Annex I) Habitat Survey Report

1. Introduction

1.1 Purpose

The purpose of a Habitat map is to describe the baseline situation in such a way that valid assumptions can be made to inform a project focussed risk assessment quickly and effectively.

A Habitat map facilitates a quick, visual appreciation of the pattern, size, relatedness and connectivity of different habitats. Mapping by habitat based on phytosociology, while supported by quadrat information of species content, does not require the perfect season for species identification. Depending on condition it can be assumed which species should be present. Habitats and a knowledge of how different species use them can also inform on the expected faunal composition of the area.

For this reason, a habitat map is considered an essential first step for a Biodiversity Action Plan

1.2 Scope:

The geographical scope of this mapping exercise extends 150m either side of the limit of upgrade works as a basis. The construction phase landtake will not extend beyond this as all works will use the permanent land acquisition. However, as there are linear features such as ditches which have the potential to carry polluted water from the work site a larger receptor all water courses flowing from the works site will be mapped for a reasonable distance. Mapping will also extend to a reasonable boundary, eg include riparian bank vegetation, rather than stopping precisely on the 150m line.

The scope will include the total area with no blank areas. Residences and their private garden, Industrial areas and agriculture will be marked as polygons. Some agricultural activity, eg hay meadows, orchards have a significance for wildlife so will be included and annotated accordingly.

Linear features may have several important habitat types, eg aquatic, emergent and riparian bank vegetation and be un-mappable as polygons. These will be recorded appropriately.

1.3 Method:

- Existing land use maps to be included and polygons entered on Google Earth as an aid to field work and ground truthing. Geographic scope to be included on maps.
- Suitable maps to be printed off for field use.
- Appropriate field recording sheets to be printed out so the information required for the deliverables is easily recorded
- Scale will be appropriate to properly represent the habitats
- Polygons of each habitat type will be taken to nearest boundary if possible to enable areas to be calculated. In the case of the limestone hillsides, indication on the outside boundary will be made if this is extensive
- Field maps to be digitised onto GIS

2. Habitat Classification

Eunis classification	Description	Natura 2000 Classification	Total area (ha)	Area to be lost temporarily	Area to be lost permanently	Total area affected (ha)	% of habitat affected by scheme in AOI
C1.34	Rooted floating vegetation of eutrophic waterbodies	3150	0.5917	0	0	0	0
C2.33	Mesotrophic vegetation of slow-flowing rivers	3260	0.3234	0	0.02	0.02	6
C3.21	Phragmites beds		1.7762	0	0.08	0.08	5
D5.1	Reedbeds normally without free-standing water		5.8174	0	0.42	0.42	7
D5.11	Common reed (Phragmites) beds normally without free-standing water		3.8254	0	0.1	0.1	3
D5.13	Reedmace (Typha) beds normally without free standing water		3.6458	0	0.27	0.27	7
E1.55	Eastern sub-Mediterranean dry grassland	62A0	6.9298	0	0.72	0.72	10
E3	Seasonally wet and wet grasslands		15.2133	0	0.21	0.21	1
E3.44	Flood swards and related communities		17.0050	0	0.19	0.19	1
G1.1	Salix alba galleries		1.2019	0	0.11	0.11	9
G1.33	Mediterranean riparian ash woods	92A0	5.8365	0	0.45	0.45	8
G1.7C2	Oriental hornbeam woods		53.9669	0	1.61	1.61	3
J	Constructed, industrial and other artificial habitats		187.3343	0.22	17.65	17.87	9

of which J1	Buildings of cities, towns and villages		141.0299	0.22	10.47	10.69	7
Mosaic G1.1, G1.3	Mediterranean riparian woodland	92A0	9.2025	0	0	0	0
Mosaic G1.7C2, E1.55	Oriental hornbeam woods G1.7C2, Eastern sub-Mediterranean dry grassland		50.7218	0	5.4	5.4	11
Mosaic J, E3	Constructed, industrial and other artificial habitats /seasonally wet and wet grasslands		14.3353	0	0	0	0
X	Mosaic of strongly degraded wet habitats		3.9617	0	0.61	0.61	15

3. Results & Analysis

Aquatic habitats

A total of 4 aquatic habitat types were identified within the PSA:

Aquatic habitats	**Eunis code**	**NATURA code**
Phragmites beds	C3.21	
Scirpus lacustris beds	C3.22	
Natural eutrophic lakes with *Magnopotamion* and *Hydrocharition* type vegetation	C1.3, C1.32, C1.33	3150, Annex I
Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation	C2.1, C2.18, C2.19, C2.1A, C2.1B, C2.2, C2.25, C2.26, C2.27, C2.28, C2.3, C2.33, C2.34	3260, Annex I

Two of them are listed on Annex I of the Habitats Directive, which are considered to be priority biodiversity features.

Terrestrial habitats

A total of 8 terrestrial habitat types were identified within the PSA:

Terrestrial habitats	**Eunis code**	**NATURA code**
Common reed (*Phragmites*) beds normally without free-standing water	D5.11	
Reedmace (*Typha*) beds normally without free-standing water	D5.13	

Flood swards and related communities	E3.44	
Seasonally wet and wet grasslands	E3	
Oriental hornbeam woods	G1.7C2	
Riverine and fen scrubs	F9	
East sub-Mediterranean dry grasslands (*Scorzoneretalia villosae*)	E1.55	62A0, Annex I
Salix alba and *Populus alba* galleries	G1.1,G1.112, G1.3, G1.31	92A0, Annex I

Two of them are listed on Annex I of the Habitats Directive, which are considered to be priority biodiversity features.

Habitat Evaluation and Sensitivity

A detailed description of the habitats that the road passes through is provided as an Annex to this report, along with a description of initial flora and fauna surveys (March/April 2019). These initial surveys have been supplemented by further studies (Jun 2019) which are provided as a standalone report, and the results of all these surveys have been used to inform this CHA and AA.

Four "natural" habitats have been identified from the Annex I of Habitat Directive within the proposed Project Study Area:

3150 - Natural eutrophic lakes with *Magnopotamion* and *Hydrocharition* type vegetation – This type of habitat is presented in Matica River and represented with different types of free-floating surface plant communities (*Nymphaeoalbae-Nupharetumn luteae, Potamogetonetum denso-nodosi*, *Potamogetonetum lucentis*) presented mostly with dominant species (Nymphaea *alba, Nuphar lutea*, *Potamogeton nodosus, Potamogeton lucens*).
Representivity of the habitat is B. Also, this type of habitat cover small riverine area, at the same time this is common type of habitat in Montenegro.
Habitat cover is 6000 m^2
Vulnerability to Project Impacts
High sensitive habitat type. This type of habitat will be under direct impact (reconstruction of old bridge and build new one) and also under indirect impacts along the whole river (mining the adjacent hill Zelenika, construction work camp near bridge, earthworks and material transfer). Impacts could resulted with changes in water conditions (hydrological impacts), changes in surface & ground water conditions, habitat pollution including deposition and runoff, changing the direction of surface run-off due to earthworks. It is considered as high (significant) impact. Efect of the impact will resulted with the loss of small percentage of this habitat. Also, it will affect aquatic species (fishes and amphibians).

River bank excavations and construction of retaining walls here may cause high water turbidity and/or pollution from accidental releases of construction materials. Further impacts may occur through accidental infilling of watercourses including by erosion of riverbanks or uncontrolled or accidental unloading of earthen material.

Sensitivity on habitat fragmentation

Fragmentation of this type of habitat can be reached in the part of the construction of a new bridge and reconstruction of the old one on Matica River. This type of habitat is spread across the river along the left and right shores. Fragmentation will be of low magnitude and will not significantly affect the connectivity of the habitat. The habitat continuity will be reistablished after the construction works

3260 - Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* – This type of habitat is presented in Sitnica River (close to the Komanski most bridge) and is presented with submerged or floating vegetation of the *Callitricho-Batrachion* (low water level or dry during summer) with domination of *Ranunculus trichophyllus*. This community is represented with different plant species with different abundance and cover (according to the metodology of Braun-Blanquet 1964): *Ranunculus trichophyllus* 3, *Myosotis scorpioides* 2, *Fontinalis antipyretica* 1, *Mentha aquatica* 1, *Potamogeton lucens* +, *Alisma lanceolatum* +, etc.

Representativity of the habitat is B. Probably relatively common habitats in Montenegro, but without enough information about the distribution.

Habitat cover is 3000 m^2

Vulnerability to Project Impacts

High sensitive habitat type. This type of habitat will be under direct impact in the area of Komanski most bridge (reconstruction of old bridge and build of new one) and also under indirect impacts along the river (mining the adjacent hill Zelenika, earthworks and material transfer). Impacts could resulted with changes in water conditions (hydrological impacts), changes in surface and ground water conditions, habitat pollution including deposition and run-off, changing the direction of surface run-off due to earthworks. It is considered as high (significant) impact. Efect of the impact will resulted with the loss of small percentage of this habitat. Also, it will affect aquatic species (surface waters).

River bank excavations and construction of retaining walls here may cause high water turbidity and/or pollution from accidental releases of construction materials. Further impacts may occur through accidental infilling of watercourses including by erosion of riverbanks or uncontrolled or accidental unloading of earthen material.

Sensitivity on habitat fragmentation

Fragmentation of this type of habitat can be reached in the part of the construction of a new bridge and reconstruction of the old one on Sitnica River. This type of habitat is spread under small bridge in direction to Komanski bridge and downstream. Sitnica River is predominantly dry during summer (July and August). Fragmentation will be of low magnitude and will not significantly affect the connectivity of the habitat. The habitat continuity will be reistablished after the construction works.

Picture 1. **Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* (Komanski bridge)**

62A0 - East sub-Mediterranean dry grasslands (*Scorzoneretalia villosae*) - This type of habitat is presented Xeric grasslands of the sub-Mediterranean zones within the alliances *Chrysopogono grylli-Koelerion* splendentisa and *Saturejion subspicata* and mostly with *Stipo-Salvietum officinalis* comm. In the Project Study Area the habitat is presented on hills around the road and represents degradation stadium of *Carpinetum orientalis* comm. These communities are represented with different plant species with different abundance and cover (according to the metodology of Braun-Blanquet 1964): *Salvia officinalis* 5, *Stipa mediterranea* 2, *Stipa bromoides* 1, *Chrysopogon gryllus* +, *Andropogon ischaemum* +, *Carex humilis* +, *Bromus erectus* +, *Koeleria subcaudata* +; significant presence of the other hemycriptophyt species is noted: *Satureja montana* 1, *Micromeria parviflora* +, *Micromeria juliana* +, *Asparagus acutifolius* +, *Bupleurum veronense* +, *Teucrium capitatum* +, *Plantago holosteum* +, *Helichrysum italicum* +, *Medicago prostrata* +; or geophyta: *Asphodelus microcarpus* +, *Asphodeline lutea* +, *Allium dalmaticum* +, *Allium margaritaceum* etc. **Representativity** of the habitat is B. This is common type of habitat in Montenegro.
Habitat cover is 69000 m^2
Vulnerability to Project Impacts
This type of habitat will be under direct impact. Overall impacts associated with loss of these habitats during construction are considered to be a moderate, impact. Efect of the impact will resulted with the loss of this habitat type in the area of construction and also loss of soil structure including erosion of the upper territorial horizon, leaching of construction

sites and soil pollution from waste.Iimpacts in this tyassociated with loss of these habitats during construction are considered to be a moderate, impact.

Sensitivity on habitat fragmentation

Loss of this type of habitat in the zone located on the route of the road will occur, however, the habitat continuity will be preserved. Fragmentation will be of low magnitude and will not significantly affect the connectivity of the habitat.

92A0 - *Salix alba* and *Populus alba* galleries - This type of habitat is presented along to the Matica, Sušica, Crkovnica Rivers, Niski potok stream and along drainage channels. This type of habitat in the Project Study Area is represented with two type of plant communities, the one dominated by *Fraxinus angustifolia* (*Fraxinus angustifolia*) and the other dominated by *Salix alba* (fragments of *Salicetum albae*). Phytocoenolofical relevé of the community with domination *F. angustifolia* was taken in the Matica River (Radulovići) and is represented with different plant species with different abundance and cover (according to the metodology of Braun-Blanquet 1964): *Fraxinus angustifolia* 4, *Salix alba* 2, *Ulmus glabra* 1, *Quercus robur* +, *Ficus carica* +, *Morus alba* +; shrubs: *Rubus idaeus* 1, *Cornus sanguinea* 1, *Clematis viticela* 1, *Hedera helix* 1, and herbs: *Lysimachia nummularia* 3, *Agrostis alba* 2, *Iris pseudacorus* 2, *Cardaminae mathiolii* 1, *Cyperus sp.* 1, *Lychnis flos cuculi* 1, *Mentha aquatica* 1, *Lysimachia vulgaris*, 1, *Leucojum aestivum* +, *Sparganium erectum* +, *Oenanthe aquatica* +, *Veronica anagallis-aquatica* +, *Aristolochia rotunda* +, *Alisma plantago-aquatica* +, *Rumex conglomeratus* +, *Asparagus tenuifolius* +, *Galium palustre* +, *Carex otrubae* +, *Plantago intermedia* +, *Picris hieracioides* +.

***Fraxinus angustifolia* comm.**

Fraxinus angustifolia 4, Ulmus glabra 3, Quercus robur 1, Genista sp., 2, Prunus spinosa 2

This community is recorded along the channels in locality Begovina and Niski potok.

Fraxinus angustifolia* comm. with *Acer tataricum

Acer tataricum 3, Ulmus glabra 2, Fraxinus angustifolia 2, Quercus robur 1, Cornus sanguinea 1, Ostrya carpinifolia +, Prunus spinosa +

This community is recorded in locality Ćurilac.

Representativity of the habitat is A. The most representative communities are recorded along Sušica and Matica River. However, the main areal of this type of habitat is located around Skadar lake, along Bojana River and Velika ulcinjska plaža.

Habitat cover is 150.000m^2

Vulnerability to Project Impacts

High sensitive habitat type, particularly in the zone of the Matica bridge and along the Matica River. Also, riparian forest are the most representative along Sušica River downstream of the bridge.This type of habitat will be under direct impact (reconstruction old bridge and build of new bridge in the area of Matica and Sušica Rivers). Also, the Project currently proposes to set up construction site along the route, of which one will be located in the immediate proximity to Matica-Sitnica River (Construction site 2 – intersection to Ćafa and Baloči;). Works at these site will include clearance of vegetation and would directly impact on a this type of habitat. Further loss of this habitat will result from clearance works along the course of the Matica-Sitnica, from the current bridge to the Komanski bridge, with the river banks near the latter particularly affected. Field elm and narrow-leafed ash trees are also proposed to be felled near the proposed Sušica, Matica, Komanski Bridges. **These works are considered to have a high level of impact (significant)**

Sensitivity on habitat fragmentation

The fragmentation of habitats will be significant and dominant in the following localities in Project Study Area: River Matica in bridge area, along with flood-forests and riparian vegetation. Total surface of habitats which will be under impact caused by the project is around 1400 m^2; River Matica, along with flood-forests and riparian vegetation. Total surface of habitats which will be under impact caused by the project is around 7000 m^2; River Sitnica in bridge area, along with flood-forests and riparian vegetation. Total surface of habitats which will be under impact caused by the project is around 2000 m^2;

Riparian forest are important component of healthy rivers and ecological function. This type of habitat acting as buffers between uplands and water of the Matica, Sitnica and Sušica River, they help filter pollutants such as nutrients and sediment. Also helps to reduce stream bank erosion. Riparian vegetation provides shade, which works to lower water temperatures. Lower water temperatures support higher dissolved oxygen levels which are important to maintain fishes, amphibians and invertebrates. This type of habitat has high sensitivity on fragmentation, per se – as a community, but, also, as a habitat which support notable species (bats, birds, reptiles...).

Picture 2. **92A0 - *Salix alba* and *Populus alba* galleries (Sušica River)**

Other natural habitats

G1.7C2 - Oriental hornbeam woods - This type of habitat in the Project Study Area is presented on the hills along to the road with one plant community - *Carpinus orientalis* comm. - This communitiy is represented with the following species: *Carpinus orientalis* 2, *Fraxinus ornus* 2, *Pistacia terebinthus* 1, *Paliurus spina christii* 1, *Clematis flamula* 1, *Cornus mas* +, *Quercus pubescens* +, *Quercus trojana* +, *Acer tataricum* +, *Punica granatum* +, *Cotynus coggygria* +, *Rubus ulmifolius* +, *Acanthus balcanicus* +, *Asparagus acutifolius* +, *Thalictrum minus* +, *Stipa bromoides* +, *Haynaldia villosa* +, *Lolium perenne* +, *Carduus nutans* +, *Tanus communis* +, *Acer campestre* +, *Clinopodium vulgare* +, *Agrostis castellana* +, *Hypericum perforatum* +, *Avena barbata* +, *Brachypodium sylvaticum* +, *Echium italicum* +, *Melica ciliata* +, *Orlaya grandiflora* +, *Daucus maximus* +, *Aegilops neglecta* +, *Dactylis glomerata* +, *Trifolium angustifolium*+.
Representativity of the habitat is B-C. This habitat type is widespread in Montenegro.
Habitat cover is 540.000 m^2
Vulnerability to Project Impacts
This type of habitat will be under direct impact. Overall impacts associated with loss of these habitats during construction are considered to be a moderate, impact. Efect of the impact will resulted with the loss of this habitat type in the area of construction and also loss of soil structure including erosion of the upper territorial horizon, leaching of construction sites and soil pollution from waste impacts in this type associated with loss of these habitats during construction are considered to be a moderate, impact.
Sensitivity on habitat fragmentation
Loss of this type of habitat in the zone located on the route of the road will occur, however, the habitat continuity will be preserved. Fragmentation will be of low magnitude and will not significantly affect the connectivity of the habitat.

C3.21 - *Phragmites* beds - This type of habitat in the Project Study Area is presented only on the right (42 27 768N 019 10 598E) and left banks of the Matica River like line type of habitat**.** This communitiy is quantitativy poor and represented with: *Phragmites australis* 5 *and Scirpus lacustris* 1.
Representativity of the habitat is B.
Important habitat for fishes, amphibians and birds.
C3.22 - *Scirpus lacustris* beds - This type of habitat in the Project Study Area is presented along to the Matica River (42 27 429N 019 11 038E) and completely dominated by *Scirpus lacustris* (*Scirpetum lacustri*).
Representativity of the habitat is B.
Important habitat for fishes, amphibians and birds.
Habitat cover is 18.000 m^2. The cover include *Phragmites* beds and *Scirpus lacustris* beds.
Vulnerability to Project Impacts
Phragmites and *Scirpus* beds are recorded along Matica River only. Sensitive habitats because support some aquatic species (fishes, amphibians…). These types of habitats will be under direct impact (reconstruction of old bridge and build new one) and also under indirect impacts along the whole river (mining the adjacent hill Zelenika, construction work

camp near bridge, earthworks and material transfer). Impacts could resulted with changes in water conditions (hydrological impacts), changes in surface & ground water conditions, habitat pollution including deposition and runoff, changing the direction of surface run-off due to earthworks. It is considered as high (significant) impact. Efect of the impact will resulted with the loss of small percentage of this habitats.
River bank excavations and construction of retaining walls here may cause high water turbidity and/or pollution from accidental releases of construction materials. Further impacts may occur through accidental infilling of watercourses including by erosion of riverbanks or uncontrolled or accidental unloading of earthen material

Sensitivity on habitat fragmentation
This freshwater habitas help filter pollutants such as nutrients and sediment and support higher dissolved oxygen levels which are important to maintain fishes, amphibians and invertebrates. This type of habitat has high sensitivity on fragmentation, as a habitat which support notable species (fishes, amphibians, birds...).

Picture 3. ***Phragmites*** **and** ***Scirpus*** **beds along Matica River**

D5.11 - Common reed (*Phragmites*) beds normally without free-standing water - This type of habitat in the Project Study Area is presented with the alliance: *Phragmition* (*Phragmites australis* comm.) and is located on the right (42 27 768N 019 10 598E) and left side of the road PG – DG, cca 100 m from the bridge on Matica River**.** This community is

represented with different plant species with different abundance and cover (metodology of Braun-Blanquet 1964): *Phragmites australis* 5, *Salix alba* +, *Salix purpurea* +, *Cyperus longus* +, *Clematis viticela* +, *Galium palustre* +, *Lychnis flos cuculi* +, *Oenanthe fistulosa* +, *Agrostis castellana* +, *Taraxacum palustre* +, *Rumex conglomeratus* +, *Trifolium fragiferum* +, *Carex otrubae* +, *Knautia integrifolia* +, *Myosotis scorpioides* +.
Representativity of the habitat is A.
Habitat cover is 58.000 m^2

D5.13 - Reedmace (*Typha*) beds normally without free-standing water - This type of habitat in the Project Study Area is presented on the left side of the road PG – DG, about 250 m long and about 150 m wide, from coordinates 42 27 886N 019 10 520N to 42 27 740N 019 10 556E. This communitiy is represented with different plant species with different abundance and cover (metodology of Braun-Blanquet 1964): *Typha angustifolia* 5, *Eleocharis palustris* 1, *Juncus tenuis* 1, *Alisma plantago aquatica* +, *Lythrum salicaria* +, *Gratiola officinalis* +.
Representativity of the habitat is A.
Habitat cover is 36.000 m^2

The area of reed *Phragmites beds* and reedmace *Typha* beds are located in Slivnice. This type of habitat support many animal species (amphibians, reptiles, birds, small mammals and bats).

Vulnerability to Project Impacts
Phragmites beds and *Typh*a beds are high sensitive habitats which support many animal species (amphibians, reptiles, birds, small mammals and bats) as well as plants (*Utricularia minor*). Habitats will be under direct impact (clearing vegetation). Also, the Project currently proposes to set up construction site along the route, of which one will be located in the immediate proximity to swampy meadows (Lužnica area). Degradation of the quality of surface or groundwater due to discharges from the areas where earthworks are being carried out or because of water pollution by substances used in the construction phase. **These works are considered to have a high level of impact (significant).**

Sensitivity on habitat fragmentation
Swampy meadows characterised by common reed *Phragmites australis* and by reedmace *Typa angustifolia,* a total surface of the habitat is around 128.000m^2. Permanent loss due to implementation of the project is around 12000 m^2. This type of habitat has high sensitivity on fragmentation as a habitat which support notable species (amphibians, reptiles, birds, bats, ...).

Picture 4. **Swampy meadows with *Typha* beds on the Slivnice**

Remaining habitats within the Project AoI are considered to be "**modified" habitats,** Anthropogenic managed pastures, meadows and tall-herb meadow fringes on fertile deep soils at low altitudes or, concretly, Vegetation of wet meadows of the submediterranean precipitation rich regions of the Balkans. Many of flooded meadows are hay meadows (mown meadows) and during surveys in June 2019 were cutting. This type of habitat is suppressed by drainage channels. All of these habitats have the potential to support notable species (see flora and fauna).

E3 - Seasonally wet and wet grasslands and E3.44 - Flood swards and related communities - This type of habitat in the Project Study Area is presented with many plant communities within the alliances: *Molinio-Hordeion secalini* (with *Agrostis castellana* comm., *Anthoxantum odoratum* comm., *Bromus racemosus* comm., *Holcus lanatus* comm., *Festuca pretensis* comm.), *Molinio-Holoschoenion and/or Deschampsion*: (with *Holoschoenus vulgaris* comm.) and *Oenanthion fistulosae* (with *Oenanthe fistulosa* comm., *Gratiola officinalis* comm.) and *Scirpion maritimi* (with *Scirpus maritimus* comm., *Cyperus longus* comm.).

E3 - Seasonally wet and wet grasslands

The dominant plant communities within this type of habitats is presented with *Agrostis castellana* comm. and following by *Festuca pretensis* comm., *Oenanthe fistulosa* comm. and *Gratiola officinalis* comm.

***Agrostis castellana* comm**. - This communitiy is represented with the following species: *Agrostis castellana* 3, *Bromus racemosus* 3, *Filipendula hexapetala* 2, *Centaurium erythraea* 1, *Centaurea weldeniana* 1, *Plantago lanceolata* 1, *Lotus corniculatus* 1, *Anthoxantum odoratum* 1, *Hypericum perforatum* 1, *Oenanthe fistulosa* 1, *Succisella petteri* 1, *Cichorium intybus* 1, *Dorycnium herbaceum* 1, *Linum bienne* +, *Ononis spinosa* +, *Sanguisorba muricata* +, *Hieracium bauhinii* +, *Kickxia commutata* +, *Scorzonera sp.* +.

***Chrysopogon gryllus* comm.**

Chrysopogon gryllus 4, *Gladiolus palustris* 3, *Filipendula hexapetala* 1, *Oenanthe fistulosa* 1, *Lotus corniculatus* +, *Orchis laxiflora* +, *Serapias vomeracea* +.

***Erianthus hostii* comm.**

Erianthus hostii 4, *Holoschoenus vulgaris* +, *Juncus tenuis* 2, *Eleocharis palustris* 1, *Galium palustre* +, *Lythrum salicaria* 1, *Cyperus longus* 2, *Potentilla reptans* 1, *Oenante silaifolia* 1

***Oenanthe fistulosa* comm.** - This communitiy is represented with the following species: *Oenanthe fistulosa* 4, *Gratiola officinalis* 2, *Juncus tenuis* 2, *Centaurea weldeniana* 3, *Filipendula hexapetala* 2, *Gladiolus palustris* +, *Galium palustre* +, *Lythrum salicaria* +, *Alopecurus rendllei* +

***Gratiola officinalis* comm.** - This communitiy is represented with the following species: *Gratiola officinalis* 5, *Oenanthe fistulosa* 1, *Juncus articulates* 1, *Galium palustre* 2, *Lythrum salicaria* 1.

***Avena fatua* comm.**

Avena fatua 4, *Anthoxantum odoratum* 1, *Lolium multiflorum* 2, *Sanguisorba minor* 2, *Cichorim intybus* +, *Trifolium pratense* +, *Plantago lanceolata* 1, *Leucanthemum vulgare* 1, *Hypericum perforatum* +, *Potentilla reptans* 2, *Kickxia commutata* 1, *Dorycnium herbaceum* +, *Echium italicum* +, *Chrysopogon gryillus* +, *Andropogon ischaemum* +, *Holcus lanatus* +, *Ononis spinosa* +

***Festuca pretensis* comm.** (42 32 059N 019 06 971N) - This communitiy is represented with the following species: *Festuca pretensis* 4, *Bromus racemosus* 2, *Teucrium scordioides* 2, *Cynosurus cristatus* 2, *Carex distans* 2, *Potentilla reptans* 2, *Deschampsia media* 2, *Lotus corniculatus* 2, *Alopecurus rendlei* 1, *Avena fatua* 1, *Lolium multiflorum* 1, *Anthoxantum odoratum* +, *Holcus lanatus* +, *Oeanthe fistulosa* +, *Gaudinia fragilis* +, *Galium palustre* +, *Lythrum salicaria* +, *Cichorium intybus* +, *Plantago lanceolata* +.

***Bromus racemosus* and *Avena fatua* comm.**

Bromus racemosus 3, *Avena fatua* 3, *Cynosurus cristatus* 2, *Dactylis glomerata* 2, *Anthoxanthum odoratum* 2, *Menta condesata* 2, *Ononis spinosa* 2-3, *Agrostis castellana* 1

***Holcus lanatus* comm.**

Holcus lanatus 4, *Anthoxanthum odoratum* 3, *Bromus racemosus* 2, *Agrostis castellana* 2, *Cynosurus cristatus* 2, *Festuca pratensis* 2, *Avena barbata* 1, *Mentha condesata* 1, *Centaurea weldeniana* 1, *Genista juanensis* 1, *Gratiola officinalis* +,

Representativity of the habitat

Within the habitat type the most representative communities are *those with Agrostis castellana, Chrysopogon gryllus* , *Erianthus hostii, Festuca pretensis, Bromus racemosus* and *Avena fatua* comm. and *Holcus lanatus* comm. with representativity A.

These communities are widespread in the central and north part of the Projected Study Area and cover a large surface.

Habitat cover is 152.000 m²

Vulnerability to Project Impacts

This type of habitat extends along the entire length of the road and will be under direct impact. Efect of the impact will resulted with the loss of habitat. However, this is common type of habitat wider range of the area. Impacts associated with loss of these habitats during construction are considered to be a moderate impact. Drainaige cannals which intersecting wet meadows are most sensitive part of this habitat type. Impacts could resulted with changes in water conditions (hydrological impacts), changes in ground water conditions, habitat pollution including deposition and runoff, pollution due to earthworks. It is considered as high (significant) impact.

Sensitivity on habitat fragmentation

Magnitude of fragmetation in flood-meadows with the pertaining drainage channels is minor but with medium sensitivity. Total surface of habitats is around 126.87 ha. Permanent loss due to implementation of the project is around 1.10 ha.

Picture 5. **Meadow community with *Festuca pratensis* on the Ćurilac locality**

Picture 6. **Wet meadow along to the road**

E3.44 - Flood swards and related communities

Mosaic of habitats- Mareške bare

Bolboschoenus maritimus comm.
Phragmites australis comm.
Cyperus longus comm.,
Agrostis castelana comm.
Holcus lanatus comm.
Holoschoenus vulgaris comm.,
Bromus racemosus comm.
Lolium multiflorum comm.
Anthoxanthum odoratum comm.

Agrostis castelllana, Bolboschoenus maritimus, Phragmithes australis, Typha angustifolia, Cyperus longus, Holcus lanatus, Holoschoenus vulgaris, Bromus racemosus, Lolium multiflorum, Anthoxantum odoratum, Juncus articulatus, Juncus tenuis, Centaurium erythrea, Phleum pratense, Holoschoenus vulgaris, Inula viscosa, Gratiola officinalis, Potentilla reptans, Oenanthe fistulosa, Lythrum salicaria, Galium palustre, Poa sylvicola, Alisma plantago aquatica, Lychnis flos cuculi, Rumex conglomeratus, Lotus corniculatus, Inula salicina

Individual trees of *Salix alba, Salix cinerea, Quercus robur, Ulmus glabra,* and bushes *Rubus ulmifolius* and *Prunus spinosa*..

Mosaic of habitats, cont. 1- Slivnice

Cyperus longus comm.,
Agrostis castellana comm.
Oenanthe fistulosa comm.
Gratiola officinalis comm.

with speces: *Agrostis castelllana, Gratiola officinalis, Oenanthe fistulosa, Cyperus longus, Bromus racemosus, Lolium multiflorum, Anthoxantum odoratum, Juncus articulatus, Juncus tenuis, Centaurium erythrea, Phleum pratense, Potentilla reptans, Lythrum salicaria, Galium palustre, Poa sylvicola, Alisma plantago aquatica, Lychnis flos cuculi, Rumex conglomeratus, Lotus corniculatus*...

Mosaic of habitats, cont. 2-Slivnice

Gratiola officinalis comm.
Cyperus longus comm.
Agrostis castellana comm.

Cyperus longus, Gratiola officinalis, Potentilla reptans, Oenanthe fistulosa,Lythrum salicaria, Mentha aquatica, Galium palustre, Agrostis castellana, Lotus corniculatus, Deschampsia media

Flood swards and related communities are represented with mosaic of habitats on the left side of the road (locality Mareške bare) and the right side of the road (locality Slivnice below Lužnica hill). This swampy area is strongly degradeted on locality Mareške bare. On the locality Slivnice this mosaic of habitats are very representative (A)!
Habitat cover is 170.000 m^2

Vulnerability to Project Impacts
Flood swards are high sensitive habitats which support many animal species (amphibians, reptiles, birds, small mammals and bats). Habitats will be under direct impact (clearing vegetation). Also, the Project currently proposes to set up construction site along the route, of which one will be located in the immediate proximity to swampy meadows (Lužnica area). Degradation of the quality of surface or groundwater due to discharges from the areas where earthworks are being carried out or because of water pollution by substances used in the construction phase. **These works are considered to have a high level of impact (significant).**
Sensitivity on habitat fragmentation
Magnitude of fragmetation in flood swards (mosaic of habitats) is high but with medium sensitivity. These habitats support notable species (amphibians, reptiles, birds, bats ...).

Picture 6. **Fragment of the *Holoschoenion vulgaris* comm. on the Mareške bare**

F9 - Riverine and fen scrubs - This type of habitat in the Project Study Area is presented along to the River Sitnica and stream Mareza. It is presented with different communities: *Vitex agnus castus* comm, *Sambucus racemosa* comm., fragments with *Salix alba* comm.
Representativity of the habitat is C.
This type of habitat is under strongly antropogenic impacts and not representative.
Habitat cover is 10.000 m^2
Vulnerability to Project Impacts
This habitat type is not representative but the fact that support the animal species (amphibians, reptiles, birds and potentinally bats). This type of habitat will be under direct impact (reconstruction of old bridge and build new one) and also under indirect impacts along the whole river (mining the adjacent hill Zelenika, earthworks and material transfer). Impacts could resulted with changes in water conditions (hydrological impacts), changes in surface & ground water conditions, habitat pollution including deposition and runoff, changing the direction of surface run-off due to earthworks. **These works are considered to have a high level of impact (significant).**
Sensitivity on habitat fragmentation
The smaller magnitude fragmentation of the habitat will happened along **with** riverine and fen scrubs of River Mareza in bridge area. Total surface of habitats which will be under impact caused by the project is around 1000m^2.

Analysis –relation: Habitats /CH and PBF

The following CH/PBF Triggers have been identified:

Criteria	Assessment	Status
Designated sites	The Zeta Stream KBA will not be adversely affected by the project The Mareza source with Sitnica and area of Velje Brdo could be affected and **is considered a PBF**	N/A PBF
Habitats of significant importance to notable(rare, endemic or restricted range species)	Aquatic habitats are considered important to a range of notable species and the River Susica, Sitnica Matica and Mareza are all **considered as PBF** to which particular attention must be paid. :	PBF

The following CH/PBF Triggers have been identified (using a precautionary approach anything analysed as "possible" is considered as "actual unless demonstrated otherwise):

Trigger	Species	Status
Notable Mammals	European Otter Lutra Lutra (NT) Bat roots (all species)	PBF PBF
Amphibians	Albanian Water Frog Pelophylax shqipericus) (EN):	CH
Fish	Soft mouthed trout Salmo obtusirostris (EN) European eel *Anguilla anguilla (CR)*	CH PBF
Invertebrates	*Valvata montenegrina (EN)* White-clawed crayfish *Austropotamobius pallipes* (EN)	CH PBF

Freshwater habitats of the Sitnica River in Project Study Area belong to the designated site - The Mareza source with Sitnica and area of Velje Brdo- which is considered as PBF.

European Otter Lutra Lutra (NT) is mammal species which possible inhabits Matica River. Habitats that are important and support the otter are all aquatic habitats and riparian ash forest. These type of habitats will be under strong pressure and impacts during construction and operation of the road which can have negative effects on the survival of this species. Therefore, further research is necessary to confirm the presence of otter through the implementation of the Action Plan for the Rivers Matica. This will include specific actions with regards the conservation of otters. During construction there is a risk of erosion and abrasion of material into the watercourses. Whilst the Rivers are slow-flowing with low water levels and a proneness to drying up (especially the Sitnica), any material increases in

water turbidity and/or accumulation of sediments here may affect the Natura 2000 habitats (3150 and 3260). Dust generated from works (eg due to the vehicle movements, blasting of Zelenika hill, removing old asphalt etc) may be blown into the watercourses, which may also suffer from run-off from earthworks during rainy periods. River bank excavations and construction of retaining walls here may cause high water turbidity and /or pollution from accidental releases of construction materials.

Bat roots (all species). In PSA there is a network of woodland habitat along the streams and drainage ditches that link larger plots of woodland (Mediterranean ash woodlands). These create essential corridors navigational aids for bats. The presence of large old trees and scrub provide roosting/nesting opportunities for bats. Marsh area (mosaic of habitats, common reed *Phragmites* beds and reedmace *Typ*a beds) between Matica and Lužnica hill are important place for bats feeding. Road construction has the potential to result in impacts to bats as a result of habitat loss (cutting trees, remove the part of wetland area), and disturbance and direct mortality amongst others. Therefore, Action plan for bats is proposed.

Albanian water frog *Pelophylax shqipericus* (EN) is recognize as CH trigger. This amphibian species is closely related to its aquatic habitats. The species was recorded in the marsh area between the bridge on the Matica river and the Lužnica hill, as well as around the bridge on Sušica river. The impact of the project is reflected through loss, degradation and disturbance of aquatic habitats (remove *Phragmites* and *Scirpus* beds and Natura 2000 habitat 3150) during reconstruction of bridges across the rivers Matica and Sušica and pollution of aquatic habitats through emission of dust, waste, excavated soil or other material along the river banks. Degradation and loss of a part of the sensitive swampy area, (*Phragmites* and *Typha* beds, flood swards) located between the Matica Bridge and Luznica hill, which supports breeding, and larval development of albanian water frog. Dranaige channels are important corridors for pulling the species into a deeper area due to the drying of the habitat. Further impacts are disturbance effects as a result of noise and vibrations during the construction phase. Therefore, specific actions with regards the conservation of this species is proposed.

Soft mouthed trout Salmo obtusirostris (EN) potentionaly inhabits Sitnica and Matica River. *S. obtusirostris* subsp. *zetensis* inhabits only cold streams near by PSA in Zeta and Morača River but it is possible that this endemic fish species is extinct. Therefore, further research is necessary to confirm the presence of this endemic species through the implementation of the Action Plan for the Rivers Sitnica and Matica. This will include specific actions with regards the conservation of this endemic species. During construction there is a risk of erosion and abrasion of material into the watercourses. Whilst the Rivers are slow-flowing with low water levels and a proneness to drying up (especially the Sitnica), any material increases in water turbidity and/or accumulation of sediments here may affect the Natura 2000 habitats (3150 and 3260). Dust generated from works (eg due to the vehicle movements, blasting of Zelenika hill, removing old asphalt etc) may be blown into the watercourses, which may also suffer from run-off from earthworks during rainy periods. River bank excavations and construction of retaining walls here may cause high water turbidity and /or pollution from accidental releases of construction materials.

European eel *Anguilla anguilla* (CR) is not confirmed in the rivers which are within PSA. Therefore, further research is necessary to confirm the presence of this migratory species through the implementation of the Action Plan for the Rivers Sitnica and Matica. This will include specific actions with regards the conservation of eel. Aquatic habitats will be under significant impacts during construction and operation of the road which can have negative effects on the species. During construction there is a risk of erosion and abrasion of material into the watercourses. Whilst the Rivers are slow-flowing with low water levels and a proneness to drying up (especially the Sitnica), any material increases in water turbidity and/or accumulation of sediments here may affect the Natura 2000 habitats (3150 and 3260). Dust generated from works (eg due to the vehicle movements, blasting of Zelenika hill, removing old asphalt etc) may be blown into the watercourses, which may also suffer from run-off from earthworks during rainy periods. River bank excavations and construction of retaining walls here may cause high water turbidity and /or pollution from accidental releases of construction materials.

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habitat. Further impacts are disturbance effects as a result of noise and vibrations during the construction phase. Therefore, specific actions with regards the conservation of this species is proposed.

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European eel *Anguilla anguilla* (CR) is not confirmed in the rivers which are within PSA. Therefore, further research is necessary to confirm the presence of this migratory species through the implementation of the Action Plan for the Rivers Sitnica and Matica. This will include specific actions with regards the conservation of eel. Aquatic habitats will be under significant impacts during construction and operation of the road which can have negative effects on the species. During construction there is a risk of erosion and abrasion of material into the watercourses. Whilst the Rivers are slow-flowing with low water levels and a proneness to drying up (especially the Sitnica), any material increases in water turbidity and/or accumulation of sediments here may affect the Natura 2000 habitats (3150 and 3260). Dust generated from works (eg due to the vehicle movements, blasting of Zelenika hill, removing old asphalt etc) may be blown into the watercourses, which may also suffer from run-off from earthworks during rainy periods. River bank excavations and construction of retaining walls here may cause high water turbidity and /or pollution from accidental releases of construction materials.

Relatedness of habitats as relevant to their use by specific fauna

Amphibians may be particularly vulnerable to effects of roads (Eigenbrod et al. 2009) because they are slow-moving organisms that access multiple habitats seasonally to complete their life cycle. Fahrig et al. (1995) found that frog and toad population abundance declined within 100m of roads and that mortality was positively associated with traffic volume. Reptiles are generally slow moving and many tend to attracted to roads as a source of heat for thermoregulation. Similarly, turtles are particularly sensitive to mortality not only because of their slow mobility, but also because of their delayed sexual maturity, and their need to use uplands to lay eggs, often bringing them in conflict with vehicular traffic

(Beaudry et al. 2010). Roads built through or near wetlands, water courses, and ponds are an especially significant source of mortality for amphibians and turtles, and for semiaquatic mammals, such as, otter (Lutra lutra) (Langen et al. 2009). Moreover, when those features are associated with riparian vegetation, they may function as travelling corridors for terrestrial vertebrates (Grilo et al. 2008), increasing species vulnerability to vehicle collisions (Lesiński 2008).
The best ecological value for amphibians and reptails in PSA area have localities where aquatic and wet habitats are present. The most representative of these habitats are in swampy area between Matica Bridge and Lužnica hill including the river Matica and Sitnica (Iković, 2017). These habitats are at the same time reproductive amphibious centers and feeding grounds for numerous other animal groups (fishes, birds, small mammals and bats). All the channels through the PSA where water retains occasionally or permanently has the role of reproductive centers and represent shelter for numerous aquatic and semiaquatic species during intense precipitation. In this period of the year, many species that have not been adapted to the high speed of water movement (in main waterways) are attracted to plain surfaces and channals constructed in order to increase the arable area (Iković 2017) and drainage (ie flood protection). However, during dry period some specific fauna species as albanian water frog *Pelophylax shqipericus* migrate from the swampy area (which dries up) using dranaige channels and ditches to the wetter central area around the Matica River and is further away.

Routes (corridors) in PSA area for specific fauna species

***Pelophylax shqipericus* (EN)**

During the dry periods, some animals migrate from the swampy area (which dries up) to the wetter central area around the Matica River and is further away from the impact area.
Special attention should be paid to preserving the swampy area between the Matica Bridge and Lužnica Hill to the greatest possible extent. This area is located 60m away from the project impact area.

***Emys orbicularis* (NT)**

The species has the status of near threatened (NT), which means it is close to becoming threatened or may meet the criteria for threatened status in the near future if there are no appropriate conservation activities. It is therefore very important to reduce the significant impact of the project on this species as much as possible. Special attention should be paid to preserving the drainage chanels and creeks in the localities: Ćurilac, Gruda and Niski potok (Begovina) at which the European pond turtle has been identified The European pond turtle, as a semi-aquatic species, can go out to the ground in some phases of seasonal activity and cross certain distances according to ecological needs
During the culvert reconstruction (on the locality Gruda) do not dispose the removed soil and other materials along the channel and prevent any intentional or unintentional possibility of erosion. Protect the channel during the construction works. Also, it is proposed to build a culvert that will allow the passage for both aquatic and terrestrial animals, providing a dry internal walkways.

***Testudo hermanni* (NT)**

The species has the status of near threatened (NT), which means it is close to becoming threatened or may meet the criteria for threatened status in the near future if there are no appropriate conservation activities. It is therefore very important to reduce the significant impact of the project on this species as much as possible, having in mind a high road kill rates that has been detected in the vicinity of Danilovgrad (Iković et al., 2012).
It is recommended to place the protective wire fence with 10 x 10 mm mesh, height 50 cm, including 10 cm buried in the ground (according to Hahn, 2015), in places where significant percent of *T. hermanni* road kills were detected along the M18 reconstruction route (in consultations with Mr. Vuk iković who conducted the research). The installation of the protective mesh fence has significantly reduced the percentage of the Hermann's turtle road kills in the part of the same M 18 road around Danilovgrad, which is not currently subjected to reconstruction (Vujović et al., 2015). Place a thick protection fence at locations where a significant rate of Hermann's tortoise roadkill was recorded (close to the Danilovgrad)

During plant and habitat surveys in June 2019 two important plant species have been recorded:

Taxonomic group	English Name	Latin Name	IUCN	EUR IUCN	Habitat Directive1	National protection	Endemic or Range Restricted	Presence in 2019 surveys	Notes	Potential for CH	Justification
Plants	Sword Lily	*Gladiolus palustris*		DD	Ann II/IV	+		+	Presence of this species is confirmed during surveys in June at one locality.	No	CHSA considered unlikely to support regionally important concentrations and loss of habitat unlikely to significantly impact the long-term survival of the species
Plants	-	*Succisela petterii*				+	+	+	This species is endemic to Croatia, Bosnia, Montenegro and Albania	No	CHSA considered unlikely to support regionally important concentrations and loss of habitat unlikely to significantly impact the long-term survival of the species