Critical Habitat Assessment, Morava Corridor Motorway Project, Serbia

Final report

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Cover Photo: Image of West Morava river in Ovcar-Kablar gorge in Serbia ©Shutterstock

Update (18th February 2021):

In the final version of this CHA (November 2020), it was recommended that field and eDNA surveys were carried out to ascertain whether the species *Theodoxus transversalis* (Striped Nerite snail) was present in the Zapadna Morava River. Results of kick surveys, eDNA analysis, existing literature and expert opinion have concluded that this species is very unlikely to be present in any of the three sections of the river, and therefore the Zapadna Morava River is classified as Natural Habitat. This species remains a Critical-Habitat qualifying species within the AoA, but like the Karst snails, there are no Project related impacts on this species. This information has also been updated in the Project Residual Impact Assessment.

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Executive Summary

Introduction

1. This report is the Critical Habitat Assessment for the Morava Corridor Motorway Project (the Project) in the Republic of Serbia. The Project is a 112 km motorway to be developed in the West Morava River Valley. The Project is aligning with International Finance Corporation (IFC) Performance Standards, including Performance Standard 6 (PS6) on Biodiversity Conservation and Sustainable Management of Living Natural Resources (IFC 2012).

2. This report aims to: identify Critical Habitat-qualifying biodiversity associated with the Project; update Natural and Modified Habitat mapping, including mapping Critical Habitat were possible; highlight the implications of the CHA results; and identify the recommended next steps for the Project, including identification of data gaps and the need for additional field surveys.

IFC PS6 requirements

3. PS6 makes several stipulations for Critical Habitat, including achievement of a net gain for Critical Habitat-qualifying biodiversity. A net gain is required where there are significant residual adverse impacts arising from project development. In Natural Habitat, no net loss, where possible, is required. A robust project-specific ESIA baseline is vital, followed by iterative and thorough application of the mitigation hierarchy to ensure that impacts are avoided, minimised and restored as far as feasible, reducing the significance of any residual impacts and the requirement for offsetting.

The CHA approach

4. Applying the PS6 criteria and thresholds for Critical Habitat involves the use of ecologically coherent Areas of Analysis (AoA). The area assessed for Critical Habitat is not just the direct project footprint but considers a broader landscape. This approach ensures that all important biodiversity within the project footprint and surrounding vicinity are taken into consideration. One AoA was identified which encompassed both aquatic and terrestrial areas. The AoA (7,653 km^2) was defined using a combination of water catchments, topographic information, and legally protected areas (LPA) and/or internationally recognised areas (IRA) of high biodiversity value. This precautionary approach ensures all project risks are taken into consideration and demonstrates transparency to stakeholders.

5. This CHA is based on existing documentation, including the Project ESIA and baseline studies, spatial analysis of data available through the Integrated Biodiversity Assessment Tool (IBAT), interpretation of global and regional datasets (e.g. the IUCN Red List of Threatened Species), and consultation with taxonomic expert specialists in Serbia (for plants, insects, birds, and freshwater species). Existing published and grey literature was also used where available. The list of potentially qualifying biodiversity features identified through IBAT was screened against applicable criteria and thresholds (IFC 2019). This was followed by expert consultation to determine species presence and significance where data are equivocal.

Findings of the CHA

6. The Project is found to be in Critical Habitat for six species. One freshwater species and five terrestrial species qualify under CH criteria. The Critical Habitat qualifying species (summarised in Table A below) comprise:
    - Five terrestrial species which qualify under Criteria 1 and 2. Four gastropod species (karst snails) which qualify under Criterion 2a, and one insect species (a bush cricket) qualifies under both Criteria 1c and 2a.
    - One freshwater aquatic species which qualifies for CH under Criteria 1a - a freshwater snail species (named the Striped Nerite).
    - Although they do not formally qualify as Critical Habitat, two additional species (the Noble Crayfish and the Thick Shelled River Mussel) are considered to be species of stakeholder concern.

Table A: Summary of Critical Habitat qualifying species

Scientific name	English name	Global RL status	Regional/ National RL status	Presence in AoA	IFC PS6 Criteria/Stakeholder concern
Gastropods					
Chilostoma kollari	-	LC	NE (National RL)	Unconfirmed	Criterion 2a
Xerocampylaea zelebori	-	LC	NE (National RL)	Confirmed	Criterion 2a
Macedonica frauenfeldi	-	LC	NE (National RL)	Unconfirmed	Criterion 2a
Agardhiella serbica	-	NT	NE (National RL)	Unconfirmed	Criterion 2a
Insects					
Broughtonia domogledi	Domogled Meadow Bush-cricket	NT	CR (Regional RL)	Unconfirmed	Criterion 1c Criterion 2a
Freshwater species					
Theodoxus transversalis	Striped Nerite	EN	NE (National RL)	Unconfirmed but potentially present in areas with good water quality and suitable habitat	Criterion 1a
Astacus astacus	Noble Crayfish	VU	NE (National RL)	Confirmed main stem and tributaries	Stakeholder concern
Unio crassus	Thick Shelled River Mussel	EN	NE (National RL)	Confirmed in main stem	Stakeholder concern

The biodiversity features that qualify the AoA as CH under IFC PS6, and the rationale for qualifying for Critical Habitat, are presented in Table 4 in the main report. The initial list of 27 candidate species considered in this CHA, and their rationale for exclusion is given in Appendix 3.

7. There is currently no evidence found that suggests that the study area supports highly threatened ecosystem(s) (under Criterion 4) or key evolutionary processes (under Criterion 5).

8. No Project infrastructure is planned within any legally protected areas nor internationally recognised areas of high biodiversity value (LPA/IRA) and therefore Paragraph 20 of PS6 does not apply. While a number of LPA/IRAs overlap with or are located within the AoA, none of these areas will qualify as CH as they are unlikely to contain biodiversity features that qualify under the CH criteria.

9. **The presence of species that qualify for Critical Habitat in the AoA does not necessarily mean that the Project will impact them.** Several scenarios are possible, from impacts that are negligible, readily avoided or temporary, to those that are significant, long-term and challenging to mitigate.

10. The AoA contains Natural and Modified Habitat with some areas of Natural Habitat supporting populations of CH-qualifying species, and therefore considered to be Natural Critical Habitat (see Figure A and Table 5).

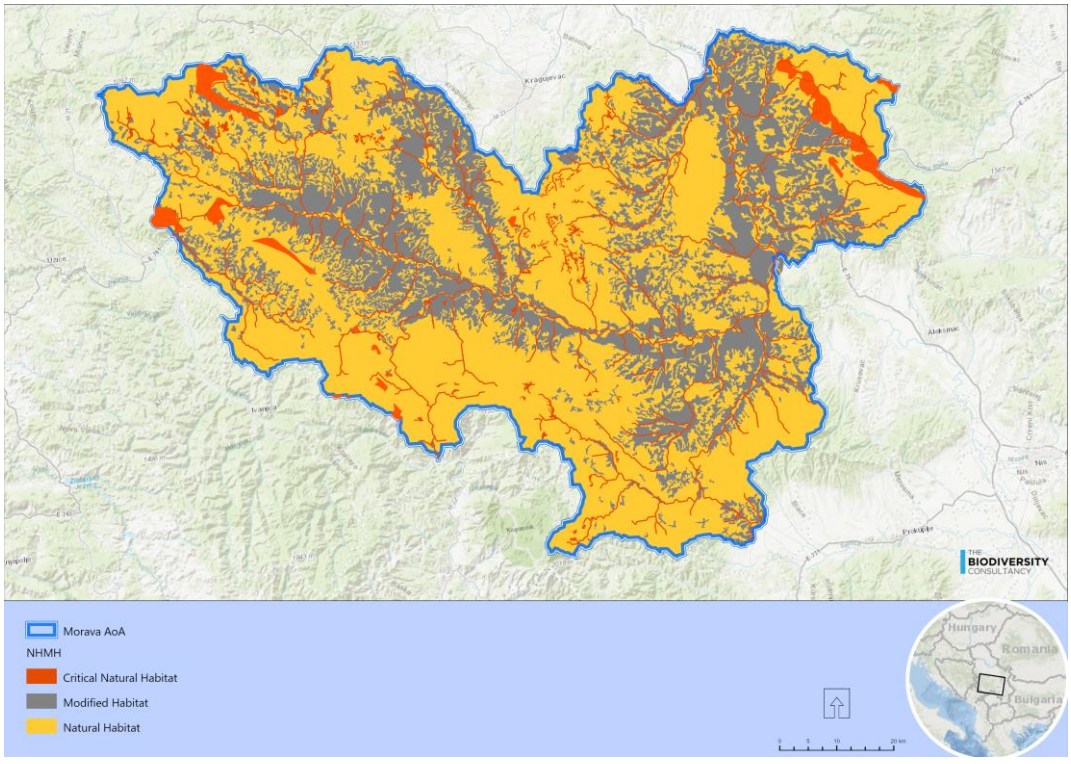

Figure A. Map of terrestrial Critical Natural Habitat, Natural Habitat and Modified Habitat in the AoA.

11. Karst limestone areas and mesotrophic pastures are terrestrial Natural Critical Habitats and the river system as aquatic Natural Critical Habitat. However, not all sections of the Zapadna Morava river system will be classed as aquatic Natural Critical Habitat as the Striped Nerite (the snail that qualifies for Critical Habitat) requires good water quality and suitable substrate. This finer scale mapping of aquatic Critical Habitat will be undertaken as part of the residual impact assessment (next steps).

Implications and next steps for the Project

12. Although there are several Critical Habitat-qualifying species in the AoA, not all are at equal risk of a Project impact. For example, the four terrestrial gastropod species are associated with a particular type of sedimentary rock containing limestone (carbonate rocks) which are found to the far east and west of the AoA. The Project's quarry sites overlap with areas of a different type of sedimentary rock containing limestone (flysch rocks); there is therefore no impact risk to the four species of terrestrial gastropod. The next steps are based on the risk of a Project impact and key information gaps to enable focused mitigation and residual impact assessment (Table 10).

13. An urgent task for the Project is conduct eDNA surveys for the Critical Habitat-qualifying Striped Nerite to understand distribution in sections of the river that will be impacted by the Project. This will enable an understanding of which sections of the river these species occur in, and refine mapping of aquatic Critical Habitat.

14. The CHA and eDNA surveys will inform the development of further mitigation measures and an estimation of residual impacts. A Biodiversity Action Plan (BAP) and offset strategy will be developed to enable the Project to achieve no net loss for Natural Habitat and Net Gain for Critical Habitat.

1 Introduction

1.1 Purpose and scope of this report

This Critical Habitat Assessment (CHA) is undertaken for the Morava Corridor Motorway Project (the Project) in the Republic of Serbia (Serbia). The Project is required to align with International Finance Corporation (IFC) Performance Standards, including Performance Standard 6 (PS6) on Biodiversity Conservation and Sustainable Management of Living Natural Resources (IFC 2012).

This CHA is one of four deliverables that will be prepared as part of the Supplemental Biodiversity Assessment by The Biodiversity Consultancy (TBC). The aim of this report is to:

- To **confirm the presence of Critical Habitat-qualifying biodiversity values** associated with the Project, based on a collation and review of existing data (ESIA, baseline surveys), scientific literature and expert input;
- To **update the habitat mapping**, confirming the extent of modified and/or natural habitat, supported by analysis and maps;
- Outline the **implications of the outcome of the CHA** for the Project; and
- Identify the **recommended next steps** for the Project, including identification of data gaps and the need for additional field surveys.

1.2 IFC Performance Standard 6

The objectives of PS6 are to protect and conserve biodiversity; maintain benefits from ecosystem services; and promote the sustainable management of living natural resources through the adoption of practices that integrate conservation needs and development priorities.

PS6 provides guidance on how to best identify three classes of area based on vegetation condition ('quality' or 'state'), and significance for biodiversity (Table 1). PS6 uses the term 'habitat' to refer to these areas, rather than the actual vegetation within them. These three area classes are: (i) **Modified Habitat**; (ii) **Natural Habitat**; and (iii) **Critical Habitat** (with Critical Habitat a subset of Modified and Natural Habitat).

Habitat condition is classified as either Natural or Modified based on the extent of human modification of the ecosystem. Monoculture plantations, agricultural areas (including seasonally fallow land in swidden systems) and urban areas show "substantial modification" and would usually be classed as Modified; whereas woodlands exploited for non-timber forest products, or charcoal usually retain most of the original species and ecological processes, and would in most cases still be considered Natural Habitat. Both Natural and Modified Habitats may contain globally important biodiversity values, thereby qualifying as Critical Habitat (PS6 GN28, IFC 2019).

Table 1: Summary of the PS6 scheme for classifying areas

Three classes of area identified in PS6		**Condition of the area**	
		Natural	Modified
High Biodiversity Values	Present	**Critical Habitat**	**Critical Habitat**
	Absent	**Natural Habitat**	**Modified Habitat**

1.3 Description of the Project

The Project is a 112 km motorway to be developed approximately 200 km south of Belgrade city, in the West Morava River Valley (Figure 1). The motorway will run from the Pojate village to Preljina near Čačak city, along a 900 metre (m) right of way.

The Project will include construction of the following permanent structures: (i) above ground structures such as bridges, and overpasses; (ii) a telecommunication network comprising power lines, communication cables and substations; and (iii) hydrotechnical structures, including 'cut-offs' (straightened, channelised sections of river), revetments and embankments to prevent flooding and erosion of the Zapadna Morava River. Temporary site facilities including quarries and borrow pits, camp sites and storage areas, crushers, concrete batching plants and asphalt plants, and access roads will be constructed for the Project.

The Project is jointly designed and built by Bechtel and ENKA (BEJV), with ownership by the Ministry of Construction, Transport and Infrastructure and Corridors of Serbia.

2 Approach to the CHA

2.1 Identify an appropriate Area of Analysis

A preliminary review of information on the region's ecology was carried out to define an ecologically appropriate Area of Analysis (AoA), so as to determine the presence of features that may qualify for Critical Habitat (CH). The AoA is identified at a scale larger than the project site or impact area itself, considering large-scale ecological processes where appropriate. This approach ensures that all potential risks within the project footprint and surrounding vicinity are taken into consideration.

In this CHA, the AoA (7,653 km^2) was defined using a combination of water catchments, topographic information, and legally protected areas and/or internationally recognised areas of high biodiversity value (LPA/IRA) information (Figure 1). These landscape features are relevant for defining an AoA as follows:

Water catchments serve as distinct ecological units for freshwater biodiversity (Saunders *et al.* 2002), while the high altitude and steep topography of catchment boundaries potentially serve

as a natural physical barrier to terrestrial biodiversity. Relevant catchments were included in the AoA at a scale that was appropriate for considering both upstream and downstream impacts to biodiversity (Appendix 1). The location of dams (Mulligan *et al.* 2020) and the connectivity index were also considered within the wider Morava river network (Grill *et al.* 2019) to refine the scale of the AoA.

Topographic information was also used to identify distinct physical features such as mountain ridges and valleys in the wider landscape (Appendix 1). Such natural features may serve as barriers to species movement, limiting landscape connectivity. They have also been shown to alter ecological patterns, processes, features and functions such as ranging behaviour, dispersal, gene flow and distribution of a broad range of species (Badgley 2010).

Key Biodiversity Areas (KBAs) are areas recognised for their biodiversity value, and are delineated based on biodiversity elements which trigger the established biological criteria (International Union for Conservation of Nature (IUCN) 2016). Therefore, such areas within and in the vicinity of the project footprint were considered to support the delineation of an ecologically appropriate AoA. Boundaries of Kopaonik and Valjevske planine KBAs were only partially included in the AoA as it is anticipated that there is a degree of ecological connectivity between their respective northern and eastern boundaries with the Project area, with the steep topography and water catchment boundaries within the KBAs potentially serving as a natural barrier for some terrestrial and aquatic species.

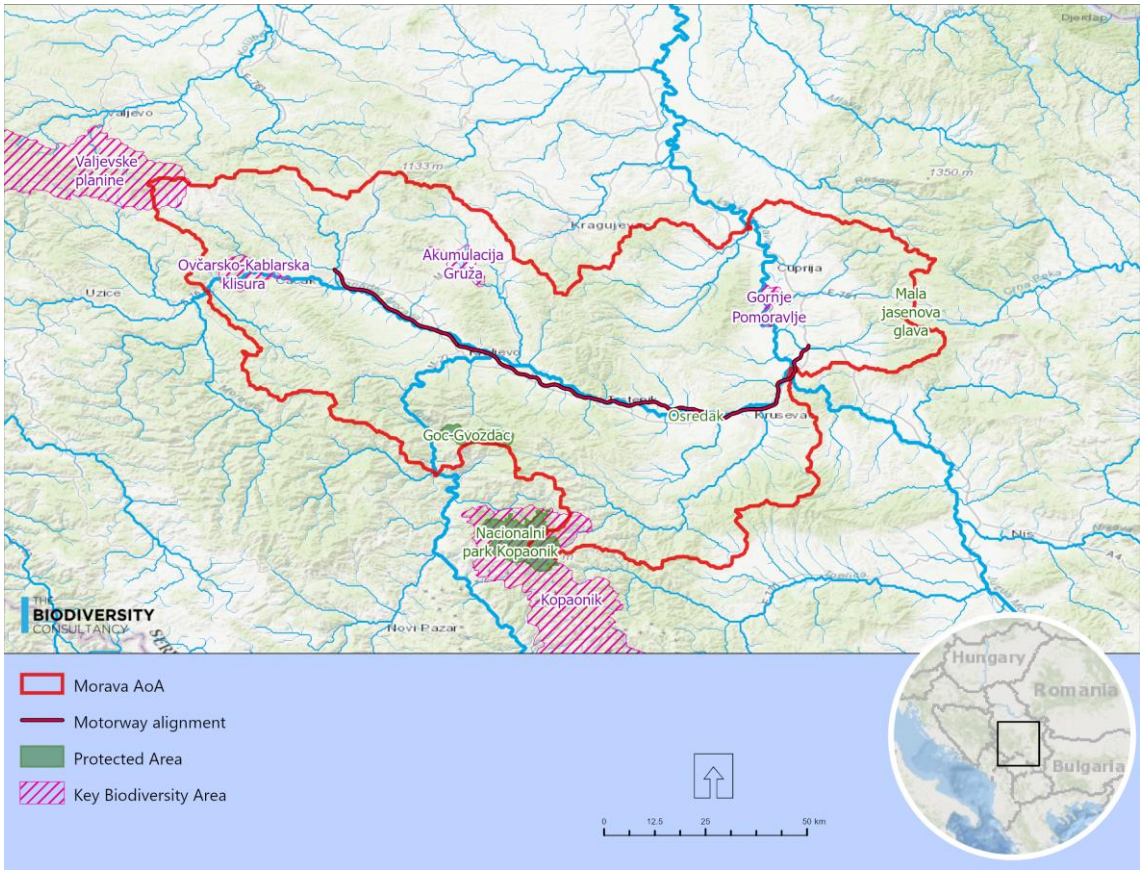

Figure 1: Area of Analysis defined for the Project. Data source: IBAT for Protected Areas and Key Biodiversity Areas.

2.2 Collation of available biodiversity information

A list of biodiversity features, i.e. species, protected areas, internationally recognised areas, that overlap with the AoA, was first compiled from a spatial analysis of data available through the Integrated Biodiversity Assessment Tool (IBAT)[1] a tool that draws information from globally recognised biodiversity datasets: the IUCN Red List of Threatened Species, Key Biodiversity Areas (priority sites for conservation), and Protected Planet/The World Database on Protected Areas (nationally and internationally recognised sites). National Red List information was also reviewed from Biologer, a database of c.163,843 species field observation records and 33,458 digitised literature records from Serbia (Popović *et al.* 2020).

Protected areas and internationally recognized areas such as Key Biodiversity Areas (KBAs) and Important Bird Areas (IBAs) within the AoA were identified. Such areas required consideration as they provide an indicator of the presence of CH-qualifying biodiversity (IFC 2019, Guidance Note 54) and carry specific requirements under IFC PS6 (see Section 2.3).

2.2.1 Key documentation

Existing Project biodiversity documentation were also reviewed to support the identification of biodiversity that may qualify the area as CH. These included:

- Environmental and Social Impact Assessment, Final Draft Report, May 2020 (2U1K 2020)
- Tender Package, Scope of Work, Terms of Reference, Appendix 1, Short technical report on the state of the population of crayfish *Astacus astacus* Linnaeus 1758, the Western Morava (Serbia) (University of Kragujevac 2020a); and
- Tender Package, Scope of Work, Terms of Reference, Appendix 1, Short technical report on the state of the population of mussels *Unio crassus* Philipsson, 1788, the Zapadna Morava River (University of Kragujevac 2020b).

Scientific and grey literature were also reviewed to supplement the assessment where required.

2.3 Apply IFC PS6 criteria for Critical Habitat

The list of potentially qualifying biodiversity features identified through IBAT was screened against applicable criteria and thresholds (IFC 2019). This was followed by expert consultation to determine species presence and significance where data are equivocal (refer to Section 2.3.1 for further information). IFC PS6 presents **five criteria** to assess for projects in Critical Habitat. These are as follows:

[1] IBAT data has been purchased by TBC on behalf of the client., invoice number: SLS069760

- Criterion 1: Critically Endangered and Endangered species;
- Criterion 2: Restricted-range species;
- Criterion 3: Migratory/congregatory species;
- Criterion 4: Highly threatened and/or unique ecosystems; and
- Criterion 5: Key Evolutionary Processes.

Criteria 1, 2 and 3 determine whether the area represents CH for a particular species. Quantitative thresholds are given for the first three criteria which are expressed as percentages of a species' global and/or national population size. Criterion 1 and 2 further specifies a minimum number of reproductive units[2]. In the absence of reliable population data, proxies such as the proportion of a species' distribution or availability of suitable habitat in the area can be used to inform CH-determination.

Criterion 4 determines whether the area represents CH for a particular ecosystem type, based on a quantitative threshold of the proportion of their global extent found within the AoA or if determined to be a high priority for conservation by regional or national systematic conservation planning.

Criterion 5 is determined based on expert opinion and qualitative value judgement as no quantitative thresholds are given. Indicators for the potential presence of key evolutionary process include certain structural features of a landscape, including landscapes with high spatial heterogeneity, environmental gradients, connectivity between habitats and sites of demonstrated importance to climate change adaptation.

IFC PS6 also requires Critical Habitat Assessments give special attention to certain **internationally recognized areas** of high biodiversity value.

A description of how the CH criteria and thresholds were applied is presented in Appendix 2.

2.3.1 Verification of results via expert consultation

IFC PS6 strongly recommends that a process of stakeholder consultation is integrated into a project's impact assessment and mitigation planning, including for the determination of Critical Habitat. Although stakeholder consultation was limited due to time constraints, a number of expert stakeholders were consulted to support the assessment of highest priority and/or lesser known species (Table 2).

[2] The IUCN KBA Standard uses the following definition for *reproductive unit*: "the minimum number and combination of mature individuals necessary to trigger a successful reproductive event at a site (Eisenberg 1977). Examples of five reproductive units include five pairs, five reproducing females in one harem, and five reproductive individuals of a plant species."

Table 2. Expert stakeholders consulted for this CHA

Name	Designation	Subject matter expertise
Gellért Puskás	Curator, Department of Zoology, Hungarian Natural History Museum	Insects of the Balkan region
Jelena Tomović	Research Associate, Institute for biological research "Siniša Stanković" National Institute of the Republic of Serbia	*Unio crassus* (Thick Shelled River Mussel)
Katarina Zorić	Research Associate, Institute for biological research "Siniša Stanković" National Institute of the Republic of Serbia	*Astacus astacus* (Noble Crayfish
Snezana Jaric	Senior Research Associate, Institute for biological research "Siniša Stanković" National Institute of the Republic of Serbia	Plants of Serbia
Vesna Djikanovic	Senior Scientific Associate, Institute for biological research "Siniša Stanković" National Institute of the Republic of Serbia	Aquatic monitoring and ecological risk assessment
Vanja Marković	University of Belgrade, Belgrade, Faculty of Biology, Institute of Zoology	*Theodoxus transversalis* (Striped Nerite)
Zoltán Fehér	Head Curator, Department of Zoology, Hungarian Natural History Museum	Terrestrial and freshwater gastropods of the Balkan region
Zoltán Barina	Curator, Department of Botany, Hungarian Natural History Museum	Plants of the Balkan region

2.4 Identify Natural Habitat and Modified Habitat

Existing project and publicly available information on land cover, and expert analysis was undertaken to designate land cover categories as Natural or Modified Habitat and determine the extent of each within the AoA. Support was enlisted from experts familiar with the ecology and landscape to help with this process, for e.g. consultation was undertaken to determine the extent of limestone areas within the AoA.

2.4.1 Terrestrial ecosystems

Ecosystems following the EUNIS habitat classification level 3 (EUNIS) (EEA 2020), a pan-European system for habitat identification, were obtained from results of the ESIA baseline surveys (2U1K 2020). This information was considered sufficient for the identification and assessment of Natural and Modified Habitat in the immediate vicinity of the Project, where direct impacts from construction and operation are expected (i.e. within the Project's Area of Influence (AoI), a corridor of 1 km width along the proposed motorway alignment).

EUNIS is based on vegetation science and requires ground-truthing surveys, this system of classification could therefore not be applied to the wider AoA. Instead, publicly available spatial land cover data, CORINE Land Cover (Copernicus 2018) and Global Surface Water, 1984-2019 (Pekel *et al.* 2016) were used to map different ecosystems in the wider environment of the AoA.

Both datasets present widely used Pan-European spatial resource on land cover information at a sufficient resolution that is considered adequate to support the identification of Natural Habitat and Modified Habitats.

2.4.2 Aquatic ecosystems

A qualitative approach to mapping of Natural and Modified Habitat was applied using information available from the ESIA consultants, 2U1K (2020) and national freshwater specialists. The qualitative approach applied the Index of Habitat Integrity (IHI) (Kleynhans 1996) to ascertain aquatic habitat quality, as detailed mapping of aquatic Natural and Modified riverine habitats was not possible with the scale and resolution of data available.

The ecological state of the Zapadna Morava was assessed for each section of river identified in the ESIA (Sections 1 - 3) as well as the downstream section in the AoA on the Velika Morava River and main tributaries on the south bank. State was assessed using the Index of Habitat Integrity (IHI – Kleynhans 1996) which was populated based on existing literature, aerial imagery and expert-based judgement. Local stakeholder input was included in the assessment based on information provided in a workshop with national freshwater specialists. An A-to-F ecological categorisation generated from the IHI (Appendix C - Kleynhans 1996) was used to express aquatic habitat quality. Based on the IFC PS6 definition of Natural Habitat and Modified Habitat, TBC adapted the categorisation of freshwater ecosystems in the AoA based on the IHI findings as described in Table 3. The outcomes of the IHI desktop assessment will be verified during rapid ground-truthing field survey of the Zapadna Morava River in the AoA in October 2020 and reported in the residual impact assessment and Biodiversity Action Plan.

Table 3 : Ecological state categories for aquatic ecosystems (Kleynhans 1996)

Ecological category	Description of the habitat	Score (%)	Natural / Modified Habitat as per IFC PS6
A	Unmodified. Still in a natural condition	**90-100**	**Natural Habitat**
B	Near natural. A small change in natural habitats and biota has taken place but the ecosystem functions are essentially unchanged.	**80-89**	
C	Moderately modified. Loss and change of natural habitat and biota have occurred, but the basic ecosystem functions are still predominantly unchanged.	**60-79**	
D	Largely modified. A large loss of natural habitat, biota and basic ecosystem functions has occurred.	**40-59**	**Natural / Modified Habitat**
E	Seriously modified. The loss of natural habitat, biota and basic ecosystem functions is extensive.	**20-39**	**Modified Habitat**
F	Critically modified. Modifications have reached a critical level and the lotic system has been modified completely with an almost complete loss of natural habitat and biota. In the worst instances the basic ecosystem functions have been destroyed and the changes are irreversible	**<20**	

2.5 Limitations of this assessment

This assessment was conducted using the best available information, complemented by expert consultations. Where there is some level of uncertainty, a precautionary approach has been employed. However, it is acknowledged that new information may change the conservation status of species for which there are information gaps, and therefore change the results of assessment. However, it should be noted that whilst further research may affect individual species currently identified as Critical Habitat-qualifying, the overall assessment of Critical Habitat status will not change. This is because Critical Habitat is identified on a weakest link approach, whereby qualifying biodiversity under any criterion confirms the Project as Critical Habitat. Evaluations of formally described and well-known species under Criterion 1 are particularly robust and unlikely to change based on further work.

Some species on the IUCN Red List of Threatened Species do not have their global ranges mapped, and therefore can be missed in the map-based screening methods used to develop the candidate list.

3 Findings of the CHA

3.1 Critical Habitat

3.1.1 Criteria 1-3

Five terrestrial species qualify for CH under Criteria 1 and 2. **Four gastropod species** (karst snails) qualify under Criterion 2a, while **one insect species** (a bush cricket) qualifies under both Criteria 1c and 2a (Table 4). The implications of these findings for the Project are discussed in Section 4.

One freshwater aquatic species qualifies for CH under Criteria 1. **One gastropod species** (Striped Nerite – a freshwater snail) qualifies under Criterion 1a. Although they do not formally qualify as Critical Habitat, **two additional species** (the Noble Crayfish and the Thick Shelled River Mussel) are considered to be species of stakeholder concern (Table 4). The implications of these findings for the Project are discussed in Section 4.

The biodiversity features that qualify the AoA as CH under IFC PS6, and their rationale for inclusion in this screening, are presented in Table 4 below. The initial list of 27 candidate species considered in this CHA, and their rationale for exclusion is given in Appendix 3.

Table 4: List of species that qualify as Critical Habitat based on PS6 criteria.

Scientific name	English name	Global RL status [1]	Regional/ National RL status [1, 2]	Presence in AoA [3]	IFC PS6 Criteria [4, 5]	Justification
Gastropods						
Chilostoma kollari	-	LC	NE (National RL)	Unconfirmed	**Confirmed** Criterion 2a: Restricted-range species	This species of karst snail is a restricted range species, with an Extent of Occurrence (EOO)[6] of less than 50,000 km^2 and known only from central and eastern Serbia. It is only associated with limestone outcrops, usually found on bare rock surfaces, in crevices or at the base of rocks (Fehér 2011a). There are two types of sedimentary rocks that contain limestone, flysch and carbonate (limestone and dolomite) rocks. Only carbonate rocks are suitable for karst snails. Subai (2002) lists 20 known locations, but this might underestimate the number of subpopulations. Experts consulted consider this species as likely to be found on limestone outcrops to the east, within the AoA (Fehér 2020) (where carbonate rocks are found – see Figure 2) and that there is unlikely to be significant limestone habitat for this species within the West Morava Valley. However, as more than 10% of this species' distribution (c.22%) overlaps with the AoA this species qualifies under Criterion 2a.
Xerocampylaea zelebori	-	LC	NE (National RL)	Confirmed	**Confirmed** Criterion 2a: Restricted-range species	This species of karst snail is a restricted range species (EOO < 50,000 km^2), known from eastern Bosnia, northern Montenegro and central Serbia. It is associated with limestone outcrops, usually found on bare rock surfaces, in crevices or at the base of rocks (Páll-Gergely 2011). There are two types of sedimentary rocks that contain limestone, flysch and carbonate (limestone and dolomite) rocks. Only carbonate rocks are suitable for karst snails. This species has been recorded in the AoA to the west of the West Morava Valley, at limestone outcrops in Međuvršje (Subai 2011; Fehér 2020) (see Figure 2). As more than 10% of this species' distribution (c.17%) overlaps with the AoA and its presence is confirmed, this species qualifies under Criterion 2a.
Macedonica frauenfeldi	-	LC	NE (National RL)	Unconfirmed	**Confirmed**	This species of karst snail is a restricted range species (EOO < 50,000 km^2), known from Bulgaria and Serbia. It is associated with limestone outcrops, usually found on limestone rocks, in crevices, under stones, among rock vegetation (Dedov 2017). There are two types of sedimentary rocks that contain limestone, flysch and carbonate (limestone

Scientific name	English name	Global RL status [1]	Regional/ National RL status [1, 2]	Presence in AoA [3]	IFC PS6 Criteria [4, 5]	Justification
					Criterion 2a: Restricted-range species	and dolomite) rocks. Only carbonate rocks are suitable for karst snails. Experts consulted consider this species as likely to be found on limestone outcrops to the east, within the AoA (Fehér 2020), and that there is unlikely to be significant limestone habitat for this species within the West Morava Valley (see Figure 2). As more than 10% of this species' distribution (c.17%) overlaps with the AoA this species qualifies under Criterion 2a.
Agardhiella serbica	-	NT	NE (National RL)	Unconfirmed	**Confirmed** Criterion 2a: Restricted-range species	This species of karst snail is a restricted range species (EOO < 50,000 km^2), known only from Serbia. It lives underground in limestone rock cracks, in soil, between small pieces of stones, and among roots (Fehér 2011b). While it is unlikely that significant limestone habitats exist for this species within the West Morava Valley, the expert considers that this species is likely to be found on limestone outcrops outside the AoA to the east, within the AoA (Fehér 2020) (see Figure 2). As more than 10% of this species' distribution (c.17%) overlaps with the AoA this species qualifies under Criterion 2a.
Insects						
Broughtonia domogledi	Domogled Meadow Bush-cricket	NT	CR (Regional RL)	Unconfirmed	**Confirmed** Criterion 1c: Critically Endangered and Endangered species Criterion 2a: Restricted-range species	This species of bush cricket is a restricted range species (EOO < 50,000 km^2), known from very small areas in Romania and Serbia where subpopulations are thought to be decreasing. The species occurs in mesic meadows with low vegetation and steppic grasslands, from the lowland to mountainous areas between elevations of 280 m asl to 1,500m asl (Chobanov *et al.* 2016a). It has been recorded from the Ovcar-Kablar gorge KBA, and Stolovi mountains in the western and southwestern sections of the AoA, respectively (Ivković *et al.* 2018). Although tolerant of, and even benefits from, moderate disturbances (e.g. traditional grazing) (Puskás 2020), this species is threatened by a continuing decline in habitat extent and quality as a result of the abandonment of traditional management, of grass cutting and grazing. As more than 10% of this species' distribution (c.20%) overlaps with the AoA the species is considered to qualify under Criterion 1c (significant concentrations of a regionally listed CR species) and Criterion 2a.
Freshwater aquatic species						

Scientific name	English name	Global RL status [1]	Regional/ National RL status [1, 2]	Presence in AoA [3]	IFC PS6 Criteria [4, 5]	Justification
Theodoxus transversalis	Striped Nerite	EN	NE	Confirmed in the AoA downstream of the project in the Velika Morava River (Djikanovic *et al.* (2020). Unconfirmed in main stem of the Zapadna Morava but potentially present in sections with good water quality (and suitable habitat).	**Confirmed** Criterion 1a: Critically Endangered and Endangered species	This Endangered freshwater snail species is distributed along the Danube River system from Germany to Bulgaria however it has a patchy and fragmented distribution due to habitat loss and other threats such as pollution. Populations are known from the Juzna Morava and Velika Morava in Serbia (Markovic 2014) and although the species has not been reported from the Zapadna Morava, specialists of the genus consider that habitat is suitable for the species in the Zapadna Morava and its tributaries (Djikanovic *et al.* (2020). Surveys over the last 20 years have shown the disappearance of the species from parts of its range in Romania and Slovakia. This species has a restricted area of occupancy (AOO) of about 80 km^2 (Solymos & Feher 2011). The species is a fluvial species requiring hard substrate and good water quality for survival. The AoA overlaps with approximately 1.5% of the distribution range and it is likely that more than 0.5% (threshold for Criterion 1) of the global population is present in the AoA. Therefore, this species would qualify under Criteria 1a; eDNA surveys to confirm its presence in the Zapadna Morava are recommended.
Astacus astacus	Noble Crayfish	VU	There is no publicly available national red list for aquatic species	Confirmed in the main stem of the Zapadna Morava and in the tributaries	**Stakeholder concern**	The Noble Crayfish is a widespread species throughout Europe but has undergone significant declines in population numbers due to competition from non-indigenous species, crayfish plague, habitat loss and over-harvesting. Globally, this species is estimated to be declining at a rate of 50-70%, however in some parts of its range numbers are stable and there have been some successful re-stocking programs, so the true rate of decline may be slightly lower (40 - 50%) thereby qualifying this species for a listing as Vulnerable on the IUCN Red List (Edsman *et al.* 2010). Simić et al. (2008) suggested that the species be listed as nationally Endangered because of population declines, but a systematic red list assessment approach was not applied by the study. In Serbia it is listed as "strictly protected" on the national list under Annex 1 (Official Gazette of RS", no. 5/2010 and 47/2011) (however there are 1,760 species with this status and

Scientific name	English name	Global RL status [1]	Regional/ National RL status [1, 2]	Presence in AoA [3]	IFC PS6 Criteria [4, 5]	Justification
						therefore it is not considered to reflect a national red listing CR or EN status). From consultation with a crayfish expert (Zoric, pers comm) the species occurs in 7 of the 9 major basins within Serbia and the AoA is not likely to be of particular importance for the species. Due to its gazettement and concern stakeholders have shown for this species, although it may not strictly qualify for Critical Habitat based on IFC Criteria, it is considered a nationally important species and therefore a priority species for the Project.
Unio crassus	Thick Shelled River Mussel	EN	There is no publicly available national red list for aquatic species	Confirmed in main stem	**Stakeholder concern**	This mussel species inhabits clean river ecosystems and lakes, with flowing waters and sandy or sandy-gravel bottoms (Zajac & Zajac n.d.). As a result, it is vulnerable to changes in water chemistry, species composition and habitat degradation. Although the species is currently listed as widespread occurring in most of lowland rivers in north and central Serbian rivers and also observed in west and south Serbia (Tomovic, pers comm). Unresolved questions about the species' taxonomy exist and the placement of geographic variants as either subspecies or distinct species (Lopes-Lima *et al.* 2014). This has been validated by the Iberian populations of *U. crassus* being recognised as a distinct endemic species (*Unio tumidiformis*) after molecular research. No spatial distribution information exists for this species in the global IUCN Red List assessment, although it is reported as widely distributed and was sampled in the Zapadna Morava in studies carried out during the Project ESIA. In Serbia it is listed under Annex 1 (Official Gazette of RS", no. 5/2010 and 47/2011) however this status and does reflect a national red listing CR or EN status. From consultation with experts, the species is of stakeholder concern and although it does not strictly qualify for Critical Habitat based on IFC Criteria due to stakeholder concern it should be treated as a priority species.

Notes:

[1] **Red List (RL) status**: **CR** = Critically Endangered; **EN** = Endangered; **VU** = Vulnerable; **NT** = Near Threatened; **LC** = Least Concern; **DD** = Data Deficient; **NE** = Not Evaluated

[2] The IUCN Red List Categories and Criteria have been applied at the regional (Europe) and national (Serbia) level. These have been included for species that have been assessed.

[3] **Presence in study area**: **Confirmed** = presence confirmed through recent field surveys; **Unconfirmed**= presence unconfirmed but considered possible given the overlap between study area and species range and/or suitability of habitats.

[4] A description of the IFC PS6 criteria is given in Section 2.3, with further detail given in Appendix 2.

[5] **Result**: **Confirmed** = sufficient evidence to support qualification as Critical Habitat under IFC PS6; **Likely** = reasonable evidence that the feature is present: (i) in the study area; and (ii) at levels that meet/approach the threshold.

Scientific name	English name	Global RL status [1]	Regional/ National RL status [1, 2]	Presence in AoA [3]	IFC PS6 Criteria [4, 5]	Justification
[6] GN6 does not a range threshold for terrestrial invertebrates, therefore the vertebrate threshold of 50,00 km^2 was precautionarily used.						

3.1.2 Criterion 4: Highly threatened and/or unique ecosystems

Formal assessment for the ecosystems in Serbia have been undertaken as part of the European Red List of Habitats (European Commission 2016).[3] The EOO of the following regionally listed CR or EN habitat types were identified to overlap with the AoA:

- D4.1a Small-sedge base-rich fen and calcareous spring mire;
- E1.9a Oceanic to subcontinental inland sand grassland on dry acid and neutral soils;
- D4.1b Tall-sedge base-rich fen;
- E3.4a Moist or wet mesotrophic to eutrophic hay meadow;
- E3.4b Moist or wet mesotrophic to eutrophic pasture;
- E3.5 Temperate and boreal moist or wet oligotrophic grassland; and
- E6.3 Temperate inland salt marsh.

None of the ecosystems identified in the European Red List have more than 5% of their global or regional distribution within the AoA. While a number of ecosystems such as high greenery and mountain mezophile meadows, and Greek maple (*Aceretum heldreichii, AceriFagetum* type), have been recognised as a high priority for conservation at the national level (Ministry of Environment and Spatial Planning 2011), the distribution of these ecosystems are either outside the AoA or they are relatively widespread across Serbia, for example, Greek Maple are located on mountain ranges across Serbia. Therefore, none of the ecosystems within the AoA qualify under Criterion 4.

3.1.3 Criterion 5: Key evolutionary processes

Most terrestrial ecosystems identified are widespread across Europe. Centres of endemism have been identified in mountainous ranges and highlands of Central Serbia, occurring at elevations of 1500-2000m asl. Mt Kopaonik is located along the southern boundary of the AoA, and has been identified as an area of rich endemic flora. However, mountainous areas of Central Serbia and Kosovo regions have only been generally identified as centres of Balkan floral endemism for central and southern Europe, while representing only 18% of the total number of 2660–2700 endemic species in the Balkan Peninsula (Tomović *et al.* 2014). Hence, it is unlikely that these areas are sufficiently unique to be considered as qualifying under Criterion 5.

The Zapadna Morava River is a dominant hydrological feature in the AoA and a major tributary of the Velika Morava system. The River is a temperate lowland floodplain occurring in the Dniester - Lower Danube Freshwater Ecoregion (FEOW 2020) and is a part of a large single paleo-hydrographic unit representing the largest river system in Western Pontic basin with a relatively heterogenous fauna (FEOW 2020). The river has low spatial heterogeneity and a continuous environmental gradient and is impacted by a series of dams (Grill et al. 2019) and intensive historical agricultural land use which has degraded the instream environment. Due to

[3] Although data gaps were recognised for non EU28 countries such as Serbia, the European Red List of Habitats represent the best available ecosystem risk assessment undertaken in alignment with the IUCN Red List of Ecosystems Categories and Criteria (Keith *et al.* 2013; Bland *et al.* 2016).

the heterogeneity of the lowland habitat of the Zapadna Morava River and the heterogeneity of fauna in the greater region it is unlikely to qualify under Criterion 5.

3.2 Natural Habitat and Modified Habitat

The AoA contains Natural and Modified Habitat with some areas of Natural Habitat supporting populations of CH-qualifying species, and therefore considered to be Natural Critical Habitat (see Table 5).

3.2.1 Terrestrial habitats

Table 5 and

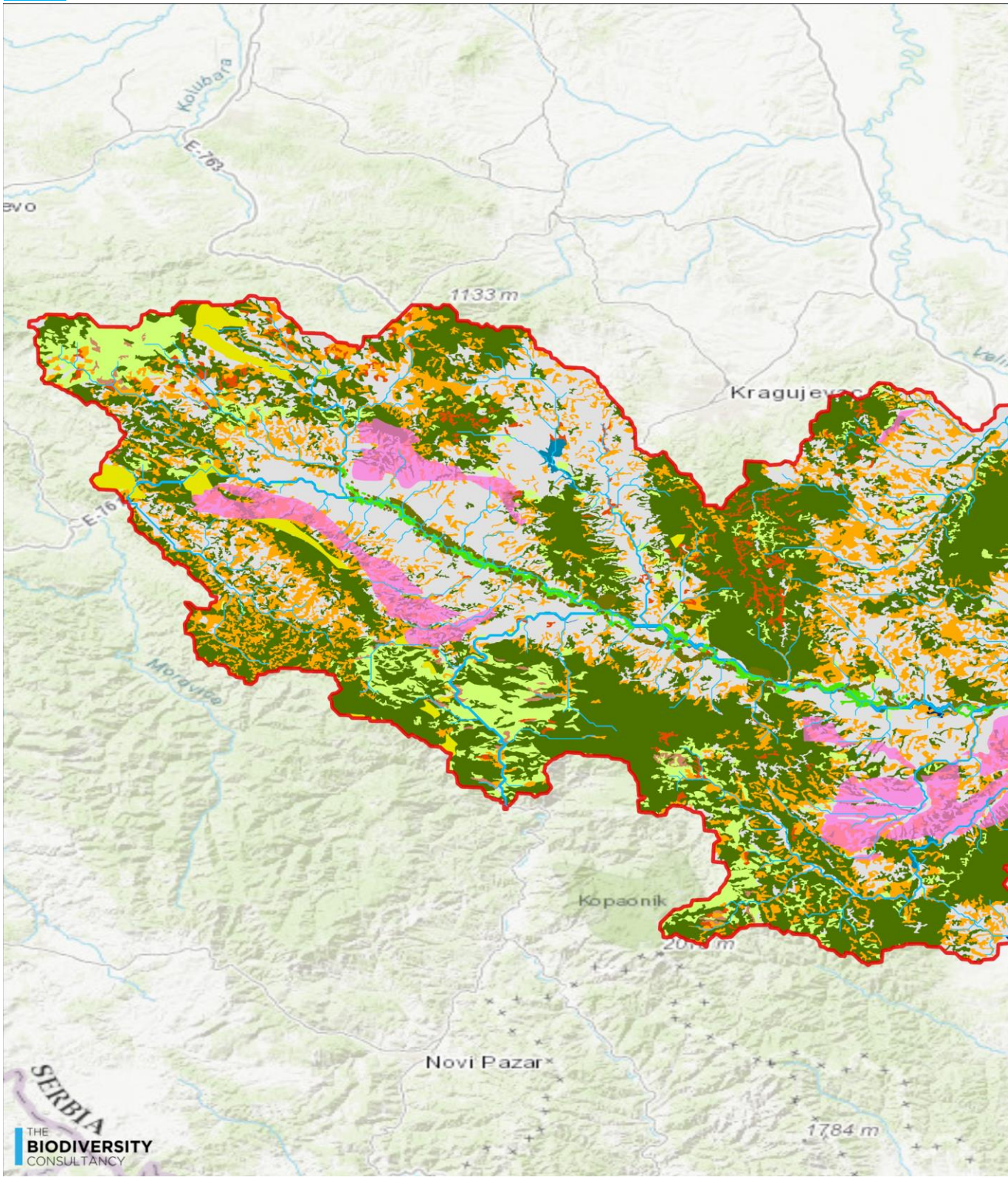

Figure 2 presents the habitat types within the AoA that meet the IFC definition of Natural Habitat or Modified Habitat. Karst limestone habitat data was not available for the mapping but the presence of some types of limestone sedimentary rock can determine the presence of this habitat (Cottle 2004) which supports the CH-qualifying gastropods. Therefore, national geological maps from University of Belgrade (2012) were also used to map the habitat types. There are two types of sedimentary rocks in the AoA that contain limestone, flysch and carbonate (limestone and dolomite) rocks. Only carbonate rocks are suitable for karst snails.

Table 5 : Terrestrial habitats in the AoA that meet the definition of Natural or Modified Habitat.

Land cover type in the wider AoA[1]	Associated EUNIS habitat types (code) in the AOI [2]	Description	Assessment of Critical/ Natural / Modified Habitat
Karst limestone[3]	Not identified by EUNIS	Karst limestone areas that occur as part of the Dinarides and Carpatho-Balkan Mountains overlap with the western section of the AoA. Most of these areas rarely have exposed bedrock and are usually covered with vegetation and soil (Menkovic 2020). There are two types of sedimentary rocks that contain limestone, flysch and carbonate (limestone and dolomite) rocks. Only carbonate rocks are suitable for karst snails. These areas likely maintain populations of CH-qualifying limestone-associated gastropods (see description in Section 3.1 for further information).	**Critical Natural Habitat**
Forest	**Riparian and gallery woodland, with dominant alder, birch, poplar or willow (G1.1)** **Thermophilous deciduous woodland (G1.7)**	Thermophile deciduous oak forest (or woodland) represents the dominant forest type found in the AoA, located away from the flooding zone of large rivers such as the Zapadna Morava river. Riparian forests are found within the flooding zone. These are typically dominated by poplars, alders, and willows with floristic composition differing based on the intensity and duration of flooding and the groundwater level (Pavlović *et al.* 2017; 2U1K 2020).	**Natural Habitat**
Shrub and/or herbaceous vegetation associations	Not identified	Small patches of vegetation are found within the AoA that mainly represent areas of transitional thermophilus woodland-shrub due to degradation, forest regeneration and/or natural succession, (Kosztra *et al.* 2019; 2U1K 2020).	**Natural Habitat**
Sparsely vegetated areas	Not identified	Areas with scattered vegetation are found close to the eastern, western and southern boundaries of the AoA. These areas typically represent steppe vegetation, tundra scrub, heath, limestone karst areas, and other sparely vegetated areas in the sub-alpine to alpine zone (Pavlović *et al.* 2017).	**Natural Habitat**
Agriculture - Pastures	**Permanent mesotrophic pastures and aftermath-grazed meadows (E2.1)**	Pastures or meadows with varying frequencies and intensities of mowing and/or grazing covered in natural or sown herbaceous species are located within the wider AoA (Kosztra *et al.* 2019). Within the AOI, regularly grazed mesotrophic pastures are located along the dry riverbed sections of the Zapadna Morava River (2U1K 2020). These low to moderately disturbed areas are suitable	**Critical Natural Habitat**

Land cover type in the wider AoA[1]	Associated EUNIS habitat types (code) in the AOI [2]	Description	Assessment of Critical/ Natural / Modified Habitat
		for maintaining populations of the CH-qualifying Domogled Meadow Bush-cricket *Broughtonia domogledi* (see description in Section 3.1 for further information).	
Agriculture - Land principally occupied by agriculture, with significant areas of natural vegetation	Not identified	A mosaic of mainly agricultural areas with more than 25-75% of the area covered in patches of natural or semi-natural vegetated areas such as forest and shrubs (Kosztra *et al.* 2019).	**Natural Habitat**
Agriculture - Complex cultivation patterns	Not identified	A mosaic of small areas of land used for small-scale agricultural practices such as annual crops, interspersed with houses and gardens (Kosztra *et al.* 2019).	**Modified Habitat**
Agricultural - Non-irrigated arable land	**Intensive unmixed crops (I1.1)**	Agricultural areas within the AoA that are generally used for intensive agricultural activities (Kosztra *et al.* 2019; 2U1K 2020).	**Modified Habitat**
Artificial surfaces	**Active opencast mineral extraction sites, including quarries (J3.2)** **Rural industrial and commercial sites still in active use (J2.3)** **Residential buildings of villages and urban peripheries (J1.2)** **Road networks (J4.2)**	Areas that have been heavily changed or modified by human activities are present across the AoA. These mainly include operational mine and quarry sites, and urban areas for industrial, commercial, residential and recreational use (Kosztra *et al.* 2019; 2U1K 2020).	**Modified Habitat**

Notes:

[1] Land cover types in the wider AoA was identified from Copernicus (2018), and validated against published literature and 2U1K (2020).

[2] Only EUNIS habitat types that were identified in 2U1K (2020) in the area of influence (AOI), i.e. 1,000 km corridor along the motorway alignment, are presented in this table. Refer to Section 2.4.1 for more information.

[3] Location of areas of karst limestone ecosystems was refined using the geological map, Topografska osnova geografskog instituta srpske akademije nauka (1953).

3.2.2 Aquatic ecosystems

3.2.2.1 Ecological context

The AoA runs west to east along the Zapadna (West) Morava River and tributaries which form a large, low gradient meandering river floodplain system flanked by *Alnus-Betula-Populus-Salix* riparian and gallery woodland and intensive agriculture. The Zapadna Morava River, which forms the headwater of the Velika (Great) Morava River, arises at the confluence of the Moravica and Djetinja rivers, and is approximately 210 km in length. The Zapadna Morava and the Južna Morava form the Velika Morava River at their confluence to the east of the study area. The river has an average discharge of 120 m^3/s and is characterized by extreme fluctuations (likely due to the high anthropogenic land use in the catchments) which results in severe flooding events on the flood plains of the system (Novaković 2013).

The valley of the Zapadna Morava River has significant agricultural potential and its fertile floodplains have been heavily exploited for farming along the banks. The Zapadna Morava itself flows through a large number of settlements, some of which are significant industrial centers (e.g. Čačak, Kraljevo). Results from an ecological status assessment of the Zapadna Morava concluded that the River is impacted by moderate organic pollution as well as various types of hydrological and geomorphological pressures from land use activities such as agriculture, industry and mining and therefore the overall status of the river was assessed as moderate (Novaković 2013).

3.2.2.2 Assessment of Natural Habitat and Modified Habitat for the riverine ecosystem

Based on the IHI results (Table 6), the Zapadna Morava and Velika Morava rivers were categorised as moderately modified (C category) due to deforestation of the banks of the river, agricultural, residential, industrial and mining encroachment which was ubiquitous throughout the catchment. Although they have undergone some modification, they are still considered to be Natural Habitat as it retains a natural habitat sequence of diversity and cover capable of supporting elements of the natural freshwater biotic community expected for the aquatic systems in the AoA.

Based on the presence of species that qualify for Critical Habitat in the AoA, **elements of the freshwater habitat will qualify as Critical Habitat. However, this has not been mapped at the present time.** The specific habitat (hard substrate areas within the river bed and tributaries) that will qualify as Critical Habitat cannot be physically mapped with existing information and will require more detailed studies to refine the Critical Habitat mapping (see Section 5); Critical Habitat with in the riverine system will therefore be mapped once more detailed data is collected as part of the residual impact assessment.

Table 6 and

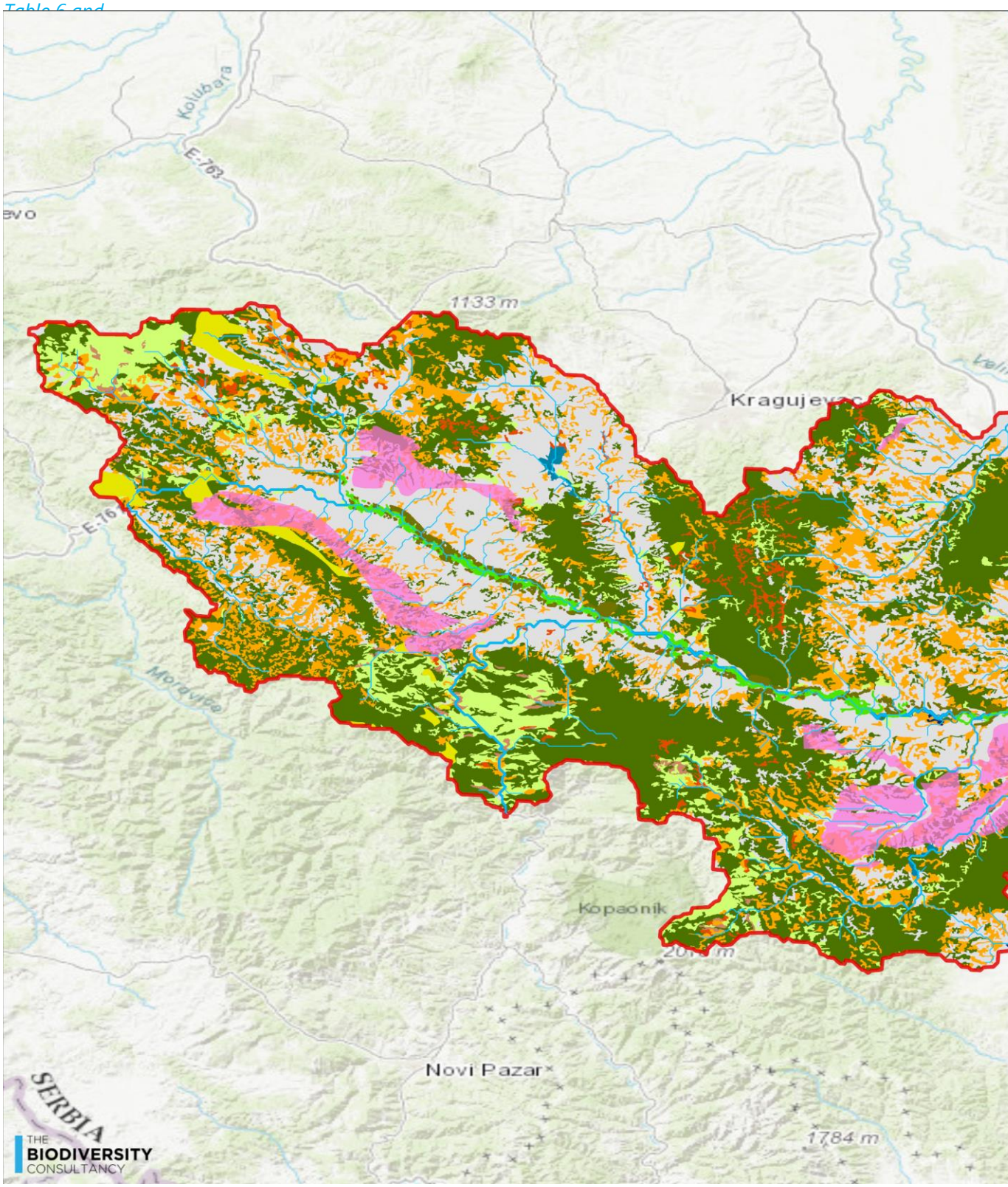

Figure 2 presents the riverine areas within the AoA that meet the IFC definition of Natural Habitat. Note that some areas in the river are Natural Critical Habitat due to the presence of the Striped Nerite.

Table 6 : Riverine areas in the AoA that meet the definition of Natural or Modified Habitat.

River Section (aligned with Project Sections)	Ecological category (IHI- Kleynhans, 1996)	Assessment of Natural / Modified Habitat
Section-1: Pojate - Kruševac (Koševi)	**C category.** The river in this section is moderately modified according to the IHI and somewhat degraded because of deforestation and agricultural, residential encroachment in the catchment. The riparian habitat is more impacted than the instream habitat which retains a relatively natural sequence capable of supporting a large element of the natural freshwater biotic community.	**Natural Habitat**
Section-2: Kruševac (Koševi)-Adrani	**C category.** The river is moderately modified and in a similar state to river section 1. Industrial activities were noted on the banks in this catchment (likely to be associated with a decreased water quality in this section of river) and some instream activities such as a small partial damming. Overall the riparian vegetation was slightly more intact in this section. The habitat sequence remains largely intact and capable of supporting a largely natural freshwater biotic community.	**Natural Habitat**
Section-3: Adrani-Preljina	**C category.** The river is moderately modified. In addition to agricultural and residential encroachment, instream sand mining activities were noted. Overall the instream habitat sequence remains largely intact and capable of supporting a largely natural freshwater biotic community.	**Natural Habitat**
Downstream section (from Section 1 start to most downstream point in AoA on the Velika Morava)	**C category.** The river in this section is moderately modified and degraded from deforestation and agricultural, residential encroachment in the catchment. The riparian habitat is highly impacted where the instream habitat retains a relatively natural sequence likely capable of supporting large elements of the natural freshwater biotic community.	**Natural Habitat**
Tributaries	**C category.** The state of the tributaries in the area are similar to the main stem Zapadna Morava River. The riparian habitat is highly impacted where the instream habitat retains a relatively natural sequence likely capable of supporting large elements of the natural freshwater biotic community.	**Natural Habitat**

3.2.2.3 *Assessment of Natural Habitat and Modified Habitat for standing waterbodies and wetlands*

Table 7 and

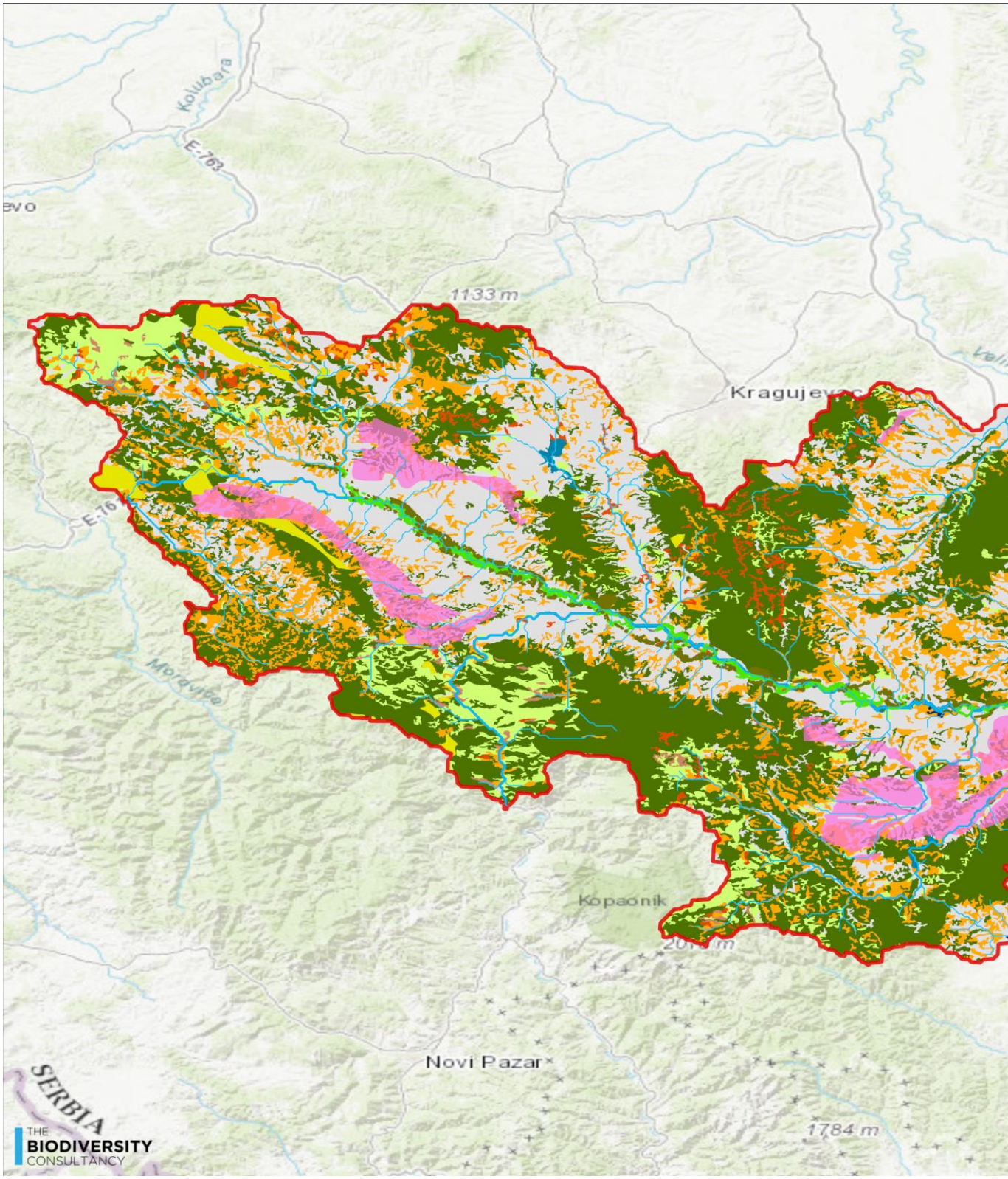

Figure 2 presents the inland standing waterbody and wetland areas within the AoA that meet the IFC definition of Natural Habitat. Highly artificial non-saline standing waters include some irrigation ponds under active use but also include well-developed native marginal vegetation and can support natural biodiversity features. It appears that some inland water body features are a result of historical cut-off of river channel meanders and floodplain oxbows, therefore these ponds are considered to be natural in origin.

Table 7: Other aquatic areas in the AoA that meet the definition of Natural or Modified Habitat.

Land cover type in the wider AoA[1]	Associated EUNIS habitat types in the AOI [2]	Description	Assessment of Natural / Modified Habitat
Inland wetlands	Not identified	Lowland areas usually flooded in winter, and more or less saturated by water all year round (Kosztra *et al.* 2019).	**Natural Habitat**
Inland waters	Highly artificial non-saline standing waters (J5.3)	Natural or artificial waterbodies that are saturated for most of the year are found in the wider AoA. In the vicinity of the Project, small artificial waterbodies support a variety of native plant and bird species that are nationally protected, e.g. the Yellow Waterlily, *Nuphar lutea,* and the Great Crested Grebe, *Podiceps cristatus*. While considered as highly artificial areas, the retained ecological functionality of these areas, plus the presence of species of largely native origin within these naturalized waterbodies meets the definition of Natural Habitat under IFC PS6.	**Natural Habitat**
Notes: [1] Land cover types in the wider AoA was identified from Copernicus (2018), and validated against published literature and 2U1K (2020). [2] Only EUNIS habitat types that were identified by 2U1K (2020) in the vicinity of the Project, i.e. 1,000 km corridor along the motorway alignment, are presented in this table. Refer to Section 2.4.1 for more information.			

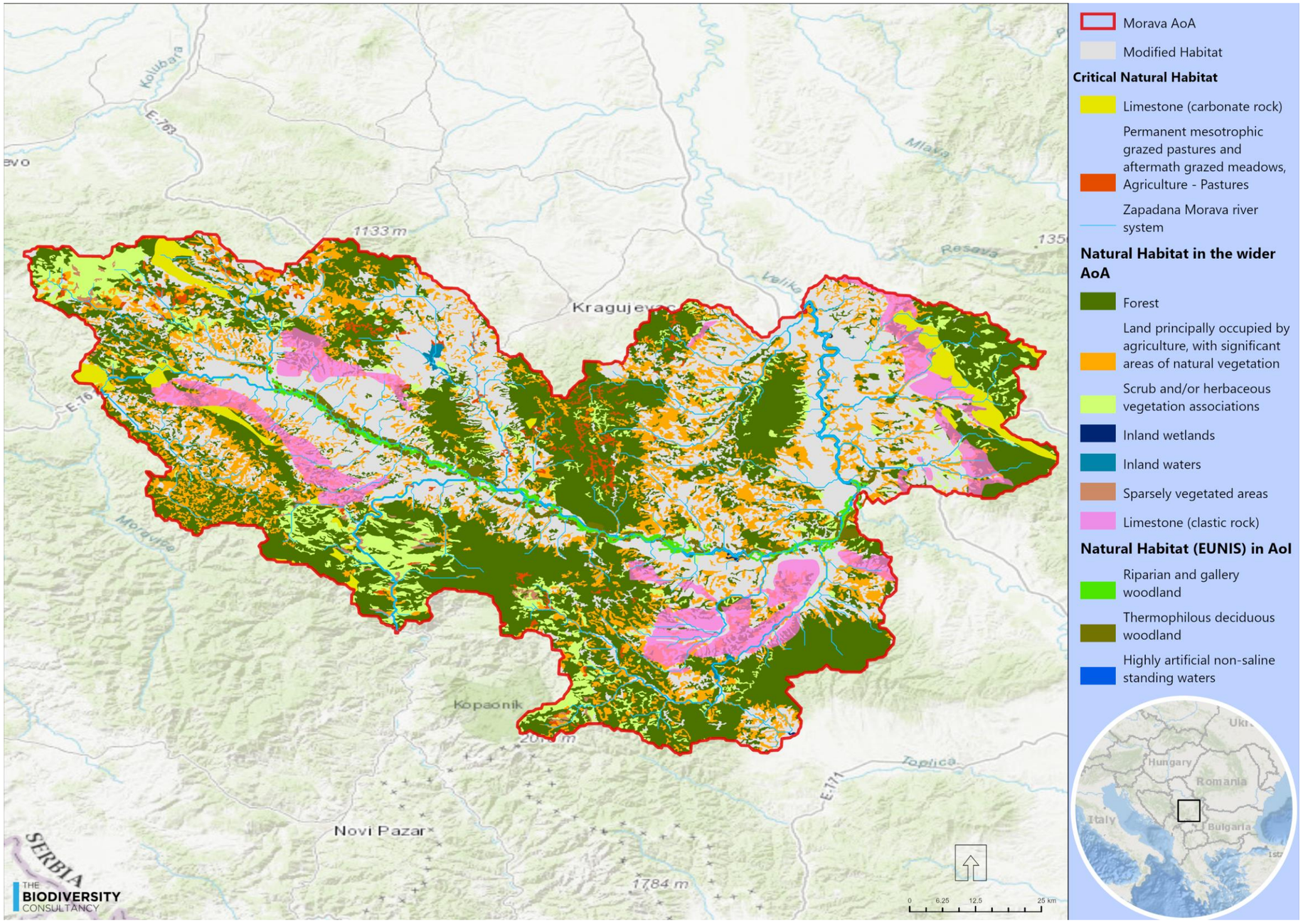

Figure 2. Map of Critical Habitat (CH), Natural Habitat (NH) and Modified Habitat (MH) in the AoA, with habitat types shown. Data sources: (EUNIS) (EEA 2020), CORINE Land Cover (Copernicus 2018) and Global Surface Water, 1984-2019 (Pekel et al. 2016), NH and MH mapping (2U1K, 2020). Note that a detailed GIS Project of the map in Figure 2 has been provided to the Project for detailed planning and design.

3.3 Protected areas and internationally recognised areas

No Project infrastructure is planned within any legally protected areas nor internationally recognised areas of high biodiversity value (LPA/IRA) and therefore Paragraph 20 of PS6 does not apply. While a number of LPA/IRA overlap with or are located within the AoA, none of these areas will qualify as CH as they are unlikely to contain biodiversity features that qualify under the CH criteria.

3.3.1 Internationally recognised areas

Five KBAs overlap with or are located within the AoA but do not qualify the Project as CH; Valjevske mountains ('Valjevske planine'), Ovcar-Kablar gorge ('Ovcarsko-Kablarska klisura') and Kopaonik, and Gornje Pomoravlje. They are KBAs as they are important national sites for, and/or hold regionally (Europe) important congregations of, certain bird species. However, these species have a global IUCN status of LC or NT, are extremely widespread across Europe, have extremely large population sizes, and general habitat preferences; the KBAs therefore do not contain species that will qualify under the CH criteria. Although there is no overlap with the Project infrastructure and any of the KBAs it should be noted that the Gornje Pomoravlje KBA is downstream of the Project on the western end of the motorway and changes to the water flow as a result of Project activities may affect the species of waterbird that trigger its KBA status (Kingfisher (*Alcedo atthis*) and sand martin (*Riparia riparia*), recommendations are therefore made in Section 5 to address this risk.

Akumulacija Gruza KBA is located within the AoA. This area is a KBA due to being known or thought to regularly hold significant numbers of a globally threatened species. The KBA is triggered by the Ferruginous Duck *Aythya nyroca*, which at the time of this assessment, had a global IUCN status of NT. At least 75 individuals of this migratory species were recorded in the KBA between 2000-2008. With a global population estimate of c.180,000–240,000 individuals, and <1% of its global range overlapping with the AoA (c.0.02%), it is unlikely that the KBA would contain concentrations that meet the CH criteria.

3.3.2 Legally protected areas

Four legally protected areas of high biodiversity value overlap with or are located within the AoA but do not contain species that qualify for CH.

Mala jasenova glava is a Special Nature Reserve located on the eastern boundary of the AoA. Designated as IUCN Management Category IV, this nature reserve contains numerous plant species that are endemic to the Balkan highlands, e.g. *Nepeta rtanjensis*, and *Ramonda serbica* (Ranđelović & Avramović 2004; WDPA 2020a).

Nacionalni park Kopaonik (Kopaonik) is a National Park that overlaps with the southern boundary of the AoA and the Kopaonik KBA. Designated as IUCN Management Category II and national Protection Category I (areas of exceptional international and national importance), this area is recognised for its high biodiversity value due to the presence of diverse ecosystems

consisting of c. 1600 plant species, of which 11.9% are Balkan highland endemics, c,170 bird species, and c.40 mammalian species (ZZPS n.d.; WDPA 2020b).

Goč-Gvozdac is a Special Nature Reserve located within the southern section of the AoA. Designated as IUCN Management Category V and national Protection Category I (areas of exceptional international and national importance), this area is recognised for the presence of endemic, rare, endangered and internationally important plant species (ZZPS n.d.; WDPA 2020c).

Osredak is a Special Nature Reserve located along the Zapadana Morava riverbank that has only been recently designated as a legally protected area in 2020. This protected area is recognised for harbouring nationally protected plant and animal species, such as the Yellow Water Lily *Nuphar lutea*, while being a stopover and nesting site for numerous waterbirds (2U1K 2020). Based on a review of EBird, where no bird records exist in the area, and the assessment of CH-qualifying species (refer to Section 3.1.1), it is unlikely that bird species will be travelling through, and potentially interacting with the area at concentrations that will qualify under the CH criteria.

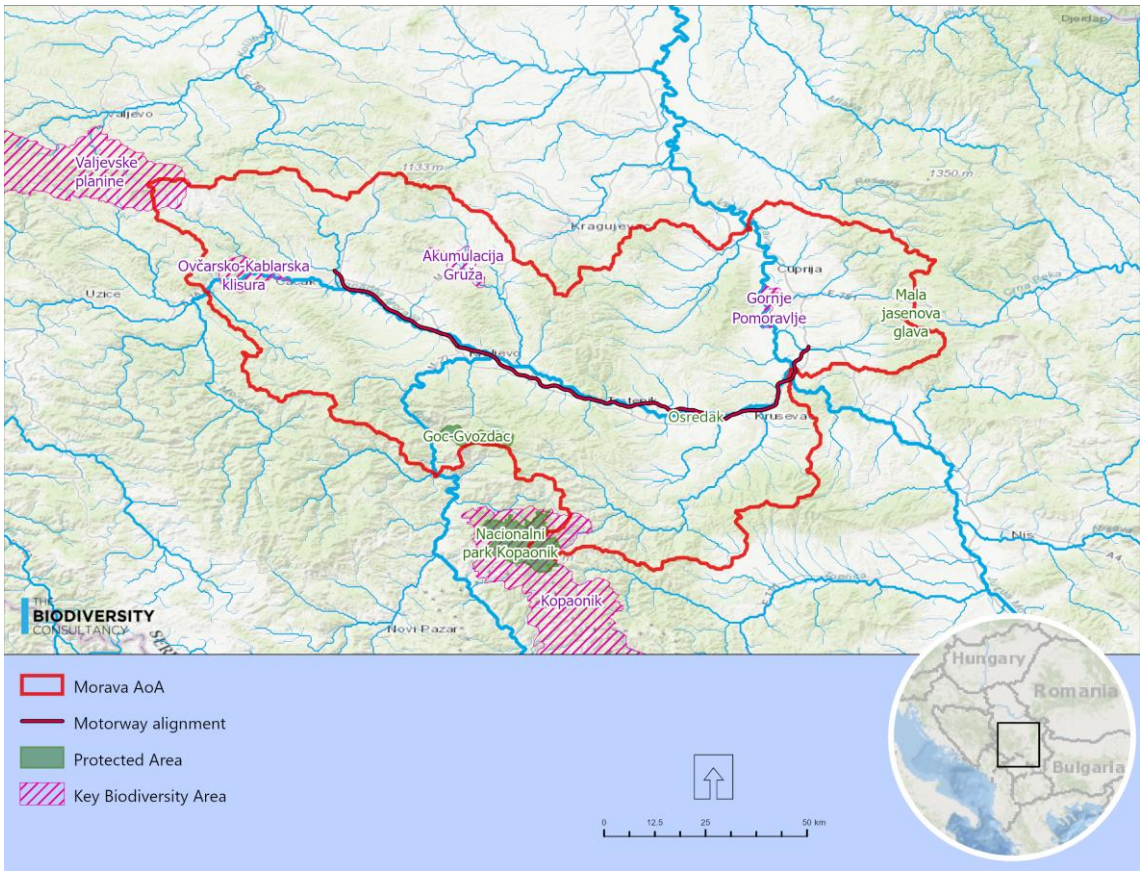

Figure 3. Protected areas and internationally recognised areas of high biodiversity value in the AoA. Data source: IBAT

4 Implications for the Project

4.1 Critical Habitat designation

The Project is operating in an area containing Critical Habitat. Being in Critical Habitat requires the Project to pay special attention to the management of biodiversity impacts and highlights the priority biodiversity that the Project needs to consider.

Where impacts do occur, lender standards require projects to fully exercise the mitigation hierarchy. Projects located in Critical Habitat will require an overall net gain of Critical Habitat-qualifying biodiversity. A high threshold of proof will be required to demonstrate that it is feasible to deliver a net gain for these biodiversity features. The CHA and an estimation of residual impacts after application of mitigation measures will provide necessary information for the development of a Biodiversity Action Plan (BAP).

Table 8 shows the requirements of PS6 paragraph 17 and 18, with respect to Critical Habitat.

Table 8: IFC PS6 paragraph 17 and 18 on Critical Habitat

PS6 reference	PS6 text
PS6 paragraph 17	'In areas of Critical Habitat, the client will not implement any project activities unless all of the following are demonstrated: • **No other viable alternatives** in the region exist for development of the project on Modified or Natural Habitats that are not Critical; • The project **does not lead to measurable adverse impacts** on those biodiversity values for which the Critical Habitat was designated, and on the ecological processes supporting those biodiversity values; • The project **does not lead to a net reduction** in the global and/or national/regional population of any Critically Endangered or Endangered species over a reasonable period of time; • A robust, appropriately designed, and **long-term biodiversity monitoring and evaluation program** is integrated into the client's management program'.
PS6 paragraph 18	'In such cases where a client is able to meet the requirements defined in paragraph 17, the project's mitigation strategy will be described in a **Biodiversity Action Plan (BAP)** and will be designed to achieve **net gains** of those biodiversity values for which the critical habitat was designated'.

4.2 Natural and Modified Habitat designation

The Project will also need to meet the PS6 expectations for the management of impacts on Modified and Natural Habitat. Table 9 describes the requirements of PS6 paragraph 12, 14 and 15 with respect to projects located within Modified and Natural Habitat.

Table 9 : IFC PS6 paragraphs on Natural Habitat

PS6 reference	PS6 text
PS6 paragraph 12	'This Performance Standard applies to those areas of Modified Habitat that include **significant biodiversity value**, as determined by the risks and impacts identification process required in Performance Standard 1. The client should **minimize impacts** on such biodiversity and **implement mitigation measures** as appropriate.'
PS6 paragraph 14	'The client will not significantly convert or degrade natural habitats, unless all of the following are demonstrated: No other viable alternatives within the region exist for development of the project on modified habitat; Consultation has established the views of stakeholders, including Affected Communities, with respect to the extent of conversion and degradation; and Any conversion or degradation is mitigated according to the mitigation hierarchy.'
PS6 paragraph 15	'In areas of Natural Habitat, mitigation measures will be designed to achieve **no net loss** of biodiversity where feasible.'
PS6 footnote 9	'No net loss is defined as the point at which project-related impacts on biodiversity are balanced by measures taken to avoid and minimize the project's impacts, to undertake on-site restoration and finally to offset significant residual impacts, if any, on an appropriate geographic scale (e.g. local, landscape-level, national, regional).

4.3 Protected areas and/or Internationally recognised areas

The Project footprint is not within or overlapping any Protected areas or Internationally recognised areas and therefore Paragraph 20 is not triggered. However, the potential for impacts on Gornje Pomoravlje KBA from Project activities upstream needs to be assessed.

5 Key data gaps and recommendations

This CHA indicates that the Project is situated in a landscape containing a number of biodiversity features that qualify as CH. However, there is variability between the species that qualify for Critical Habitat in terms of whether they may be impacted directly or indirectly by the Project. For example, the four terrestrial gastropod species are associated with a particular type of sedimentary rock containing limestone (carbonate rocks) which are found to the far east and

west of the AoA. The Project's quarry sites overlap with areas of a different type of sedimentary rock containing limestone (flysch rocks); there is therefore no impact risk to the four species of terrestrial gastropod. Further surveys are therefore not recommended for these species. For the two remaining Critical Habitat-qualifying species, the key data gaps and recommendations to enable the Project to align with PS6 and ensure a robust evidence base exists to demonstrate compliance are outlined in Table 10.

Table 10. Key information gaps and recommendations to align with PS6

Biodiversity feature	Identified gaps	Recommended actions
Insects		
Broughtonia domogledi (Domogled Meadow Bush-cricket)		This species likely occurs in mesic meadows that is found near to the infrastructure footprint. Therefore, there is potential for the Project to impact habitat that may support this species. The significance of residual impacts to meadow habitat should be assessed and, if required, options to offset residual impacts considered. Species-specific surveys are not considered necessary as habitat can be used to assess impact. Pre-disturbance surveys are recommended to confirm presence/absence and confirm CH or NH status prior to impact.
Freshwater aquatic species		
Theodoxus transversalis (Striped Nerite)	There is limited information on the occurrence and distribution of the species in the Zapadna Morava River and tributaries.	This species may occur in some sections of the Zapadna Morava River where there is good water quality and suitable habitat. A field visit undertaken in October 2020, assessed that suitable habitat was present along the course of the Zapadna Morava however, poor water quality in some sections (specifically section 3 where the majority of the river regulation work will be undertaken), has resulted in the substrate being covered in algae; this means that the substrate is no longer suitable for the species. eDNA surveys are recommended to confirm if the species is present in different sections of the river where potential impacts may occur. eDNA surveys will also provide information on the presence/absence of the Noble Crayfish and the Thick-Shelled River Mussel.
Internationally recognized areas		
Gornje Pomoravlje KBA	River flow modelling has not yet been undertaken based on the river regulation changes to enable an assessment of indirect impacts on this KBA.	Review the results of the river flow modelling and assess for impacts to the species that trigger the status of the KBA. Avoidance and minimization measures will be required if impacts are expected to occur.

6 Next steps

To fully align with PS6, the following next steps are recommended:

1. **Conduct eDNA surveys** for the Critical Habitat-qualifying Striped Nerite to understand distribution in sections of the river that will be impacted by the Project (refer to Table 10 for further information).

2. Update the **Biodiversity Impact Assessment** to focus on Critical Habitat-qualifying biodiversity features, the habitat supporting those features, and stakeholder priority biodiversity. This will require documentation of avoidance and minimisation measures, and evaluate whether any CH-qualifying species will be significantly impacted by the Project by undertaking a **Residual Impact Assessment** (RIA) to understand losses and gains required to achieve net gain/ not net loss.

3. Investigate the possibility to further **avoid/minimise significant impacts** as predicted by the residual impact assessment with information flowing into alternatives analysis e.g. for quarry locations and river regulation.

4. If significant residual impacts are predicted, **develop a Biodiversity Action Plan (BAP), including options to offset residual impacts where needed**, to demonstrate how the Project will apply the mitigation hierarchy and achieve Net Gains for CH-qualifying biodiversity features or No Net Loss of Natural Habitat.

5. Develop a **Biodiversity Offset Strategy** presenting the Project's framework for offset design and implementation considerations including broad actions that will be taken to achieve necessary offset gains.

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Appendix 1: Topographic and water catchment information considered for identifying the AoA

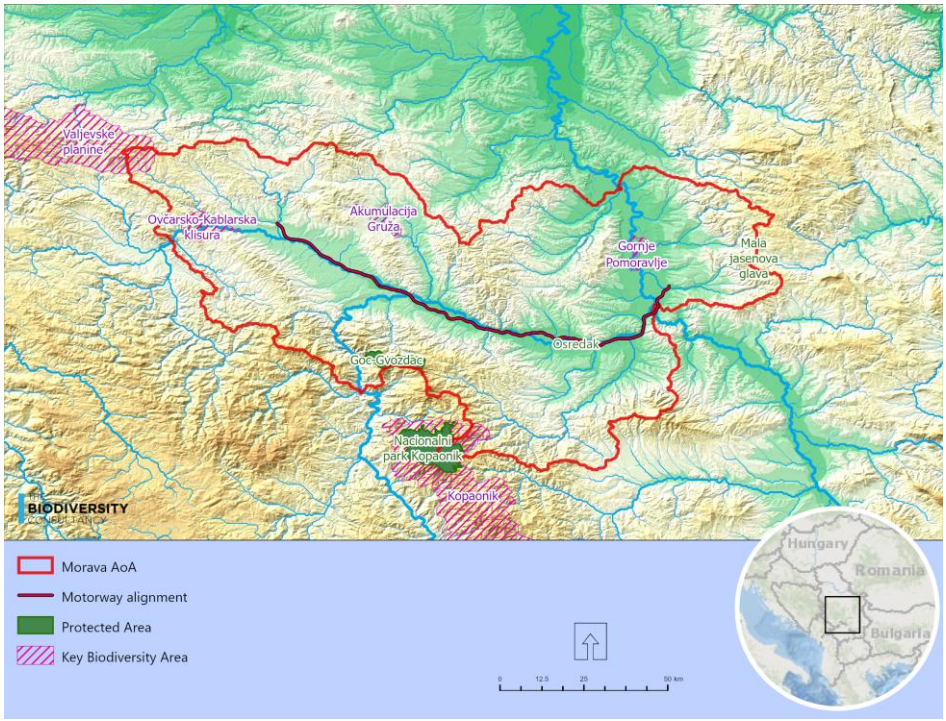

Figure 4. Map of the Area of Analysis with topographic information presented

Figure 5. Map of the Area of Analysis with water catchment information presented

Appendix 2: Methods used to apply Critical Habitat thresholds

Criterion 1: Critically Endangered and Endangered species

Areas qualifying for this criterion support:

a. Globally-important concentrations of IUCN Red-listed Critically Endangered or Endangered species (>0.5% of the global population and >5 reproductive units of a CR or EN species);

b. Globally-important concentrations of an IUCN Red-listed VU species, the loss of which would result in the change of the IUCN Red List status to EN or CR and meet the thresholds under (a); or

c. As appropriate, areas containing important concentrations of a nationally/regionally-listed EN or CR species

The screening was preferentially based on the proportion of a species' population in a given area, but often – owing to limited data – on the proportion of a species' global distribution. When information was unclear, a precautionary approach was taken, and the species was included as potentially qualifying.

For criterion 1c, the screening uses national Red List information, given in Biologer, a database of c.163,843 species field observation records and digitised 33,458 literature records of Serbia (Popović *et al.* 2020).

Criterion 2: Restricted-range species

Areas qualifying for this criterion hold ≥10% of the global population size and ≥10 reproductive units of a restricted-range species. "Restricted-range" refers to a species' extent of occurrence (EOO), and is defined according to its habitat:

- For **terrestrial vertebrates** and **plants**, a restricted-range species is a defined as those that have an EOO of less than 50,000 km^2. GN6 does not currently provide a threshold for terrestrial invertebrates, so the precautionary threshold for vertebrates was applied;
- For **riverine** and **other aquatic species** in habitats that do not exceed 200 km width at any point (e.g., rivers), restricted-range is defined as having a global range less than or equal to 500 km linear geographic span (i.e., the distance between occupied locations furthest apart). There are limited data on occupied locations of freshwater and marine species, and limited availability of those data. As such, for freshwater species this was calculated by measuring the distance the two furthest points of the catchment(s) in which the species is present. For coastal species, it was calculated by measuring the longest axis of the distribution range of the species. For freshwater species in particular, this approach may underestimate the number of restricted-range species, since they may not occupy entire catchments within which they occur. To address this, careful consideration was also given to freshwater species where linear geographic span was less than 600 km.

The AoA was screened for overlap with restricted-range species' maps from the IUCN Red List. Any such species were compared with the recommended thresholds for Criterion 2 (IFC 2019). Similar to Criterion 1, the screening was based on the proportion of a species' distribution in the study area in the absence of information on species' populations.

Criterion 3: Migratory and congregatory species

Areas qualifying for this criterion support either:

a. ≥ 1 percent of the global population of a migratory or congregatory species at any point of the species' lifecycle and on a cyclical or otherwise regular basis; or

b. ≥10 percent of the global population of a species during periods of environmental stress.

The study area is first assessed for its possibility of being an area where species will interact in large numbers with the project, e.g. migratory soaring birds are well known to follow specific and narrow migration corridors leading to sometimes large concentrations of individuals converging at specific points (Kirby *et al.* 2008)(TBC 2018). Candidate species in the study area were subsequently screened against PS6 thresholds (IFC 2019), based on the proportion of a species' population in a given area, and expert opinion supported by available literature.

Criterion 4: Highly threatened and/or unique ecosystems

Ecosystems qualifying under this criterion are those:

a. representing ≥5% of the global extent of an ecosystem type meeting the criteria for IUCN status of CR or EN.

b. not yet assessed by IUCN, but determined to be of high priority for conservation by regional or national systematic conservation planning.

IUCN defines ecosystems as complexes of organisms and their associated physical environment within a specified area (IUCN 2016). They have four essential elements:

A biotic complex (i.e., the ecosystem is composed by a specific community of living organisms. This native biota is distinguishable between different ecosystems and has a central role in ecosystems dynamics, structure, and functions);
An abiotic environment (i.e., the ecosystem is characterized by specific physical factors);
The interactions within and between them, and;
A physical space in which these operate.

Areas qualifying under this criterion hold ≥5% of the global extent of an ecosystem type meeting the criteria for IUCN status of CR or EN or other areas not yet assessed by IUCN, but determined to be of high priority for conservation by regional or national systematic conservation planning. Screened ecosystems were identified checking the list of ecosystems assessed by the IUCN (IUCN 2020) and the presence of any threatened ecosystems at the

regional/national level using the European Red List of Habitats (European Commission 2016) and their corresponding factsheets on the status and distribution of each habitat type given in EEA (2019).

Criterion 5: Areas associated with key evolutionary processes

The key factor defining this criterion is '*the structural attributes of a landscape*'. Although key evolutionary processes may operate at various spatial scales, in the sense of PS6, these are usually considered at a relatively fine scale rather than broad biogeographic regions (e.g. an unusual outcrop of a rock type that holds unique and endemic plant assemblages). No quantitative thresholds exist for this criterion, so there is a reliance on expert opinion and qualitative value judgement.

Internationally recognized areas

GN54 (IFC 2019) states that '*certain internationally recognized areas of high biodiversity value may be recognized as Critical Habitat and should be given special attention during assessments. Examples include the following*:

- *Areas that meet the criteria of the IUCN's Protected Areas Categories Ia, Ib and II* (Dudley 2008)*;*
- *Key Biodiversity Areas (KBAs), which encompass Important Bird and Biodiversity Areas (IBAs)*'.

Appendix 3: Candidate species that were excluded from this CHA

A refined list of 31 species was further assessed in detail in this CHA after excluding species that were highly unlikely to approach the thresholds under Criterion 1-4 following the approach given in Appendix 2. The rationale for excluding 23 of these 31 species as Critical Habitat -qualifying is given in Table 11 below.

Table 11. List of 23 species assessed in detail in this CHA, and their rationale for exclusion as a CH-qualifying species.

Scientific name	English name	Global RL status [1]	National/Regional RL status [1]	Presence in AoA [2]	IFC PS6 Criteria [3]	Initial screening result [4]	Final CHA result [4]	Justification
Birds								
Circus aeruginosus	Western Marsh-harrier	LC	NT (national RL)	Confirmed	3a	Possible	Unlikely	This is a migratory soaring bird species that breeds in Serbia. It has an extremely large range with a population trend that appears to be increasing. The global population is c. 500,000-999,999 individuals. To meet the threshold for Criterion 3a, the AoA is required to support c. 5,000-9,999 individuals. This species migrates on a broad front, i.e. they move over wide areas and are not confined to 'narrow' corridors (BirdLife International 2019a). With limited evidence that the AoA is part of a major migratory flyway and the AoA comprising such a small proportion of its global distribution (0.02%), it is unlikely that this species will potentially travel through, and interact with the area at concentrations that will trigger Criterion 3a.
Aquila heliaca	Eastern Imperial Eagle	VU	CR (national RL)	Confirmed	1c, 3a	Possible	Unlikely	This is a migratory soaring bird species that breeds in Serbia. The global population is c. 2,500-9,999 individuals, of which c. 5-7 pairs, i.e. a maximum of c.14 individuals, are found in Serbia. To meet the threshold for Criterion 3a, the AoA is required to support at least c. 25-99 individuals respectively. The Balkan population, known mostly from Bulgaria and Macedonia, are mainly a resident species with some juveniles moving south (BirdLife International 2015a, 2019b). With individuals of this species exhibiting very limited seasonal movements in the region, only 16 EBird records of this species found to the north of Serbia to date, and the AoA comprising such a small proportion of its global distribution (0.02%), it is unlikely that this species will be travelling through, and potentially interacting with the area at concentrations that will trigger Criterion 1c and/or 3a.
Falco cherrug	Saker Falcon	EN	EN (national RL)	Unconfirmed	1c, 3a	Possible	Unlikely	This is a migratory soaring bird that is also a resident species of Serbia. The global population is c. 2,200-29,800 individuals, of which the population in Serbia contains only c. 14-17 pairs, i.e. 28-34 individuals (BirdLife International 2014, 2017a). To meet the threshold for Criterion 3a, the AoA is required to support at least c. 122-298 individuals, respectively. With such a small number of individuals estimated for Serbia, only 13 Ebird records observed in Serbia, to date, limited evidence that the AoA is part of a major migratory flyway, and the AoA comprising such a small proportion of its global distribution (0.02%), it is unlikely that this species will be travelling through, and potentially interacting with the area at concentrations that will trigger Criterion 1c and/or 3a.
Ciconia nigra	Black Stork	LC	NT (national RL)	Confirmed	3a	Possible	Unlikely	This is a migratory soaring bird species that breeds in Serbia. The global population is estimated as c. 24,000-44,000 individuals, of which the population in Serbia contains only c. 135-170 pairs, i.e. a maximum of c.340 individuals (BirdLife International 2015b, 2017b). To meet the threshold for Criterion 3a, the AoA is required to support at least c. 240-440 individuals. With 473 nation-wide EBird records to date that have mainly concentrated to the north of the AoA, limited evidence that the AoA is part of a major migratory flyway, and the AoA comprising such a small proportion of its

Scientific name	English name	Global RL status [1]	National/Regional RL status [1]	Presence in AoA [2]	IFC PS6 Criteria [3]	Initial screening result [4]	Final CHA result [4]	Justification
								global distribution (0.02%), it is unlikely that this species will potentially travel through, and interact with the area at concentrations that will trigger Criterion 3a.
Accipiter nisus	Eurasian Sparrowhawk	LC	LC (national RL)	Confirmed	3a	Possible	Unlikely	This is a migratory soaring bird that is also a resident species of Serbia. The global population is estimated as c. 2,200,000-3,300,000 individuals, of which c. 1,450-1,700 pairs, i.e. a maximum of c.3400 individuals, are found in Serbia. It has an extremely large range with a population trend that appears to be stable (BirdLife International 2016a). To meet the threshold for Criterion 3a, the AoA is required to support at least c. 22,000-33,000 individuals. With such a small number of individuals estimated for Serbia, limited evidence that the AoA is part of a major migratory flyway, and the AoA comprising such a small proportion of its global distribution (0.02%), it is unlikely that this species will potentially travel through, and interact with the area at concentrations that will trigger Criterion 3a.
Ciconia ciconia	White Stork	LC	LC (national RL)	Confirmed	3a	Possible	Unlikely	This is a migratory soaring bird species that breeds in Serbia. The global population is estimated as c. 700,000-704,000 individuals, of which c. 1,220-1,370 pairs, i.e. maximum of 2,740 individuals, are found in Serbia (BirdLife International 2015b, 2016b). To meet the threshold for Criterion 3a, the AoA is required to support at least c. 7,000-7,040 individuals. With such a small number of individuals estimated for Serbia, the AoA comprising such a small proportion of its global distribution (0.02%), and limited evidence that the AoA is part of a major migratory flyway, it is unlikely that this species will potentially travel through, and interact with the area at concentrations that will trigger Criterion 3a.
Falco subbuteo	Eurasian Hobby	LC	LC (national RL)	Unconfirmed	3a	Possible	Unlikely	This is a migratory soaring bird species that breeds in Serbia. This species migrates on a broad front, i.e. they move over wide areas and are not confined to 'narrow' corridors The global population is estimated as c. 500,000-999,999 individuals, of which Serbia contains c. 590-770 pairs, i.e. a maximum of c.1,540 individuals (BirdLife International 2015c, 2016c). To meet the threshold for Criterion 3a, the AoA is required to support at least c. 5,000-9,999 individuals. With such a small number of individuals estimated for Serbia, limited evidence that the AoA is part of a major migratory flyway, and the AoA comprising such a small proportion of its global distribution (0.01%), it is unlikely that this species will potentially travel through, and interact with the area at concentrations that will trigger Criterion 3a.
Milvus migrans	Black Kite	LC	EN (national RL)	Confirmed	1c, 3a	Possible	Unlikely	This is a migratory soaring bird species that breeds in Serbia. The global population is estimated as c. 1,000,000-2,499,999 individuals, of which Serbia contains c. 34-45 pairs, i.e. a maximum of c. 90 individuals (BirdLife International 2015d, 2019c). To meet the threshold for Criterion 3a, the AoA is required to support at least c. 10,000-24,999 individuals. With such a small number of individuals estimated for Serbia, limited evidence that the AoA is part of a major migratory flyway and the AoA comprising such a small proportion of its global distribution (0.01%), it is unlikely that this species will be travelling through, and potentially interacting with the area at concentrations that will trigger Criterion 1c and/or 3a.
Falco peregrinus	Peregrine Falcon	LC	EN (national RL)	Confirmed	1c, 3a	Possible	Unlikely	This is a migratory soaring bird that is also a resident species of Serbia. The global population is estimated as c. 100,000-499,999 individuals, of which Serbia contains c. 34-45 pairs, i.e. a maximum of c. 90 individuals (BirdLife International 2015e, 2019d). To meet the threshold for Criterion 3a, the AoA is required to support at least c. 1,000-4,999 individuals. With such a small number of individuals estimated for Serbia, limited evidence that the area is part of a major migratory flyway,

Scientific name	English name	Global RL status [1]	National/Regional RL status [1]	Presence in AoA [2]	IFC PS6 Criteria [3]	Initial screening result [4]	Final CHA result [4]	Justification
								and the AoA comprising such a small proportion of its global distribution (0.01%), it is unlikely that this species will be travelling through, and potentially interacting with the area at concentrations that will trigger Criterion 1c and/or 3a.
Clanga pomarina	Lesser Spotted Eagle	LC	CR (national RL)	Confirmed	1c, 3a	Possible	Unlikely	This is a migratory soaring bird species that breeds in Serbia. The global population is estimated as c. 140,000-60,000 individuals, of which 15-21 pairs, i.e. a maximum of c.42 individuals, are found in Serbia (BirdLife International 2015f, 2016d). To meet the threshold for Criterion 3a, the AoA is required to support at least c. 400-600 individuals, respectively. With such a small number of individuals estimated for Serbia, limited evidence that the AoA is part of a major migratory flyway and the AoA comprising such a small proportion of its global distribution (0.06%), it is unlikely that this species will be travelling through, and potentially interacting with the area at concentrations that will trigger Criterion 1c and/or 3a.
Pernis apivorus	European Honey-buzzard	LC	LC (national RL)	Confirmed	3a	Possible	Unlikely	This is a migratory soaring bird species that breeds in Serbia. The global population is estimated as c. 280,000-420,000 individuals, of which Serbia contains 650-820 pairs, i.e. a maximum of c.1640 individuals (BirdLife International 2015g, 2016e). To meet the threshold for Criterion 3a, the AoA is required to support at least c. 2,800-4,200 individuals. With such a small number of individuals estimated for Serbia, limited evidence that the AoA is part of a major migratory flyway, and the AoA comprising such a small proportion of its global distribution (0.04%), it is unlikely that this species will potentially travel through, and interact with the area at concentrations that will trigger Criterion 3a.
Circaetus gallicus	Short-toed Snake-eagle	LC	NT (national RL)	Confirmed	3a	Possible	Unlikely	This is a migratory soaring bird species that breeds in Serbia. This species triggers the KBA criteria for the Kopaonik where 2-4 breeding pairs (maximum 8 individuals) were last surveyed as present in the KBA. The global population is estimated as c. 100,000-200,000 individuals, of which the population in Serbia is only c. 105-120 pairs, i.e. a maximum of c.240 individuals (BirdLife International 2015h, 2016f). To meet the threshold for Criterion 3a, the AoA is required to support at least c. 1,000-2,000 individuals. With such a small number of individuals estimated for Serbia, limited evidence that the AoA is part of a major migratory flyway, and the AoA comprising such a small proportion of its global distribution (0.03%), it is unlikely that this species will potentially travel through, and interact with the area at concentrations that will trigger Criterion 3a.
Hieraaetus pennatus	Booted Eagle	LC	EN (national RL)	Confirmed	1c, 3a	Possible	Unlikely	This is a migratory soaring bird species that breeds in Serbia. The global population is estimated as c. 149,000-188,000 individuals, of which the population in Serbia is only c. 16-25 pairs, i.e. a maximum of c.50 individuals (BirdLife International 2015i, 2016g). To meet the threshold for Criterion 3a, the AoA is required to support at least c. 1,490-1,880 individuals. With such a small number of individuals estimated for Serbia, limited evidence that the AoA is part of a major migratory flyway, and the AoA comprising such a small proportion of its global distribution (0.03%), it is unlikely that this species will travel through, and potentially interact with the area at concentrations that will trigger Criterion 1c and/or 3a.
Accipiter gentilis	Northern Goshawk	LC	NT (national RL)	Unconfirmed	3a	Possible	Unlikely	This is a migratory soaring bird that is also a resident species of Serbia. The global population is c. 1,000,000-2,499,999 individuals, of which c. 900-1,150 pairs, i.e. c. 1,800-2,300 individuals are found in Serbia (BirdLife International 2015j, 2016h). To meet the threshold for Criterion 3a, the AoA is required to support at least c. 10,000-24,999 individuals. With limited evidence that the AoA is part of a major migratory flyway and the AoA comprising such a small proportion of its global

Scientific name	English name	Global RL status [1]	National/Regional RL status [1]	Presence in AoA [2]	IFC PS6 Criteria [3]	Initial screening result [4]	Final CHA result [4]	Justification
								distribution (0.02%), it is unlikely that this species will potentially travel through, and interact with the area at concentrations that will trigger Criterion 3a.
Falco tinnunculus	Common Kestrel	LC	LC (national RL)	Confirmed	3a	Possible	Unlikely	This is a migratory soaring bird that is also a resident species of Serbia. The global population is estimated as c. 14,000,000-6,500,000 individuals, of which c. 4,000-5,000 pairs, i.e. c.8,000-10,000 individuals are estimated for Serbia (BirdLife International 2015k). To meet the threshold for Criterion 3a, the AoA is required to support at least c. 40,000-65,000 individuals. With such a small number of individuals estimated for Serbia, limited evidence that the AoA is part of a major migratory flyway, and the AoA comprising such a small proportion of its global distribution (0.01%), it is unlikely that this species will potentially travel through, and interact with the area at concentrations that will trigger Criterion 3a.
Aquila chrysaetos	Golden Eagle	LC	VU (national RL)	Confirmed	3a	Possible	Unlikely	This is a migratory soaring bird that is also a resident species of Serbia. The global population is estimated as c. 100,000-200,000 individuals, of which c. 63-73 pairs, i.e. c.126-146 individuals are estimated for Serbia (BirdLife International 2015l). To meet the threshold for Criterion 3a, the AoA is required to support at least c. 1,000-2,000 individuals. With such a small number of individuals estimated for Serbia, limited evidence that the AoA is part of a major migratory flyway, and the AoA comprising such a small proportion of its global distribution (0.00%), it is unlikely that this species will potentially travel through, and interact with the area at concentrations that will trigger Criterion 3a.
Falco biarmicus	Lanner Falcon	LC	NE (national RL)	Unconfirmed	3a	Possible	Unlikely	This is a migratory soaring bird that is also a resident species of Serbia. The global population is estimated as c. 850-1700 individuals, of which c. 0-1 pair, i.e. a maximum of 2 individuals are estimated for Serbia (BirdLife International 2015m, 2016i). To meet the threshold for Criterion 3a, the AoA is required to support at least c. 9-17 individuals. With such a small number of individuals estimated for Serbia, limited evidence that the AoA is part of a major migratory flyway, and the AoA comprising such a small proportion of its global distribution (0.00%), it is unlikely that this species will potentially travel through, and interact with the area at concentrations that will trigger Criterion 3a.
Insects								
Isophya clara	Durmitor Plump Bush-cricket	LC	NE (EU28 RL)	Unconfirmed	2a	Possible	Unlikely	This species is a restricted range species, with an EOO of less than 50,000 km^2. The species occurs in mesic meadows with low vegetation and steppic grasslands, from the lowland to mountainous areas between elevations of 200 m asl to 1,800m asl (Chobanov *et al.* 2016a). This species is thought to be relatively common across Western Serbia and can be found in a range of habitat types of varying disturbance levels, e.g. near urban settlement areas, and in scrub or Urtica vegetation within pastures. It's overall population size is thought to be very large, comprising numerous sub-populations (Ivkovic *et al.* 2014; Chobanov *et al.* 2016b). This species has previously been surveyed within the AoA at Rudnik Mt., Knić, Ovčar-Kablar Gorge, Stolovi Mountain. While more than 10% of this species' distribution (c.12.4%) overlaps with the AoA, it is widespread, common, and tolerant of, or even benefits from, a moderate level of disturbance (e.g. traditional grazing) (Puskás 2020). Hence, this species is unlikely to be found at significant numbers within the AoA to trigger Criterion 2a.

Scientific name	English name	Global RL status [1]	National/Regional RL status [1]	Presence in AoA [2]	IFC PS6 Criteria [3]	Initial screening result [4]	Final CHA result [4]	Justification
Stenopterus similatus	-	DD	DD (EU27 RL)	Unconfirmed	1a	Possible	Unlikely	This species is endemic to the Balkans, but it is uncertain if it resides in Serbia. Even if this species is found to occur within the AoA, it is relatively widespread and common in wide range of shrubland habitats of varying disturbance levels in countries such as Cyprus (Tykarski *et al.* 2010). Hence, this species is unlikely to be present in sufficient numbers to trigger Criterion 1a.
Hylaeus adriaticus	-	DD	DD (EU27 RL)	Unconfirmed	1a	Possible	Unlikely	This species is endemic to the Balkans. While more than 0.5% of its distribution overlapping with the AoA, this species is known to be restricted to the mountains of the east Mediterranean area along the coast from Croatia to Greece (Dathe 2013). Hence, this species is unlikely to be present in sufficient numbers to trigger Criterion 1a.
Plants								
Arabis scopoliana	-	DD	DD (National RL)	Unconfirmed	1a	Possible	Unlikely	This species is endemic to the Dinaric Alps region, stretching from Italy in the northwest to Albania in the southeast. It has been suggested to be present in Serbia, although there is no published data confirming the presence or absence of this species within the country (Stojanović *et al.* 2018). If found to be present, it will only occur at altitudes above 1500 m to the east and west of the West Morava Valley, on limestone outcrops within the AoA (Barina 2020; Jaric 2020). With no nationwide records to date, and the limited distribution of suitable habitat in the AoA for this species, this species is unlikely to be present in sufficient numbers to trigger Criterion 1a.
Tozzia carpathica	Carpathian Tozzia	DD	CR (National RL)	Unconfirmed	1a, 1c	Possible	Unlikely	This species is an extremely rare and relict species in the country that is restricted to wet mountain/alpine areas, at altitudes above 1500 m asl in the Carpathians and Balkan Mountains (Barina 2020). It has been recorded from Kopaonik Mountains, close to the southern boundary of the AoA. However, it is now thought to be extinct as it has not been recent recorded in the area (Stojanović *et al.* 2018). With very few and old nationwide records to date, and the limited distribution of suitable habitat in the AoA for this species, it is unlikely to be present in sufficient numbers to trigger Criterion 1a and 1c.
Freshwater species								
Plagigeyeria gladilini	-	VU		Unconfirmed	1b	Unlikely	Unlikely	This species lives in karstic water (springs and streams in caves). It is a troglobite species (i.e. it lives permanently underground and cannot survive outside the cave environment). It is known 2 locations - one in Bulgaria, and the second one is the former Yugoslavia, probably in Serbia, however the location in Serbia is unclear from available information (Georgiev 2010). *Plagigeyeria gladilini* is likely a misidentification for the AoA as it is not known from Serbia, with the nearest record being the White Drin drainage of Kosovo (Grego *et al.* 2017). This species' presence in Serbia could refer to records from another *Plagigeyeria* sp. (Fehér 2020). It is therefore unlikely to qualify as Criteria 1b.

Notes:

[1] **Red List (RL) status**: **CR** = Critically Endangered; **EN** = Endangered; **VU** = Vulnerable; **NT** = Near Threatened; **LC** = Least Concern; **DD** = Data Deficient; **NE** = Not Evaluated

[2] **Presence in study area**: **Confirmed** = presence confirmed through field surveys; **Unconfirmed**= presence unconfirmed but considered possible given the overlap between study area and species range and/or suitability of habitats.

[3] A description of the IFC PS6 criteria is given in Section 2.3, with further detail given in Appendix 2.

Scientific name	English name	Global RL status [1]	National/Regional RL status [1]	Presence in AoA [2]	IFC PS6 Criteria [3]	Initial screening result [4]	Final CHA result [4]	Justification
[4] **Result**: **Possible** = low/no evidence of effort to determine presence or absence, however if the species is found to be present in the study area at significant numbers, the area is likely to meet the threshold for qualifying as Critical Habitat; **Unlikely** = reasonable evidence that the species did not meet the threshold.								

Appendix 4: Index of Habitat Integrity methodology

The Index of Habitat Integrity (IHI) methodology was applied to ascertain the change of instream and riparian habitat from natural conditions and assess the quality of aquatic habitat for inference of NH and MH as per IFC PS6. The IHI provides a tool for assessing instream and riparian habitat by scoring impacts (Table 12) on the system under present conditions (Kleynhans 1996). The severity of impact of the modifications is based on six categories which comprise of ratings ranging from 0 to 25: where 0 (no impact), 1 to 5 (small impact), 6 to 10 (moderate impact), 11 to 15 (large impact), 16 to 20 (serious impact) and 21 to 25 (critical impact) (Table 13). The IHI methodology classifies habitat integrity into one of six classes for the river, ranging from Natural (Category A) to Critically Modified (Category F) (Table 14).

Table 12: Criteria used for the assessment of habitat integrity which are rated from 0 – 25 (adapted from Kleynhans, 1996)

Instream channel Criteria	Riparian Zone Criteria
Water abstraction	Bank erosion
Water quality	Indigenous vegetation removal
Bed modification	Water abstraction
Channel modification	Water quality
Flow modification	Channel modification
Inundation	Exotic vegetation encroachment
Exotic macrophytes	Flow modification
Exotic fauna	Inundation
Solid waste disposal	

Table 13: Descriptive classes for the assessment of modifications to habitat integrity used in the application of the IHI (adapted from Kleynhans, 1996)

Impact Category	Description	Score
None	No discernible impact or the modification is located in such a way that it has no impact on habitat quality, diversity, size and variability.	**0**
Small	The modification is limited to very few localities and the impact on habitat quality, diversity, size and variability are also very small.	**1 - 5**
Moderate	The modifications are present at a small number of localities and the impact on habitat quality, diversity, size and variability are also limited.	**6 - 10**
Large	The modification is generally present with a clearly detrimental impact on habitat quality, diversity, size and variability. Large areas are, however, not influenced.	**11 - 15**

Serious	The modification is frequently present and the habitat quality, diversity, size and variability in almost the whole of the defined area are affected. Only small areas are not influenced.	**16 - 20**
Critical	The modification is present overall with a high intensity. The habitat quality, diversity, size and variability in almost the whole of the defined section are influenced detrimentally.	**21 - 25**

Table 14: Ecological categories, key colours and category descriptions presented within the habitat assessment (Adapted from Kleynhans, 1996)

Category		Description	Score (%)
A	Natural	Unmodified, natural.	90-100
B	Largely Natural	Few modifications, small change in natural habitats and biota may have taken place but the ecosystem functions are essentially unchanged.	80-89
C	Moderately Modified	A loss and change of natural habitat and biota have occurred but the basic ecosystem functions are still predominantly unchanged.	60-79
D	Largely Modified	Large loss of natural habitat, biota and basic ecosystem functions has occurred.	40-59
E	Seriously Modified	The losses of natural habitat, biota and basic ecosystem functions are extensive.	20-39
F	Critically Modified	Modifications have reached a critical level and the lotic system has been modified completely with an almost complete loss of natural habitat and biota. In the worst instances the basic ecosystem functions have been destroyed and the changes are irreversible.	<20