



INTERMEDIATE ENVIRONMENTAL MONITORING REPORT DURING WORKS n° 2

ČORTANOVCI – SUMMARY OF RESULTS

Introduction

The main objective of this environmental report during works is to address the base values of the main parameters identified during the elaborations of the EMRbW. These values were established during the Inception Phase and will serve as the base for evaluation of effects of river training and dredging works to the environment.

According to the ToR, one Monitoring report must be prepared every 3 months from the start of the construction works at each critical sector till the end of works (at critical sectors on which dredging activities are performed) and until the start of the Defects Notification Period (for critical sectors on which river training structures have been constructed), identifying all changes in environmental parameters compared to the base values identified in the Environmental Monitoring Report Before Works, also arguing the reasons for these changes, as well as their long-term impact to the integrity of the affected areas.

Works have begun in Čortanovci on April 23th 2019 and they have not been finished by the end of October 2019, so this report is necessary in order to identify the current status of environment after three months.

The Environmental Monitoring Report n° 2 covers the following fields:

- Hydromorphology
- Sediment and water quality
- Waste
- Biology
 - Phytoplankton
 - Macrozoobenthos
 - Vegetation (*Limosella aquatica*)
 - Birds (*Charadrius dubius* and *Riparia riparia*)
 - Fish (*Acipenser ruthenus*)
- Development of vegetation and riparian areas
- Protected Areas and Ecological Networks

The table below shows the works to be carried out in the critical sector Čortanovci and their exact location according to the Final Design:

N°	Name of critical sector	Type of works	Chainage from	to
	Čortanovci	Sill 22.1	1237+700	
		Sill 22.2	1237+150	
		Sill 22.3a	1236+150	
		Sill 22.3b	1236+000	
		Dredging	1240+300	1239+350

The report shows the status of environment once completed six months of works, according to ToR statements.



Description of work site

Čortanovci is the only critical sector where works execution is in progress in this moment. Construction works are being performed on two locations Sill 22.2 and sill 22.1.

Construction works were started at the downstream location (sill 22-2), and just after approximately three weeks (May 15th they were started at the upstream location, sill 22.1. Placing the geotextile for Sill 22.3a begun on June 1st and June 24th for Sill 22.3b.

Floating barge with construction material is used as a temporary storage for solid material like steel armature (reinforcement bar) and new rolls of geotextile are into the foil Floating office.



Status of the works after 6 months (April 2019 to October 2019)

The construction Works in the sector 22 (Čortanovci) are not completed. The table below shows the current status of each planned activity per structure.

Sector 22 (Čortanovci)	Sill 22.1	Sill 22.2	Sill 22.3a	Sill 22.3b
Geotextile	Completed	Completed	Completed	Completed
Base layer (phase I)	Completed	Completed	On going	Completed
Base layer (phase II)	Completed	Completed	Not started	Completed
Profiling the base layer	Completed	Completed	Not started	Completed
Construction of the body	Completed	Completed	Not started	On going
Profiling of body	Completed	Completed	Not started	Not started



Project context

River stretch Čortanovci is located downstream from gauging station Novi Sad.



Hydromorphology

Čortanovci stretch has been located downstream of Vojvodina capital – Novi Sad between km1246+600 and km1235.

It is characterized with typical hourglass shape, with approximately 350m width at the narrowest section. Upstream part is approximately 600m wide and downstream 840m. Whole stretch is 11.6km long, but part of stretch with above depicted contraction is just 3.4km long.

This contraction locally affects flow conditions and consequently shapes river bed morphology. Actually, river current upstream of contraction, slows down due to increased flow resistance, water level rises and kinetic energy of river flow transforms into potential energy on this location. Such dynamics is suitable for sediment deposition. As consequence, has been generated sandbar along the left river bank (km1240), 1km upstream of river contraction (km1239).

Downstream of contraction, flow conditions are totally different. Contraction caused acceleration of flow and consequently increased bed load transportation capacity. On this locality depths are bigger than 10m. After contraction, river flow expands continually. Flow conditions are changing, depths are decreasing and sedimentation occurs along the right river bank where is developed sand deposit which are narrowing navigation channel and aggravate navigational conditions.

Considered stretch does not have recorded training works from past time. .

Water quality monitoring

Detailed Monitoring plan for both water and sediment quality was created in accordance with monitoring plan from the Inception Report but also in accordance with currently valid dynamic plan and prediction that working period are going to be longer than it was planned.

Regular water quality monitoring is performed every third month (four times per year), while additional monitoring is performed more frequently. During additional monitoring campaigns parameters like temperature, TSS and mineral oil are being determined. Extra monitoring of these parameters is not predicted within the Inception Report for the locations where the construction is performed, only where dredging and sediment disposal is performed. However, the SEM team



ČORTANOVCI									
SAMPLING POINTS AND OBJECTS ON THE SITE	RESULTS OF WATER QUALITY IN DIFFERENT CAMPAIGNS								
	13/05/2019			16/07/2019			29/08/2019		
	temperature (°C) / suspended matters (mg/l) / mineral oils (mg/l)								
Sampling point 1				22.5	14	<0.1			
SILL 22.1									
Sampling point 2				22.5	6	<0.1	24.9	14	<0.1
SILL 22.2									
Sampling point 3	14	12	<0.1	24.5	14	<0.1	24.9	10	<0.1
LEGEND:	I CLASS	II CLASS	III CLASS	IV CLASS	V CLASS				

Results of the sediment quality obtained during regular monitoring campaigns performed on 16/07/2019 and 01/11/2019 show that all parameters values are below target values and most of them are not even detected.

Waste

During this period regular inspections have been carried out with the purpose of detecting uncontrolled discharges of waste or pollution incidents. The monitoring has been done by visual inspection of vessels and water analysis.

Conclusions show that all the established preventive measures are been followed by WKSC, so that during this period there has been no incident related to discharges or waste

Phytoplankton

This is typical phytoplankton community structure for this season, characterized by low intermediate primary production. Community structure was uniform along depth gradient and among localities

Macrozoobenthos

Mussels were represented by four genera and eight species. Due to low water level, many individuals of mussels cover upper part of right bank in the work zone. Rough estimation of percentage coverage can be 95% of Corbicula and Dreissena species and 5% of Anodonta and Unio species. Unio species are recorded by both tumidus and pictorum, dimensions of 3-4 cm in width and 7-9,5 in length, Anodonta woodiana with dimensions of 9 in width and 12,5-14 cm in length, two Anodonta anatina individuals in deeper water, Corbicula fluminea and C. fluminalis with average width of 2,5 cm and 3 cm in length, unidentified juvenile forms of Corbicula and Dreissena polymorpha and D. rostriformis bugensis with 1,3-1,5 cm in width and 2-3 cm in length. Also, many of them are present and easy visible in the shallow water.

Sector	Unio sp.	Other species
Sector 22 Čortanovci	Unio tumidus Unio pictorum	Anodonta woodiana Anodonta anatina



		<i>Corbicula fluminea</i> <i>Corbicula fluminalis</i> <i>Corbicula sp.</i> <i>Dreissena polymorpha</i> <i>Dreissena rostriformis bugensis</i>
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Birds

Bird population was scarce in qualitative sense and were represented by colony of European herring gull (*Larus argentatus*) and few individuals of White wagtail (*Motacilla alba*).

Not any individual of migratory birds *Charadrius dubius* and *Riparia riparia* has been found.

Sector	<i>Charadrius dubius</i>	<i>Riparia riparia</i>	Other species
Sector 22 Čortanovci	--	--	<i>Larus argentatus</i> <i>Motacilla alba</i>

Fishes

No any individual of Sterlet, *Acipenser ruthenus*, has been found. Other species are represented by two species. Table below presents found fishes species in sector Čortanovci.

Sectors	<i>Acipenser ruthenus</i>	Other species
Sector 22 Čortanovci	-	<i>Sander lucioperca</i> (1) <i>Blicca bjoerkna</i> (1)

Macrovegetation

All types of vegetation – woody plants, shrubs and herbaceous plants are fully developed by floors. Highest floor is characterised by presence of genera *Quercus*, *Tilia*, *Populus*, *Fraxinus*, *Morus* and *Salix*.

Sector	Species: <i>Limosella aquatica</i>	Other species
Sector 22 Čortanovci	No results	<i>Populus euroamericana</i> <i>Populus alba</i> <i>Salix alba</i> <i>Quercus sp.</i> <i>Tilia sp.</i> <i>Fraxinus americana</i> <i>Amorpha fruticosa</i> <i>Erigeron annuus</i> <i>Xanthium strumarium</i> <i>Bidens frondosa</i> <i>Bidens bipinnata</i> <i>Plantago major</i> <i>Persicaria maculosa</i>



		<p><i>Rubus caesius</i> <i>Typha latifolia</i> <i>Rumex sp.</i> <i>Phragmites sp.</i> <i>Helianthus sp.</i> <i>Chenopodium rubrum</i> <i>Chenopodium ficifolium</i> <i>Chenopodium sp.</i> <i>Gnaphalium uliginosum</i> <i>Sicyos angulatus</i> <i>Corylus avellana</i> <i>Hedera helix</i> <i>Chelidonium majus</i> <i>Cornus sanguinea</i> <i>Rosa canina</i> <i>Crataegus monogyna</i> <i>Solanum nigrum</i> <i>Euonymus europaeus</i> <i>Sambucus ebulus</i> <i>Ambrosia artemisiifolia</i> <i>Aristolochia clematidis</i> <i>Vitis sp.</i> <i>Ranunculus sceleratus</i> <i>Viburnum acerifolium</i> <i>Ulmus sp.</i> <i>Epilobium sp.</i> <i>Cyperus eragrostis</i> <i>Morus rubra</i> <i>Physalis alkekengi</i> <i>Lycopus europaeus</i> <i>Stellaria media</i> <i>Acer campestre</i> <i>Acer negundo</i> <i>Urtica dioica</i></p>
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Plants

Not any individual of species *Limosella aquatica* and *Lindernia palustris* have been found.

Sector	Species: <i>Limosella aquatica</i> Species: <i>Lindernia palustris</i>
Sector 22 Čortanovci	No results

Development of vegetation

Due to favourable climatic conditions in this period, some species was still with flowers and pollinators. Herbaceous plants are represented by species from families Aristolochiaceae,



Ranunculaceae, Onagraceae, Cyperaceae, Caryophyllaceae, Asteraceae, Plantaginaceae, Polygonaceae, Lamiaceae, Rosaceae, Vitaceae, Typhaceae, Oleaceae, Poaceae, Amaranthaceae, Sapindaceae, Salicaceae, Cucurbitaceae, Ulmaceae, Urticaceae, Betulaceae, Moraceae, Araliaceae, Papaveraceae, Cornaceae, Solanaceae, Celastraceae and Adoxaceae..

Riparian areas

Water level is in decreasing. From group of invertebrates, Mussels, Snails and Insects were recorded. From Vertebrates, one individual of Dice snake (*Natrix tessellata*) and two species of Frogs were recorded, and one dead individual of European mole (*Talpa europea*).

Vegetation shows regularly seasonal and spatial development by floors. Due to favourable weather condition, some herbaceous plants still have a flower. Birds are occurred by European herring gull on the sand bar and low-numerous White wagtail. Invertebrate animals are represented by Snails, Mussels and Insects (families *Formicidae*, *Pentatomidae*, *Apidae*, *Vespidae* and *Calopterygidae*). Vertebrata animals are represented by Dice snake. Fungi are represented by several common species for forest habitat (Oyster mushroom, Golden chanterelle mushroom, Hoof fungus). Vegetation and animals are not endangered in no way by the ongoing works.

Variable water level strongly influences on mussel population.

Protected areas

During this period, negative effect over the Special Nature Reserve “Kovilj-Petrovaradin marshes”, due to the activities of this project, have not been observed.

During this period, negative effect over the National Park of “Fruška Gora” due to the activities of this project have not been observed.

Ecological network

One area, which is near to work zone, is mentioned in Decree on Ecological Network (“Official Gazette of RS”, No. 102/2010). This is “Kovilj-Petrovaradin marshes”, on left river bank. This area is not affected by the works because all planned activities are going close to the right river bank or in the river closer to the left bank.

Previous and ongoing activities on the critical sector Čortanovci does not show negative effect on the mentioned area.

Summary of results

After field surveys during November 2017, March and August 2018, May, June, July and October 2019 the following target species have been found **in sector Cortanovci**

Period	Macrozoobenthos <i>Unio</i> sp.	Fishes <i>Acipenser ruthenus</i>	Plants <i>Limosella aquatica</i>	Plants <i>Lindernia palustris</i>	Birds <i>Riparia riparia</i>	Birds <i>Charadrius dubius</i>
November 2017	-	-	Two individuals	-	-	-
March 2018	-	-	-	-	-	-
August 2018	<i>U. pictorum</i> (several) <i>U. tumidus</i> (several)	-	-	-	-	-
May 2019	<i>U. tumidus</i> (1)	-	-	-	-	-



June 2019	<i>U. tumidus</i> (1)	-	-	-	-	-
July 2019	<i>U. tumidus</i> (~10) <i>U. pictorum</i> (5-7)	-	-	-	-	
October 2019	<i>Unio pictorum</i> (a few dozen) <i>Unio tumidus</i> (a few dozen)					

Summary of main impacts in the sector during this period

In this sector is defined the construction of some river training structures and dredging activities.

During this second period activities have been focused on the construction of sills 22.2 and 22.1 and 22.3a and 22.3b. The monitoring activities during this period has been focused on determination of the potential effects on biological parameters and water and sediments parameter, due to the fact that the effects on the hydromorphology would be analysed once the works will have been completed.

According to the data explained in precedent sections, several monitoring have been executed during this months, the last of them after complete six months since the beginning of works in Čortanovci. The obtained results have been compared with data included in Environmental Monitoring Report before Works.

Regarding water and sediments, after this six months it is possible to conclude that there are no significant effects over these parameters. The obtained results during field surveys in October are significantly similar to the previous ones. This can be interpreted as the works are not affecting the quality of water and sediments in the vicinity of critical sector of Čortanovci.

From the point of view of biology, the results show that the nature is not been affected by the works.

Bearing in mind that works are being executed from the water, the riparian vegetation existing in the river banks are not suffering any impact except a little dust deposited on leaves. This impact cannot be avoided because mainly depends on wind direction. However, it is not significant and the general status of riparian habitat remains in good conditions.

None of individuals of protected species of plants have been affected during these months and wildlife seems not to be impressed by the presence of machinery and workers. Protected species of birds have not been detected in Čortanovci during the field surveys.

Protective and corrective measures

The following mitigation measures have been carried out during these months to reduce or to avoid the described adverse impacts resulting from the proposed project activities:

- Confirm the absence of the river mussel (*Unio* sp.) in the vicinity of the working area.
- Perform monitoring of spills and suspended concentration during the execution of the works. If excedance of the critical concentration is observed the work intensity is to be reduced;
- Monitor the incidence of works over the vegetation surrounding the working area
- Monitor the variations, if any, of wildlife population around the working areas, focused on the main species mentioned in the EIA.



Conclusions & Recommendations

Works that are being executed currently in the critical sector of Čortanovci are following the methods and recommendations regarding environment protection included in the EIA report and official decision. Additionally, WKSC has accomplished the environmental measures included in the tender specifications and taking into consideration the conclusions of the Inception Report. The environmental monitoring began at the same moment as the works and has been considered one of the most important elements of the project. Thank to this, the measures implemented by WKSC and the continuous monitoring are avoiding negative effects on the nature.

The main recommendation is to continue with the strong and continuous monitoring until the end of works in this sector. If any negative effect would appear, the environmental team should be immediately advised in order to take the most adequate corrective measures.