<i>Fringilla coelebs</i>	1,2,3,6,7, 8,9,10,11, 12,	WBD -I	Species is common; Bosna River valley is not its typical habitat
70	<i>Carduelis chloris</i>			
71	<i>Carduelis carduelis</i>			
72	<i>Serinus serinus</i>			

	Coccothraustes		
73	coccothraustes		
74	Emberiza citrinella	Spec2;	
Data acquired from the hunters and from the DIZB database:			
75	Anser albifrons	CMS - II;	Species uses Bosna River valley during the winter migrations
76	Anser anser	CMS - II;	Species uses Bosna River valley during the winter migrations
77	Coturnix coturnix		Species uses Bosna River valley during migrations
78	Grus grus	Spec 2; WBD -I; CMS - II;	Species uses Bosna River valley during migrations
79	Gallinago gallinago	CMS - II;	Species uses Bosna River valley during migrations
Spec2	Species whose populations are globally concentrated in Europe, and their conservation status is not satisfactory (based on BirdLife International (2017) European birds of conservation concern: populations, trends and national responsibilities Cambridge, UK: BirdLife International)		
WBD - I	Species from Annexes of EU Habitat directive		
IUCN	Species with threatened category at global level according to IUCN		
CMS -II	Species from Annexes of Convention on Migratory Species		

Annex 8. List of Mammals

No	Species	Sites	Status	Remarks
1	Erinaceus roumanicus			One roadkill at the side road
2	Lepus europaeus			
3	Apodemus agrarius			
4	Vulpes vulpes			Activity traces recorded and one roadkill
5	Mustela nivalis			
6	Martes foina			Activity traces recorded
7	Meles meles			Activity traces recorded
8	Capreolus capreolus			

Data acquired from the hunters and from the DIZB database:

9	Castor fiber		HD -II	Lukavica river and area of Kožuhe
10	Canis aureus		HD - IV	area of Kožuhe
11	Lutra lutra		IUCN - NT; HD - II, IV	Bosna River and its tributaries

HD - II, IV Species from Annexes of EU Habitat directive

IUCN Species with threatened category at global level according to IUCN

Annex 9. Statements from Stakeholders

Annex 9.1 List of Consultees



DIZB - Društvo za istraživanje i zaštitu biodiverziteta Society for Research and Protection of Biodiversity

Number: 17/17
Date: 11.4.2017.

List and signatures of the representatives of organizations and institutions in the scope of "Biodiversity Screening Exercise" regarding analysis of biodiversity in the construction zone of Vc motorway in the valley of the river Bosna (section- Rudanka - Podnovlje)

Name of the organisation	Place of meeting	Date and time	Signatures of present persons
Fishing association „Optima“ Modriča	Modriča	10.00 - 10.40 h 11.05.2017.	Gajić ĐUŠKO, PRESIDENT
Hunting association „Fazan“ Doboj	Doboj	12.20 - 13.00 h 11.05.2017.	VEDRAN BOŽIČKOVIĆ, PRESIDENT
Forest administration „Doboj“ Doboj	Doboj	14.30 - 15.10 h 22.05.2017.	SLAVEN TEŠANOVIĆ, TECHNICAL DIRECTOR
Fishing association „Bosna“ Doboj	Banja Luka Doboj	13.15 - 13.54 h 11.05.2017.	BARKO MITROVIĆ, PRESIDENT
Republic Institute for Protection of cultural, historical and nature heritage of Republic of Srpska, Banja Luka	Banja Luka	12.15 - 13.05 h 12.05.2017.	DRAGAN KOVAČEVIĆ, HEAD OF DEPARTMENT
Public Institution „Vode Srpske“, regional office in Doboj	Doboj		

„Insitu“ Ltd, Beograd

Maja Simov

DIZB-a, Banja Luka

Jovica Sjeničić

Adr: Brace Potkonjaka 16 • 78 000 Banja Luka, RS (BiH) • Tel: 0038766/783-051, 0038765/653-001 • E: dizb.banjaluka@gmail.com •
Web: www.dizb.weebly.com • Br. rač: 5672412700003496 Sberbank a.d.

Annex 9.2 Letter from Institute for Cultural and Natural Heritage



REPUBLIKA SRPSKA
MINISTRY OF EDUCATION AND CULTURE
REPUBLIC INSTITUTE FOR CULTURAL AND NATURAL HERITAGE

Vuka Karadzica 4, Banja Luka, tel/fax: 051/247-419, email: rzzzs@blic.net

No: 07/1.30/625-336/17

Banja Luka, 22.05.2017.

To: Society for Research and Protection of Biodiversity
Brace Potkonjaka 16
Banja Luka

SUBJECT: Information related to the Corridor Vc road sections Rudanka - Johovac and Johovac – Podnovlje

According to your request we provide the information related to the status of the Bosna River at the two Corridor Vc road sections.

- The River Bosna is not planned for designation as a nature conservation area under the amended Spatial Plan of Republika Srpska until 2025. In addition, no areas of nature conservation value have been identified along the two Corridor Vc sections;
- In 2009, for the purpose of the Corridor Vc construction (Lot 1, Lot 2, Lot 3), the Institute prepared the *Requirements for use of cultural and natural heritage and definition of protection zones and measures in the Corridor Vc area* for each of the three Lots. The documents evaluated natural and cultural heritage along the alignment and proposed the conservation and mitigation measures;
- The Registry of Designated Nature Conservation Areas does not indicate presence of designated natural values along the two road sections;
- No activities related to the establishment of ecological network in Republika Srpska have been planned for 2017.

As per the Article 18 paragraph 2 of the Law on Nature Conservation (Off. Journal of RS, No. 20/14) it is our opinion that in respect to the nature conservation objectives, the proposed works and activities can be implemented.

Best regards,

Slobodan Nagradić, Director



www.nasljedje.org

Annex 9.3. Letter from Public Water Management Company



REPUBLIKA SRPSKA PUBLIC WATER MANAGEMENT COMPANY "VODE SRPSKE" BIJELJINA

Miloša Obilića 51. 76300 Bijeljina Republika Srpska - Bosnia and Herzegovina, Secretary: 055/201-784, fax: 055/211-517; Director: 055/201-492; **Departments:** Legal affairs: 055/ 221-391; Sava River Basin:055/ 226-030; Trebisnjica River Basin: 059/245-510; Flood management: 055/220-360;

E-mail: bijeljina@voders.org ; www.voders.org

No: 04.4-335/17

Date: 26.05.2017.

To: Society for Research and Protection of Biodiversity
Brace Potkonjaka 16
Banja Luka

SUBJECT: Response to the request for information

As per your request No. 20/17 dated 24.05.2017. where you asked for the information about the monitoring of the River Bosna water quality in the area between Doboje and Modrica, for the purpose of ecological assessment of habitats and species, we provide the following response.

We inform you that the systematic monitoring of surface water quality in Republika Srpska has been permanently conducted from 2000. The number of monitoring stations has been varying, depending on the Annual Monitoring Programme adopted by the Ministry of Agriculture, Forestry and Water Management which is implemented by "Vode Srpske".

As you required the monitoring results for the Bosna River from two monitoring stations: Rudanka and Modrica, we provide you the excerpt from the Annual Reports on Surface Water Monitoring in 2015 and in 2016. The Reports were prepared by an accredited laboratory "Institute for Water" d.o.o. Bijeljina, according to the Annual Monitoring Programme and the contract No. 01-1548/15 dated 11.12.2015.

Sampling for the physical and chemical analysis was conducted in accordance with the BAS ISO 5667-1, BAS ISO 5667-3 and BAS ISO 5667-6 standards.

Sampling for the microbiological analysis was conducted in accordance with the BAS ISO 5667-2,3 1t1 6, BAS EN 28265:2003, BAS EN 27828:2003, BAS EN ISO 9391:2003, BAS ISO 13 946:2003 and BAS ISO 19458.

Microbiological quality of water was analysed based on: total number of aerobic heterotrophs (22°C and 36°C), cfu/ml, total number of coliforms and faecal coliforms (MPN/100ml) and determination of the number of faecal streptococci, MF, cfu/100ml in 2015.

Analytical quality control was conducted according to the ISO 17025 standard.

External control was conducted by LGC Aquacheck, QWAS, United Kingdom.

Identification of phytoplankton taxa, bottom diatom and macroinvertebrates was conducted based on the available determination keys.

Besides the basic saprobity index (S) required by the Decree, for the quantitative analysis of phytoplankton, phytobenthos, macroinvertebrates the indexes calculated by the software packages OMNIDIA and ASTERICS were also used.

The Decree on classification and categorisation of water bodies of RS requires only the saprobity index (Pantle, Buck) to be used for evaluation of the water quality.

Information prepared by:

Sanja Katana, ecology engineer
Banja Luka

Head of the local office in

David Latinovic

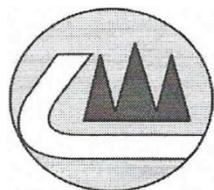
Aleksandra Kovačević, technology engineer

Руководилац подручне канцеларије
Бања Лука

Давид Латиновић, дипл. инж. грађ.



Annex 9.4 Letter from Public Forest Management Company



PUBLIC FOREST MANAGEMENT

Шупне Републичке Српске
COMPANY

a.d. Sokolac

Forest Estate "Doboj"
Kneza Lazara 16, Doboj

No: 01-03-1894/17

Date: 24.05.2017.

To: Society for Research and Protection of Biodiversity
Brace Potkonjaka 16
Banja Luka

SUBJECT: Response to the request for information according to the letter No. 14/17 from 08.05.2017.

Area of interest: The area between Rudanka and Podnovlje

Type of required information: Natural habitats and species categorised as significant in terms of conservation value

Objective: Identification of relevant ecological features in order to mitigate the potential adverse effects of the motorway construction and operation

According to your request we inform you on the following:

As a Coordinator for Forest Certification, on behalf of the Forest Estate Doboj, I inform you that no forests of high conservation value are present in the area, including the rare, threatened or protected species and representative forests.

Best regards,

Coordinator,

Boro Lazic