



INTERMEDIATE ENVIRONMENTAL MONITORING REPORT DURING WORKS

ARANKINA ADA – 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 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 Arankina ada on December 21st 2020 and they have not been finished by the end of March, so this report is necessary in order to identify the current status of environment after three months.

The Environmental Monitoring Report n° 1 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 Preliv and their exact location according to the Final Design:

N°	Name of critical sector	Type of works	Chainage from	to
	Arankina ada	Dredging	1247+000	1244+800

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

Description of work site

Arankina ada is the only critical sector where works execution is in progress in this moment.



Status of the works after 3 months

The construction Works in the sector 21 (Arankina ada) are not completed. The table below shows the current status of each planned activity per structure.

Item	Activity	Status
1	Dredging area - Placing of benchmarks;	COMPLETED
2	Dredging area - Survey;	COMPLETED
3	Dredging area - Geodetic data processing	COMPLETED
4	Dredging area - Preparation of drawings	COMPLETED
5	Dredging area - Dredging with dumping	UNDER the execution (start date 21.12.2020)

Project context

The stretch Arankina ada has been located between the gauging stations Novi Sad, Titel and Zemun, nearer to Novi Sad. Titel is a referent gauging station for the Tisza river, and it is located in the vicinity of the Tisa Danube confluence.



Arankina ada stretch is one of the typical Danube stretches with several interconnected isles arranged in a row along with the river current. The most downstream river island name (Arankina Ada) named the whole stretch. The stretch morphological development begins after several sharp bends in Novi Sad's zone when the river current slows down and creates the circumstances for bedload deposition.



The consequent river islands are located in the middle of the river flow closer to the left riverbank, except the last one (Arankina Ada), which splits the river current into two equivalent river branches. Even water depths in the branches are similar, around 7m below LNL. Accordingly, the capacities in terms of the bedload and water volume discharges are similar too.

The navigational channel is placed in the right river branch. The problems with navigation outlines appeared when the sedimentation started to enlarge submerged upstream reef. The reef sides started to suppress the 25dm depth contour line towards the right river bank and narrow the navigational channel.

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 concluded that additional monitoring could be useful for screening the situation during works execution.

During the works execution phase, a total of one regular monitoring campaign was conducted (February, 26/02/2021).

During this regular campaign, sampling was performed at a position located about 100 m downstream of the sedimentation works, at three different depths (1,0; 2,5; 5,0 m). Sampling and further analysis was performed by the accredited laboratory Anahem from Belgrade.

In the meantime, 7 water samples in 7 campaigns were taken for additional analyses during the works at Arankina Ada. Samples were taken downstream from the deposit site.

Sediment monitoring

In the phase of works execution, a total of one sampling campaign was conducted at the location Arankina Ada, at the same time when water samples were taken on 26/02/2020.

Review of water and sediment quality results

The results obtained during the first regular sampling campaign conducted on 26/02/2020 at the Arankina Ada location show that the quality of water samples, taken and analysed from three different depths (1,0; 2,5; 5,0 m), was not different from the quality of samples analysed in previous campaigns, as within this Project (benchmarks) as well as official campaigns.

The results of physico-chemical analyses show that the water quality of the Danube at the Arankina Ada location (depth 1,0 m) predominantly corresponds to the quality of class I waters, except for the parameters total phosphorus and BOD5 which correspond to the class II water quality.

Regarding the microbiological classification of the quality of this sample, it can be concluded that the waters of the Danube at the location of Arankina Ada, belong to class III for total coliform bacteria, while it belongs to class III for intestinal enterococci; coliform bacteria of fecal origin and aerobic heterotrophs.



The results of physico-chemical analyses show that the quality of the Danube water at the Arankina Ada site (depth 2,5 m) predominantly corresponds to the quality of class I waters, except for the parameters total phosphorus and BOD5 which correspond to the class II water quality.

Regarding the microbiological classification of the quality of the mentioned sample, it can be concluded that the waters of the Danube at the Arankina Ada location belong to class II of surface waters criteria for total coliform bacteria, coliform bacteria of fecal origin and intestinal enterococci, while for the parameter aerobic heterotrophs it corresponds to class III.

The results of physical and chemical analyses show that the water quality of the Danube at the Arankina Ada location (depth 5,0 m) predominantly corresponds to the quality of class I waters, except for the parameters ammonium ion, phosphorus and BOD5 which correspond to class II water quality.

Regarding the microbiological classification of the quality of this sample, it can be concluded that the waters of the Danube at Arankina Ada belong to class III of surface waters criteria for total coliform bacteria, coliform bacteria of fecal origin, intestinal enterococci, and aerobic heterotrophs.

DURING WORKS EXECUTION

AA – 5,0 m	26/02/2021	I	I	I	II			I	I	I	I	II	I							III	III	III	III
AA – 2,5 m	26/02/2021	I	I	I	II			I	I	I	I	II	I							II	II	II	III
AA – 1,0 m	26/02/2021	I	I	I	II			I	I	I	II	II	I							II	III	III	III

During the additional sampling and analysis of water at the Arankina Ada location, during the construction phase, 7 campaigns have been carried out so far and 7 samples have been taken to determine the quality of water temperature parameters, suspended solids and mineral oils. The value of the results of the first 5 samples) corresponds to class I water quality for all three parameters.

ARANKINA ADA															
SAMPLING POINTS	RESULTS OF WATER QUALITY IN DIFFERENT CAMPAIGNS														
	15.12.2020.		20.12.2020.		09.01.2021.		18.01.2021.		26.02.2021.						
	temperature (°C) / suspended matters (mg/l) / mineral oils (mg/l)														
Sampling point 1 (upstream)															
Sampling point 2 (downstream)	5,5	12	<0,1	7	10	<0,1	6,9	12	<0,1	4,2	16	<0,1	7,1	18	<0,1
LEGEND:	I CLASS	II CLASS	III CLASS	IV CLASS	V CLASS										

The results of testing the values of sediment quality parameters obtained during the regular monitoring campaigns, in the phase of works execution, performed on 26/02/2021 at the location Arankina Ada, show that the values of all tested parameters are below the prescribed limit values, and most of them are not detected. Concentrations of pollutants are at the level of the natural background and sediments can be dislocated without any special protection measures.



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 during this period there has been no incident related to discharges or waste

Phytoplankton

This is typical phytoplankton community structure for this season. Community structure was uniform along depth gradient and among localities.

Macrozoobenthos

Five mussel species from four genera were found in total. On the riverbank, two individuals of Swollen river mussel (*Unio tumidus*) and several of Asian clam (*Corbicula fluminea*) were recorded in the sand-water intermediate zone. In samples of sediment from river bottom, two individuals of Zebra mussel (*Dreissena polymorpha*) have been found on dredging site 2 (1246 km + 500 m) and one individual of same species on dredging site 3 (1245 km + 900 m). On dredging site 1 (1247 km), as well as on all three deposition sites, were no mussels. Downstream of work zone several individuals of *Unio pictorum*, *Unio tumidus* and *Sinanodonta woodiana* were found, along with *Dreissena polymorpha* as parasite on *Unio pictorum*.)

Sector	<i>Unio</i> sp.	Other species
Sector 21 Arankina ada	<i>Unio tumidus</i> <i>Unio pictorum</i>	<i>Corbicula fluminea</i> <i>Dreissena polymorpha</i> <i>Sinanodonta woodiana</i>

Birds

One large population of European herring gull (*Larus argentatus*) was in the work zone, with approximately 30 individuals. Among them, several individuals of Black-headed gull (*Larus ridibundus*) were recorded. Mallard (*Anas platyrhynchos*) was present with 5-7 males. Several individuals of Great cormorant (*Phalacrocorax carbo*) were in flight.

Sector	<i>Charadrius dubius</i>	<i>Riparia riparia</i>	Other species
Sector 21 Arankina ada	--	--	<i>Anas platyrhynchos</i> <i>Larus argentatus</i> <i>Larus ridibundus</i> <i>Phalacrocorax carbo</i> <i>Corvus corone</i>

Fishes

In the standing nets seven fish species from seven genera, with 38 individuals, has been caught, from which 24 individuals of *Cyprinus carpio*, which is the consequence of introducing 800 kg of that species day before. All individuals of *Cyprinus carpio* has been returned into the water after measuring of weight. In pulling the net no one individual of fish has been caught. In electrofishing no one individual of fish has been caught.



Sectors	<i>Acipenser ruthenus</i>	Other species
Sector 21 Arankina ada	No individuals	<i>Cyprinus carpio</i> (24 individuals) <i>Hypophthalmichthys molitrix</i> (4) <i>Abramis brama</i> (5) <i>Blicca bjoerkna</i> (1) <i>Chondrostoma nasus</i> (1) <i>Esox lucius</i> (2) <i>Aspius aspius</i> (1)

Macrovegetation

Macrovegetation along right riverbank are characterized by moderate diversity. Health status of woody plants are good. Roots of some herbaceous or woody species are fully exposed to the air or water. *Populus* species and *Salix alba*, together with *Fraxinus* individuals, dominates in number of individuals. Some plant individuals are partially or totally flooded

Sector	Species: <i>Limosella aquatica</i>	Other species
Sector 21 Arankina ada	No results	<i>Populus alba</i> <i>Salix alba</i> <i>Fraxinus</i> sp. <i>Amorpha fruticosa</i> <i>Stellaria media</i> <i>Urtica dioica</i> <i>Euphorbia helioscopia</i> <i>Chelidonium majus</i> <i>Malva sylvestris</i> <i>Conium maculatum</i> <i>Marrubium vulgare</i> <i>Geranium purpureum</i> <i>Geranium robertianum</i> <i>Urtica urens</i> <i>Galium aparine</i>

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 21 Arankina ada	No results

Development of vegetation

Woody plant species shows proper seasonal development, but high humidity may cause degradation of some herbaceous, non-hydrophyte, species near the riverbank due to degradation of root system. Some plant individuals are under the water due to entrance of water into the habitat. Submersed macrophytes are present primarily in the lower part of work zone. Phase of leafing begins at some species. Perennial mesophytes are present but less endangered due to fibrous root system.



Riparian areas

Main characteristic of riparian area at time of this monitoring is inundation of plant habitat, in some parts approximately up to ten meters in comparison to drier periods. Karlovački sleeve, behind main river flow, is full of water and somewhere “cut” the riverbank with water and almost comes out to the main river flow. Habitats are flooded and this make difficult survival of small herbaceous plant species. Some plant species begin flowering and leafing. Vegetation period start earlier in time of this monitoring and some species of pollinators and insects in general are present. More individuals (>10) of Spinycheek crayfish (*Faxonius limosus*, Decapoda, Crustacea) has been found on the left riverbank, as well as two individuals of European crayfish (*Astacus astacus*, Decapoda, Crustacea). Birds are occurred by common genera for this period, dominated by Gulls and Mallards. Some bird species has been recorded by sound (*Corvus corone*). Vertebrata, except birds, has not been recorded.

Protected areas

Following the EIA document (section 3.8 and from EIA Appendix VII), the protected areas that could be affected by the work at Critical Sector of Preliv are summarized in the table below:

Sector 21	Protected Area
Arankina ada	Kovilj-Petrovaradin marsh”

Negative effects over the Nature Park “Begeč swamp”, due to the activities of this project, are not expected due to long distance between dredging zones and position of “Begeč swamp”.

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 Special nature reserve “Kovilj-Petrovaradin marsh”. This area is not affected by the works because all planned activities took place in the river “.

Summary of results

After surveys during November 2017, August 2018, July, August and November 2020, the following target species have been found **in sector Arankina ada.**

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	-	-	-	-	-	-
August 2018	-	-	-	-	-	-
February 2021	-	-	-	-	-	-
March 2021	<i>Unio tumidus</i> (several) <i>Unio pictorum</i> (several)	-				

Summary of main impacts in the sector during this period

During these three months activities have been focused on dredging activities, currently on going. 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 monitorings have been executed during these months, the last of them after complete three months since the beginning of works in Arankina ada. The obtained results have been compared with data included in Environmental Monitoring Report before Works.

Regarding water and sediments, after these three months it is possible to conclude that there are no significant effects over these parameters. The obtained results during field surveys in March 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 Arankina ada.

From the point of view of biology, the results show that the nature is not been affected by the works. Results obtained until now are line with normal status during each season, especially birds and fishes.

Bearing in mind that works are being executed from the water, the riparian vegetation existing in the riverbanks 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 impact 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 Arankina ada 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 on critical sector Arankina ada are following the methods and recommendations regarding environment protection included in EIA report and official decision. Additionally, WKSC is accomplishing the environmental measures included in the tender specifications and taking into consideration conclusions of Inception Report. The environmental monitoring begun at the same moment that 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 over 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.