Annex K) Aquatic Invertebrate Draft Report

1. Introduction

The survey of Aquatic Invertebrates was conducted during June and the beginning of July 2019 in the impact area of reconstruction of the Main Road M-18, section Danilovgrad-Podgorica. The sites at which the surveys of Aquatic Invertebrates were carried out have been selected on the basis of the expert's knowledge of the area and by the inspection of available literature sources.

The area through which the Route of the Danilovgrad-Podgorica section of the Main Road M-18 runs passed four streams, ie., Sušica, Matica, Sitnica and Mareza which are inhabited by a number of endemic and endangered aquatic invertebreate species. It is reasonable assumed that all the endemic and rare species of aquatic invertebrate that are present in the area require protection and implementation of conservation measures (see below).

Method:

During a field work aquatic invertebrates were collected once from each site, using a semi-quantitative approach, in which a cumulative sample was taken from all substrates, with the sampling time proportional to the estimated percentage cover of the substrate. All samples were preserved immediately in 96% ethanol, transferred in the lab and later on identified using a stereomicroscope.

The geographical scope of this assessment extends 150m either side of the limit of construction works for the M18 road upgrade between Podgorica and Danilovgrad . This distance is suggested as reasonable to be monitored taking into the hydrological characteristics of watercourses assumed to be impacted by the construction works for the M18 road upgrade between Podgorica and Danilovgrad. Two rivers, the Sušica and the Sitnica river (at Komanski Most) are intermittent rivers which dry up in the summer months.

The species list given in this survey and which resulted from the field work include **only endemic species and the species listed by IUCN**. For each species the conservation status at a regional, national and international level is given. There is also a risk assessment for aquatic invertebrates potentially affected by the project works together with recommendations for the most appropriate mitigation measures.

Finally, this study identifies locations, species and survey methods most suitable for a long-term monitoring programme.

2. Results

Species which inhabit the selected localities situated in the area of the M18 road route, section Danilovgrad – Podgorica were provided on the basis of published literature sources and from recent field work.[1]

Species	Locality	Endemism	Conservation status (IUCN)
Valvata montenegrina **Glöer & Pešić, 2008**	Terrain around the Mareza Bridge Terrain around the Komanski Bridge	Endemic for Lake Skadar basin	**Endangered** **B1ab(iii)**
Radix skutaris **Glöer & Pešić, 2008**	Terrain around the Mareza Bridge Terrain around the Komanski Bridge Terrain around Matica bridge	Endemic for Lake Skadar basin	**Endangered B1ab(iii)**
Stagnicola montenegrinus **Glöer & Pešić, 2009**	Terrain around the Komanski Bridge Terrain around the Mareza Bridge Terrain around Matica bridge	Endemic for Balkan	NT
Viviparus mamillatus **(Küster, 1852)**	Terrain around the Mareza Bridge Terrain around the Komanski Bridge Terrain around Matica bridge	Endemic for Balkan	DD
Bithynia radomani **Glöer & Pešić, 2009**	Terrain around the Mareza Bridge Terrain around the Komanski Bridge	Endemic for Lake Skadar basin	LC
Radomaniola curta curta **(Küster, 1853)**	Terrain around the Mareza Bridge	Endemic for Montenegro	LC
Laurogammarus scutariensis	Terrain around the Mareza Bridge	Endemic for Lake Skadar	-

[1] Involved specialist for aquatic invertebrates (Prof Vladimir Pešić, Univer.Montenegro, Podgorica)

(*Schaferna* 1922)		basin	

Key risks for Aquatic inverteberate communities during construction

Potential degradation of aquatic habitats is the key risk to aquatic invertebrates. This could arise from civil works associated with river crossings and where the road runs close to watercourses; the results of reconstruction of bridges across the rivers (Mareza, Sitnica, Matica, Sušica) and the road route which runs across streams (Crkovnica) is recognized as the key risk for aquatic invertebrates, especially for the endemic and endangered species.

Loss of the lentic parts of abovementioned watercorses, and the wetlands, especially in the area between the Matica Bridge and Luznica hill, can significantly affect the populations of endemic gastropods that inhabit this area what may cause a decrease in their abundance and possible their local extinction.

Storage of the excavated soil or other material near or at the bank of watercourses, or depositing directly into aquatic and semiaquatic habitats, may threaten habitats used by the aquatic invertebrates which inhabit these habitats.

Emission of dust and other polluting matters from the construction machinery, as well as the waste generated during the construction work may cause pollution of aquatic habitats affecting especially populations of endangered species such as *Valvata montenegrina* and *Radix skutaris*.

Specific protection measures for endangered species (VU, EN, CR)

Valvata montenegrina

Valvata montenegrina is endemic to the Lake Skadar basin, where it is known from several closely located sites from the river Mareza drainage (canals and pools), but also from a few sites at the vicinity of the Skadar lake, i.e., Podhum and Karuc spring (Glöer & Pešić 2008). Anyhow the population from Mareza (which is the **locus typicus**!) is the most abundant.

Valvata montenegrina inhabit lentic parts with a muddy substratum and aquatic vegetation.

The species is characterized by the reddish-brown and ribbed shell has 4.5 whorls with a deep suture, while the body whorl is prominent. The spire is slightly tall to squad, while the umbilicus is open and deep but a little covered up by the body whorl. The aperture is nearly circular, weakly angular apically, and the concave operculum is paucispiral with 2.5 whorls, while these are accompanied by tangential growth lines (see Glöer & Pešić 2008 for description).

This species is listed as **Endangered** by IUCN (see Pešić 2010) and therefore is highly important to reduce project impact to the smallest possible degree. As mentioned above, habitat destruction is the key threat for populations of this species and implementing appropriate mitigation measures is thus essential. At the first, all excavated material, and/or

waste material should not be deposited in proximate vicinity to the water habitats where this species lives.

Figure 1. Shell of *Valvata montenegrina* (from Glöer & Pešić 2008)

Radix skutaris

Radix skutaris is endemic to Montenegro, where it is known from a number of sites located in the Lake Skadar basin (Glöer & Pešić 2008).

This species is characterized by a yellowish horn-coloured shell with 4 whorls enlarging rapidly, the spire is short and pointed, while the aperture is large with an angle of 60° at the top. The inner lip is folded at the columella, and with a fold only weakly sinuated (see Glöer & Pešić 2008 for detailed description).

Similarly to *Valvata montenegrina*, *Radix skutaris* inhabits also lentic parts with a muddy substratum and aquatic vegetation.

Figure 2. Shell of *Radix skutaris* (from Glöer & Pešić 2008)

This species is listed as **Endangered** by IUCN (see Pešić 2010) and therefore is highly important to reduce project impact to the smallest possible degree. For example, any possible intentional or unintentional filling of the bank and aquatic habitats during reconstruction of bridges across the rivers (Mareza, Sitnica, Matica, Sušica) should be avoided.

Stagnicola montenegrinus

This species has the status of a nearly threatened species (NT), which means that it is close to fulfilling the criteria for becoming endangered, or it could become endangered in the near future (Pešić 2010). This species inhabits also lentic parts with a muddy substratum and aquatic vegetation and can be found frequently in association with *Radix skutaris*.

Recommendations for mitigation measures for Endangered species *Valvata montenegrina* and *Radix skutaris* during both the construction and operational phases of the project

● Monitoring of the mitigation measures for the both endangered species, ie, *Valvata montenegrina* and *Radix skutaris* is required.

Having in the mind that populations of *Valvata montenegrina* at the Mareza region is the most abundant (core population) and that on other known sites this species is found in a much lower abundance. Therefore it can be reasonably expected that this species is under a high threat! This species is found at the two sites Mareza and Sitnica river and the both sites should be selected as future monitoring points.

Radix skutaris is more abundant and frequent in the studied area (Pešić unpublished) but this species is listed as Endangered by UICN what justify need for its monitoring. The

species is found in Mareza, Sitnica and Mareza and these localities should be selected for future monitoring of this species.

- Minimum one year (preferably two) after the works are completed, populations of endangered species *Valvata montenegrina* and *Radix skutaris* should be monitored.

Based on the obtained results, if necessary, defining additional protection measures should be done.

References

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Appendix

Sampling at Komanski Most site, Sitnica River

Samples with specimens of *Bithynia radomani*