

**TERMS OF REFERENCE (TOR) FOR CONSULTANCY SERVICES FOR
PREPARATION OF DESIGN FOR CONSTRUCTION OF STRUCTURES FOR FLOOD
PROTECTION OF THE OBRENOVAC TOWN**

CONTENTS

1.	BACKGROUND	2
2.	OBJECTIVE OF THE ASSIGNMENT.....	5
3.	SCOPE OF SERVICES.....	6
4.	TASKS.....	7
5.	AVAILABLE REFERENCE DOCUMENTS.....	28
6.	REPORTING REQUIREMENTS, DELIVERABLES AND TIME SCHEDULE	29
7.	SERVICES AND FACILITIES TO BE PROVIDED BY THE ADMINISTRATION.....	30
8.	SUPERVISION OF THE WORK BY THE ADMINISTRATION	30
9.	TIME, DURATION AND WORKPLACE	30
10.	PROFILE OF THE CONSULTANT.....	31
11.	SELECTION	33
12.	ANNEXES.....	34
	ANNEX 1: DATA TO BE PROVIDED BY THE EMPLOYER	34
	ANNEX 2: COMPLIANCES WITH REGULATIONS IN REPUBLIC OF SERBIA	34
	ANNEX 3: INDICATIVE OUTLINE OF SITE-SPECIFIC STAKEHOLDER ENGAGEMENT PLAN (SEP):	36
	ANNEX 4: LEGAL FRAMEWORK FOR ENVIRONMENTAL IMPACT ASSESSMENT STUDY (EIA STUDY)	37
	ANNEX 5: PRECONDITIONS OBTAINED FROM INSTITUTE FOR NATURE CONSERVATION	38

List of Abbreviations

CS	Pumping station
EHS	Environmental, Health and Safety
EHWS	Early Hydro meteorological Warning System
GIIP	Good International Industry Practices
GIS	Geographical Information System
GNSS	Geodetic Methods and the method of integrated system
GPS	Global Positioning System
GRM	Grievance Redress Mechanism
GOS	Government of Serbia
MAFWM	Ministry of Agriculture, Forestry and Water Management
OHS	Occupational Health and Safety
OT	Operational Traverse
PE	Pipeline
PIU	Project Implementation Unit
RC	Retaining Structures
RNU	Early Warning System
TL	Transmission Line
TS	Substation
ToR	Terms of Reference
WB	World Bank

1. BACKGROUND

The Republic of Serbia has received financing from the World Bank towards the cost of the Sava and Drina Rivers Corridors Integrated Development Program, Phase I project, and intends to apply part of proceeds for financing consultancy services of works to support flood protection and environmental management of the Sava and the Drina River Corridors.

The Ministry of Agriculture, Forestry and Water Management – the Directorate for Water will be responsible for works on flood protection under two components of the Program:

Component 1: Integrated Management and Development of the Sava River Corridor – this component will finance investments in renovations and upgrading of flood protection infrastructure to address the increasing risk of flooding due to climate change. These activities will reduce the risks and impacts of floods, thereby increasing the resilience to climate change – related threats.

Component 2: Integrated Management and Development of the Drina River Corridor – this component will support multipurpose investments along the Drina River to reduce the risk of a potential impact of floods. This component will facilitate the implementation actions, management measures, and investments identified by the Drina Strategic Action Plan prepared under Western Balkans GEF-SCCF Drina River basin Management Project and investments identified through the Integrated Water and Hydropower Development Project. The above measures will contribute to increased resilience to floods and droughts.

Due to its geomorphological and hydrological characteristics, the Kolubara river basin is predisposed for development of flood waves having the significant volumes and particularly pronounced peaks.

Devastating torrential floods occurred several times for the last 25 years (the floods in the Kolubara river basin were recorded in 2001, 2006, and 2010, and the floods in the Tamnava river basin in 1999, 2006, and 2009), while the 2014 flood was exceptional regarding casualties and damages.

In the Kolubara river basin, the Belgrade Urban Municipality of Obrenovac is exposed to the greatest flood risk. Its territory is located at the downstream end of the river basin, on the Kolubara confluence to the Sava River, on low ground, and has very complex hydrographic conditions including the impact of the Sava on the Kolubara flood regime.

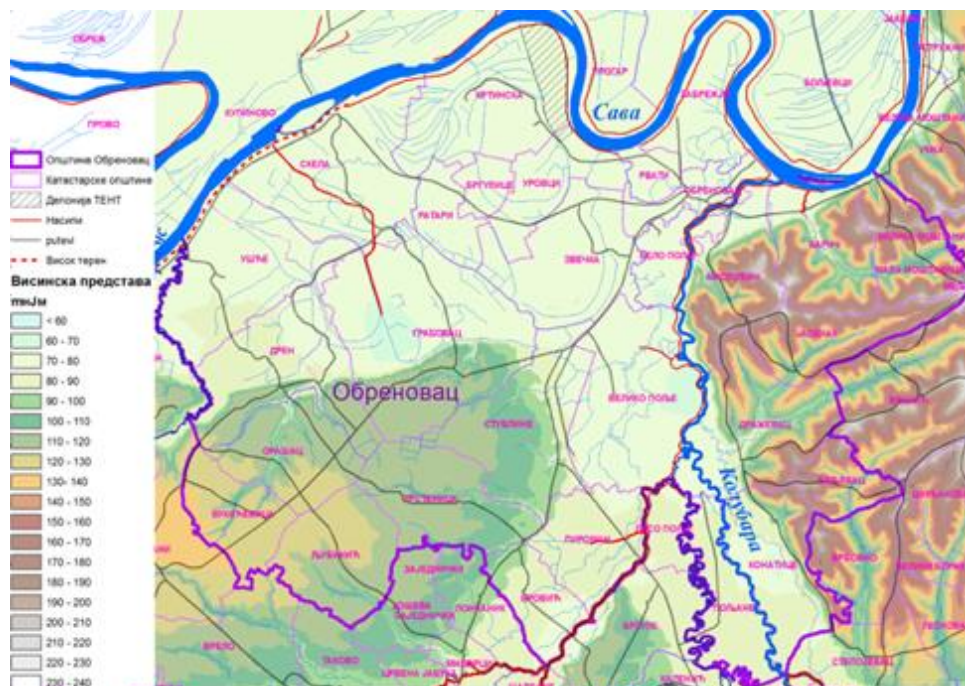


Figure 1. Territory of Obrenovac Municipality

The total area of the Urban Municipality of Obrenovac is 411 km². Floods of the Kolubara and the Tamnava endanger around 135 km² of land, mainly on the left riverbank. The Obrenovac city centre, having the area of 55 km² and located on the lowest parts of the terrain, is exposed to very high flood risk. Out of total 75,000 inhabitants, more than 55,000 are under risk of floods. The territory of Urban Municipality of Obrenovac accommodates several large industrial plants (as thermal power plants *Nikola Tesla A* and *B*), as well as significant infrastructure (highway E-763 *Miloš Veliki*, railroad).

The embankments along the Sava, the Kolubara, the Tamnava and their small tributaries provide flood protection of low parts of the territory of the Urban Municipality of Obrenovac and divide it into two spatially separated protected areas.

East from the Kolubara confluence into the Sava river, there is around 490 ha of protected area *Barič-Mislodjin*. The area Barič-Mislodjin is protected by the embankment on the Kolubara right riverbank from its confluence to the high grounds near Mislodjin, and the embankment on the Sava right riverbank from the Kolubara confluence to the high grounds in Barič. Within this area, there are two inhabited places, Barič and Mislodjin, a chemical plant in Barič, significant traffic infrastructure (highway E-763 *Miloš Veliki*, main road Belgrade-Obrenovac, etc.), as well as drainage system covering 460 ha (with 6,230 m long channel network and a pumping station *CS Mislodjin*).

West from the Kolubara confluence into the Sava river, there is a specific protected area *Obrenovac* which encompasses a wide area between the Sava, the Kolubara, the Tamnava, and the peripheral channel *Grabovac*. The protected area *Obrenovac* is confined by the embankments along the left riverbanks of the Kolubara, the Tamnava and the Trstenica, the embankments on the right riverbank of the Sava from the Kolubara confluence to Skela and the embankment along the peripheral channel *Grabovac*. Within the protected area *Obrenovac*, there is a town of Obrenovac and several smaller settlements (Rvati, Urovci, Breska, Krtinska, Zabrežje, Belo Polje, Zvečka, Brgulice, Ratari, Skela), a number of industrial facilities, thermal power plants *Nikola Tesla*, water facilities, several dozens of kilometers of modern roads (highway E-763 *Miloš Veliki*, main road Belgrade-Obrenovac-Ub-Valjevo, etc.), the industrial railroad (for supply of the thermal power plant with coal), other infrastructure, as well as large areas of agricultural land with the drainage systems *Zabreške livade*, *Vić Bara*, *Velika Bara – Kupinac*, *Vukićevica*, *Belo Polje*, *Veliko Polje*, and *Brović*, with seven pumping stations: Zabran, Vić Bara, Kupinac, Skela (old and new ones), Vukićevica, and Skela.

In the period from 14 May to 16 May 2014, the Kolubara flood wave exceeded historical peak and volume maximums in the area of Obrenovac and upstream, near the Kolubara open pit mines. Open pit mines *Tamnava Zapad* and *Veliki Crljeni* were filled with around 200 million m³ of water. Even though, the water spilled over the Kolubara and the Tamnava embankments and flooded a major part of Obrenovac.

It is evident that Obrenovac is at flood risk, but this problem became even more prominent after the 2014 flood. The extensive rehabilitation works and reconstruction of flood protection structures surrounding the upstream mine complex Kolubara were done, while the existing embankments for the protection of Obrenovac were just repaired.

Frequency of floods and size of flood damage in the Kolubara river basin, and especially the size and devastating energy of the May 2014 flood wave, indicate that it is essential to improve flood protection and create conditions for better flood risk management, consistent with the spatial and economic development of that region. To solve the problem, the *Study on flood management improvement in the Kolubara river basin* (phases 1, 2, and 3, Jaroslav Černi Water Institute, 2014 - 2018) was developed. The Study defines the concept of integral flood protection in the Kolubara river basin, which encompasses: erosion protection, accumulation of water in the upper parts of the river basin, formation of surface storages, and extension and reconstruction of flood protection structures. The Study defines the strategy which has been harmonized with the plans for spatial and economic development of the local self-government units, and also the plans for the development of the power industry and other state infrastructural systems. The study also promotes the application of non-structural measures through the development of the early hydrometeorological warning system (EHWS). The EHWS development started in 2019 and will be done in several stages. The Feasibility study with the concept of development and implementation of EHWS was adopted in 2020, as a basis for subsequent phases. The EHWS is currently in use at the pilot catchment of the Tamnava river. The preparation of an operational hydrologic-hydraulic model for the entire Kolubara river basin is foreseen for the current phase of EHWS development.

The Urbanistic design for reconstruction of the Kolubara and the Tamnava embankments and the bridge on the road Belgrade – Obrenovac in the Urban Municipality of Obrenovac and the municipality of Ub

(Institute of Architecture and Urban and Spatial Planning of Serbia, Belgrade, 2021) was prepared as a base for the determination of public interest, sub-division of land parcels and issuance of Location conditions for the reconstruction of the flood protection structures at the Kolubara and the Tamnava.

The Conceptual solution and the Feasibility study with the Preliminary design for the protection of Obrenovac from the Kolubara and the Tamnava floods (Jaroslav Černi Water Institute, 2021-2022) was prepared. The main objective of this technical documentation was to define optimal technical concepts for the protection of Obrenovac and increase the flood protection level of the *Obrenovac* and *Barič-Mislodjin* protected areas. The special intention was addressed to the 2014 floods which were disaster for the Obrenovac city. The Study also cover the Environmental-Social aspect of the project prepares in accordance to the law of Serbia.

The Location conditions (register no: ROP-MSGI-40783-LOCH-2/2022; reference no: 350-02-02204/2021-07, dated 4 April 2022) were issued based on the Conceptual solution, and used for the development of the Preliminary Design.

The Feasibility study and Preliminary design were reviewed by the State revision committee, and approved as fully compliant with the issued Location conditions, and providing a good base for further development of the technical documentation (Ministry of Construction, Transport and Infrastructure, Report on the expert revision no. 351-02-02805/2022-07 dated 29 December 2022).

2. OBJECTIVE OF THE ASSIGNMENT

The Directorate for Water intends to engage a suitably qualified consultancy company to provide services for design of works identified under Components 1 and 2 for rehabilitation of the flood protection structures and drainage control systems in Republic of Serbia.

The objectives of the assignment are as following:

- Performing of additional geodetic works for development of relevant and updated geodetic basic data, with a digital model of the terrain as the basis for the design.; All landmarks and underground installations shall be surveyed and recorded.
- The additional geotechnical investigation works for the preparation of the Design for the construction permit (and Construction design) of the structures for the protection of Obrenovac from the Kolubara and the Tamnava floods includes exploratory boreholes and geophysical-geolectrical testing in the design area and at the locations of borrow-pits for estimation of the quality of the material that will be incorporated into the body of the embankment;
- Preparation of Design for construction permit and Construction design for intersection of the designed flood protection structures routes with the existing water supply and electrical installations;
- Revision and verification or correction of the dimensions of the structures proposed in the Preliminary design on the basis of the additional hydrologic-hydraulic analyses of floods in the Kolubara river basin. New analysis shall be used to determine the adverse impacts of the Kolubara and the Tamnava floods more precisely;
- Designs for construction permit shall be developed for the purpose of obtaining a construction permit. The designs for construction permit must contain technical solutions of reconstruction of the structures for the protection of Obrenovac from the Kolubara and the Tamnava floods, in accordance with the adopted division into phases/sections.

A Design for construction permit must be harmonized with the existing Location conditions and be in accordance with the guidelines from the of the Preliminary design;

Designs for construction permit and Construction design shall be developed compliant to the Environmental and Social requirements and standards adopted set forth in the Project's ESMF, SEP, LMP and RPF.

- Construction design shall be prepared for the purpose of construction and performance of works. Construction design further develops details and technological solutions defined in the Design for construction permit.

3. SCOPE OF SERVICES

The Scope of the Consultant Services includes preparation of all above-mentioned surveys and designs developing further the Preliminary design, as the basis for all assignments under this procurement documents. It shall take in account the analyses of proposed solutions and different rehabilitation options, project planning, rehabilitation schedules, cost estimates. The Designs shall address the various issues identified in the Study Objectives listed earlier and detailed in the Tasks covered hereunder.

During the development of the Designs, the Consultant shall identify any additional aspects that are not covered by the Tasks but are required to be addressed to achieve the Study Objectives, and make appropriate recommendations to the Client.

4. TASKS

The following embankments exist along the Kolubara and the Tamnava rivers (the embankment sections are marked in compliance with the Flood defense plan of the Republic of Serbia):

- within the protected area *Obrenovac*, the sections:
 - S.3.5.1 – embankment along the left Kolubara bank from the confluence into the Sava to the bridge on the road Belgrade-Obrenovac;
 - S.3.5.2 - embankment along the left Kolubara bank from the bridge on the road Belgrade-Obrenovac to the confluence of the Tamnava river;
 - S.3.5.3 – embankment along the left Tamnava bank from the confluence into the Kolubara to the bridge Čemanov most;
- within the protected area *Barič-Mislodjin*, the sections:
 - S.3.4.4 – the embankment on the right Kolubara bank from the confluence into the Sava to the bridge on the road Belgrade-Obrenovac;
 - S.3.4.5 - the embankment on the right Kolubara bank from the bridge on the road Belgrade-Obrenovac to the high grounds in Mislodjin.

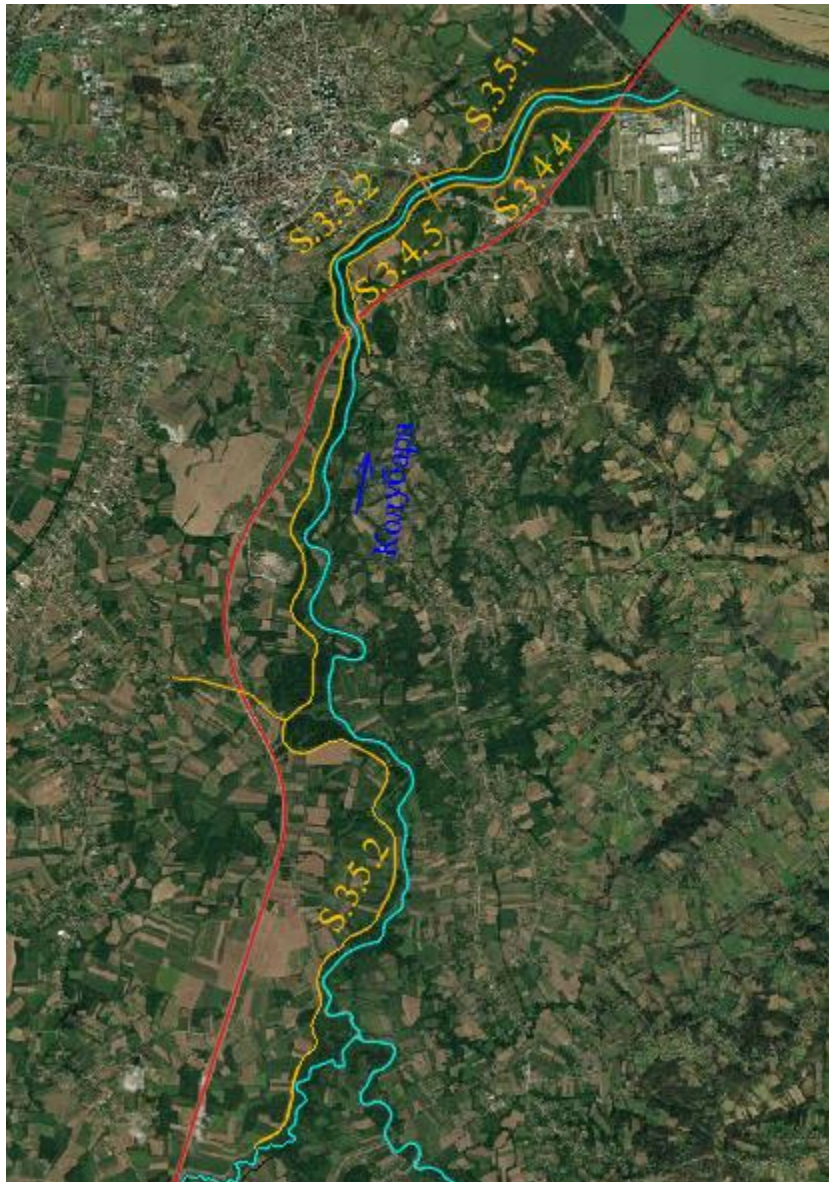


Figure 2. Embankments along the Kolubara



Figure 3. Embankments along the left bank of the Tamnava

The May 2014 flood clearly indicated that the territory of the municipality of Obrenovac is under very high flood risk despite the existing protection system. Due to inadequate height and size of the flood protection structures, overflowing and collapse of embankments on the Kolubara and the Tamnava rivers may occur again.

Having in mind the above said, the Objective of assignment is as following:

- Geodetic works with the development of supporting Geodetic elaborate;
- Geological investigation works with the development of Geological elaborate;

and the development of:

- Design for relocation of installations;
- Hydrological-hydraulic studies, such as flood flows in each and in both rivers coincided, river routing within the designed flood way for different probable floods, etc.;
- Designs for construction permit and
- Construction designs of the structures and specifications for the protection of Obrenovac town from the Kolubara and the Tamnava floods.

Since the flood protection structures are linear, and having in mind their length the technical documentation shall be prepared separately for 5 identified phases/sections. This would enable obtaining individual construction permits for the section and performance of works in phases.

The technical documentation should encompass the following sections (river chainage is marked with r.km, and embankment chainage with e.km) and works:

Phase/ Section 1:	<p>The Kolubara river from the confluence into the Sava to the existing bridge at the entrance to Obrenovac (r.km 0+000 – r.km 3+080):</p> <ul style="list-style-type: none"> - Regulation of the Kolubara riverbed (r.km 0+000 – r.km 3+080) <ul style="list-style-type: none"> - deepening of the flood channel; - securing the low water channel at the critical location where the river intersects the highway (r. km 0+623); - securing the concave left bank in the river bend (r.km 1+260 – r.km 1+660); - securing the concave right bank in the river bend (r.km 2+080 – r.km 2+590);
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- Reconstruction of the embankment on the Kolubara left bank (e.km 0+000 – e.km 2+530) and the accompanying structures in the body of the embankment and along the embankment;
 - pumping station (CS) *Zabreške livade* (e.km 1+600) – retaining wall, pressure pipeline in the body of the embankment;
 - faecal pumping station (e.km 2+230) – retaining wall;
 - Reconstruction of the embankment on the Kolubara right bank (e.km 0+000 – e.km 2+910);
 - Relocation of the existing installations and infrastructure:
 - water supply and sewerage: relocation of water supply pipeline PE 160 along the foot of the embankment on the left bank in the length of approximately 2300m;
 - low and medium voltage power lines: relocation of E10 powerlines which intersect with the river stream (r.km 1+890, r.km 2+833 and r.km 2+864)
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Phase/ Section 2:	<p>The Kolubara river in the area of the existing bridge on the road Belgrade-Obrenovac (r.km 3+080 – r.km 3+130):</p> <ul style="list-style-type: none"> - Regulation of the Kolubara river channel (r.km 3+080 – r.km 3+130): deepening of the flood channel; - Reconstruction of the embankment on the Kolubara left bank (e.km 2+530 – e.km 2+580) - Reconstruction of the embankment on the Kolubara right bank (e.km 2+910 – e.km 2+950) - Relocation of the existing installations and infrastructure: <ul style="list-style-type: none"> - water supply and sewerage: <ul style="list-style-type: none"> - reconstruction/relocation of the main pipeline Ø500 (r.km 3+131) - relocation of the pipeline PE 32 up to the pumping station <i>Mislodjin</i> (a part in the phase 2, and a part in the phase 3); - low and medium voltage power lines: <ul style="list-style-type: none"> - relocation of E10 powerlines which intersect with the river stream (r.km 3+132 and r.km 3+158) - relocation of E10 powerlines in the body of the embankment on the right bank up to the pumping station <i>Mislodjin</i> (a part in the phase 2, and a part in the phase 3); - relocation of E10 powerlines along the foot of the embankment on the right bank (a part in the phase 2, and a part in the phase 3);
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Phase/ Section 3:	<p>The Kolubara river from the bridge on the road Belgrade-Obrenovac up to the upstream end of the channel regulation and embankment on the right bank (r.km 3+130 – r.km 5+440):</p> <ul style="list-style-type: none"> - Regulation of the Kolubara river channel (r.km 3+130 – r.km 5+440) <ul style="list-style-type: none"> - deepening of the flood channel;
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- securing the concave left bank in the river bend (r.km 4+150 – r.km 4+400);
 - Reconstruction of the embankment on the Kolubara left bank (e.km 2+580 – e.km 4+880), with relocation of the embankment in the area of the highway (e.km 4+182 – e.km 4+773)
 - Reconstruction of the embankment on the Kolubara right bank (e.km 2+950 – e.km 4+943), with relocation of the embankment in the area of the highway (e.km 4+377 – e.km 4+943)
 - ~~Works for protection of the Kolubara discharge section in the area of the bridge at the highway~~ Protection of the Kolubara river bed in the area of the bridge
 - Relocation of the existing installations and infrastructure:
 - water supply and sewerage;
 - relocation of the pipeline PE 32 up to the pumping station *Mislodjin* (a part in the phase 2, and a part in the phase 3);
 - low and medium voltage power lines
 - relocation of E10 powerlines which intersect with the river stream (r.km 3+760 and r.km 3+840)
 - relocation of E10 powerlines along the foot of the embankment on the right bank (a part in the phase 2, and a part in the phase 3);
 - relocation of the transmission line TL (DV) 121/2 (no. 121/2, 110 kV, substation TS Belgrade10 – substation TC TENT A SP) which crosses the right embankment at km 4+670, and km 4+470 along the left embankment)
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Phase/
Section 4: The Kolubara river from the upstream end of channel regulation to the confluence of the Tamnava r. (r.km 5+440 – r.km 13+660):

- Reconstruction of the embankment on the Kolubara left bank to the confluence of the Čikovac stream (e.km 4+880 – e.km 8+730) with the reconstruction of the floodgate *Čikovac*
- Reconstruction of the embankment on the Kolubara left bank from the confluence of the Čikovac stream to the confluence of the Tamnava (e.km 8+730 – e.km 13+003)

Phase/
Section 5: The Tamnava river from the confluence into the Kolubara to the Čemanov most bridge (r.km 0+000 – r.km 13+850):

- Reconstruction of the embankment on the Tamnava left bank (e.km 0+000 – e.km 13+501) with the relocation of the embankment in the area of highway and reconstruction of the structures in the body of the embankment and along the embankment:
 - culvert at the confluence of the Suvaja stream (e.km 2+538)
 - culvert at the confluence of the Trstenica (e.km 4+032)
 - pipe culverts in the body of the embankment (e.km 10+527 and e.km 12+257)
- Cutting of the Tamnava river bend in the area of the Suvaja stream confluence
- Relocation of the existing installations and infrastructure

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- low and medium voltage power lines
 - relocation of powerlines along the foot of the embankment on the left bank MNN from the substation TS 10/0.4 kV *Milorci 3* at the upstream end of the embankment.
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The Consultant's staff shall include suitably qualified engineers and other professionals who are competent to carry out these duties.

The project is divided into 6 Tasks:

Task 1: Investigation works

For the purpose of the development of the Preliminary design, geodetic surveys of the floodplains and main river channels of the Kolubara and the Tamnava were conducted. The results were given in the *Report on geodetic investigation works* (Jaroslav Černi Water Institute, Belgrade, 2019).

The *Report on engineering-geological investigations* (Jaroslav Černi Water Institute, Belgrade, 2019) was made on the basis of the extensive field investigation works in the area covered by the Preliminary design. In December 2021, additional geophysical investigation was conducted on the right bank embankment with the method of geoelectrical and geophysics scanning.

It may be necessary to perform additional investigation works for preparation of the Designs for the Construction permit and Construction designs of the flood protection structures along the Kolubara and the Tamnava.

The aim of the additional investigation work is to provide detailed bases for the development of Designs for the construction permit and Construction designs and Construction drawings. The activities are described in the text below.

- *Geodetic works with the preparation Geodetic works with the preparation of geodetic elaborate*

For the development of relevant and updated geodetic basic data, with a Digital Terrain Model (DTM) of the terrain as the basis for the design, the additional geodetic surveys should include the survey of the details. All field surveys are to be accomplished by field survey bench marks and bearings for the future references:

- the existing structures that are located on the route of the embankment and which need to be reconstructed;
- locations of new structures which are to be constructed according to the Preliminary design;
- cross-sections of the main river channel and coastal area of the Kolubara at the critical locations, at the distance of 25 m;
- cross-sections of the concave banks of the Kolubara where the construction of bank protection revetments is envisaged, at the distance of 25 m;
- cross-sections of the main river channel and coastal area of the Tamnava at the critical locations, at the distance of 25 m;
- cross-sections of the main river channel and coastal area of the Tamnava at the location of cutting of the river bend, at the distance of 25 m;
- bathymetric survey of the old river channel *Potkovica* – a part of the Kolubara river at the crossing points of the route of the designed embankment.

The scope of the geodetic works is defined per phases of the development of the design documentation, in accordance with the legal regulations. Geodetic activities should be performed in the following phases:

- collecting the official data;
 - geodesic grid design – operational traverses in the areas of the subject locations
 - collecting the field data
 - survey on geodetic works
 - geodetic setting-out design and benchmarks
- *Collecting the official data*

The position basis for determining the coordinates of the operational traverse points is made up of the trigonometric points of the state network. On the topographic map 1:25.000, it is necessary to insert all network points from all rows (trigonometric, Triangulation Survey and elevation network) in wider area of the structure, to which the points of the operational traverse for surveying of the structures and the terrain will be connected. As part of the design documentation, it is mandatory to attach lists of coordinates of the existing points and lists of benchmark heights certified by the competent state geodetic authority that issued the above data.

For forming of a cadastral-topographic layout, it is necessary to obtain basic cadastral data from the relevant institution (Republic Geodetic Authority). Obtaining of the basic cadastral data is the obligation of the Client.

- *Geodesic grid design*

The aim of creation of the geodetic documentation is to form a single basic data for the development of the design – technical documentation, and subsequent setting-out of the designed structures. The spatial basis for creation of the basic geodetic data and performance of geodetic works is represented by the points of the operational traverse. It is necessary to conduct identification and control of the existing basic geodetic data. If in the area of the structure there are no basic geodetic data of the relevant geometry and accuracy, it is necessary to establish a new one, for the purpose of the development of the design documentation and construction, and maintenance of the structure as well.

The points of the operational traverse (OT) should be designed in continuity, if possible along the structure, at the lateral distance of maximum 50 m, outside the working zone. The OT points should be visible to the height of the tripod and be at the distance of 50-250 m. The OT design should also include the points of the existing trigonometric and elevation network located near the structures. All points of the OT should be stabilized with the adopted type of the benchmark given by the Republic Geodetic Authority, in compliance with the regulations for stabilization of the points of the state traverse network. Stabilization of the points should be done at least 20 days before geodetic surveying.

X, Y coordinates are determined by levelling free network in the local coordinate system using the least squares method, and then by transforming thus obtained coordinates, fit them the into the state coordinate system if the points are determined using GPS static method of surveying or with a combination with the classic methods.

The quality of similarity transformation is assessed according to the size of the corrections along the coordinate axes for the included points of the state trigonometric network, which must be less than 20 cm regarding absolute value. In classic methods of surveying (total stations), for determining coordinates of the OT points, the criteria for traverse network of the second order should be applied according to the applicable Law (*Official Gazette of the Republic of Serbia*, nos. 20/92 and 48/93, *Instructions for development and maintaining of basic geodetic data for surveying details 02. 1997*) which deals with this subject matter.

The accuracy of OT must not be less than $f d/D = 1:10.000$ according to assessment of relative error of traverse side for any surveying method applied.

Relative accuracy of a traverse network of the second order is represented by the greatest relative error of traverse side, calculated as function error if the network is levelling or the largest error of continued series of levels if the calculation is done using the series of levels.

If the points are determined with GPS surveying method, there should be applied the methodology from the Regulation on the application of global positioning system for surveying of real estate.

The heights of the OT points should be determined using geometry levelling according to the principle of technical levelling of increased accuracy. The accuracy of relative vertical positions of the benchmarks of the local elevation network must be higher than 5 mm per square root of the distance between them given in kilometres.

- *Collecting of the field data*

The Survey of geodetic works should provide spatial base for the design on the basis of different geodetic methods of collecting data, surveying of the existing conditions of the terrain in horizontal and vertical sense. According to the defined scope given in the Table 1 of the Terms of Reference, it is necessary to apply standard terrestrial geodetic methods and the method of integrated system GNSS-echosounder for underwater surveying.

Geodetic surveying should be done with the relevant terrestrial method which satisfies the criteria of accuracy up to 5 cm. Along the defined locations of the future structures, all existing structures that are within the defined scope of surveying should be surveyed.

Basic design requirements:

- all surveying shall be done within the networks of permanent stations AGROS (Active Geodetic Reference Frame of Serbia);
- All data are to be presented in the spatial reference system GK7, Gaus-Krüger projection on Bessel ellipsoid, in the height system NVT 1 (date Trieste).

- *Survey of geodetic works*

All geodetic activities conducted as a part of collecting geospatial data of the mentioned location must be stated within the Survey of geodetic works, and all in accordance with the defined Terms of Reference. All pieces of evidence on taking over the official data from the relevant institutions must be attached.

All basic geodetic data for the development of design technical documentation are to be formed on the basis of the data collected in the field using geodetic methods, and on the basis of them, the relevant basic topographic data should be made with digital model of the terrain and prepared for printing in the scale 1:1.000. By integrating the formed basic topographic data and official digital cadastral plans, cadastral-topographic plans should be formed as a final product.

- *Design of geodetic setting-out*

The basic task of geodetic setting-out is to mark the geometry of the designed structure on the terrain (to transfer the structure from the design onto the terrain, that is, to position it spatially) within the boundaries of given tolerances for construction of the structure. This means to transfer characteristic points of the structure onto the terrain immediately prior to the beginning of the construction as well as during the performance of construction works.

On the basis of the data from the Detailed design, it is necessary to define basic elements for setting-out and on the basis of this to make the Design of geodetical setting-out with the following content:

1. General documentation
 1. Decision on fulfilment of the conditions for obtaining licence
 2. Excerpt on registration of a company
 3. List of participants in creation of the technical documentation
 4. Decision on appointing the responsible ~~liable~~ designer
 5. Statement of the liable designer
 6. Licence of the responsible ~~liable~~ designer

2. General design requirements
3. Textual part – Technical report
 1. General data on the design
 2. Basic data on the designed structure
 3. Existing geodesic grid
 4. Shape (geometry) of geodesic grid
 5. Connecting the structures with the geodesic grid
 6. Analytic development of geometry of the designed structure
 7. Object of geodetic setting-out
 8. Selection of the setting-out method of the structure geometry
 9. Calculation of accuracy (optimization of accuracy) of setting-out of the structure geometry
 10. Calculation of elements for setting-out the characteristic points of the geometry of the structure
 11. Selection of surveying methods and instruments for setting-out and control of surveying
 12. Method of fixation (materialization) of characteristic points of the structure
4. Numeric documentation
 1. List of coordinates of the points of geodesic grid (the bases for setting-out)
 2. List of coordinates and levels of the characteristic points of the structure
5. Graphical documentation
 1. Layout chart of the geodesic grid
 2. Layout plan of the water project

Geodetic surveys have to be done in accordance with the specification in the Table 1.

Table 1. Scope and content of geodetic investigation works

PHASE/SECTION	STRUCTURE	SCOPE OF GEODETIC WORKS
1 The Kolubara from the confluence into the Sava to the existing bridge on the entrance to Obrenovac (r.km 0+000 – r.km 3+080)	Critical location – intersection with the route of the highway E-763 <i>Miloš Veliki</i> near the confluence into the Sava (km 0+623)	Terrestrial surveying method of cross-sections of the Kolubara main channel from km 0+520 to km 0+730, in the average width 120 m, at the distance of 25 m (8-10 cross-sections)
	Concave left bank of low water channel in the bend (km 1+260 – km 1+660)	Terrestrial surveying method of cross-sections of the Kolubara left bank and part of the main riverbed from km 1+260 to km 1+660, in the average width up to 90 m, at the distance of 25 m (16 cross-sections)
	Concave right bank of low water channel in the bend (km 2+080 – km 2+590)	Terrestrial surveying method of cross-sections of the Kolubara right bank and part of the main riverbed from km 2+080 to km 2+590, in the average width up to 90 m, at the distance of 25 m (21 cross-section)
	pumping station (CS) Zabreške livade	Terrestrial surveying method of the terrain and structures for the creation of a

PHASE/SECTION	STRUCTURE	SCOPE OF GEODETIC WORKS
		topographic map, with density of points sufficient for the scale 1:1,000
	faecal pumping station	Terrestrial surveying method of the terrain and structures for the creation of a topographic map, with density of points sufficient for the scale 1:1,000
	underground water supply network PE 160	Terrestrial surveying method of the terrain along the route in the length of 2,800 m in the area of approximately 20 m (10 m on the left and on the right from the route), with density of points sufficient for the scale 1:1,000. Record all intersections of the route with the existing installations and water courses; survey all existing above-ground structures and lines
2 The Kolubara in the zone of the existing bridge on the road Belgrade-Obrenovac (r.km 3+080 – r.km 3+130)	Main pipeline Ø500	Terrestrial surveying method of the terrain and cross-sections of the Kolubara along the route in the area of approximately 20 m (10 m on the left and on the right from the route), with density of points sufficient for the scale 1:1,000. Record all intersections of the route with the existing installations and water courses; survey all existing above-ground structures and lines
	Underground water supply network PE 32 towards the pumping station (CS) Mislodjin	Terrestrial surveying method of the terrain along a part of the route in the area of approximately 20 m (10 m on the left and on the right from the route), with density of points sufficient for the scale 1:1,000. Record all intersections of the route with the existing installations and water courses; survey all existing above-ground structures and lines
3 The Kolubara from the bridge on the road Belgrade-Obrenovac to the upstream end of regulation of the channel and embankment on the right bank (r.km 3+130 – r.km 5+440)	Concave left bank of the low water channel in the bend (km 4+150 – km 4+410)	Terrestrial surveying method of cross-sections of the Kolubara main channel from km 4+150 to km 4+410, in the average width up to 90 m, at the distance of 25 m (11 cross-sections)
	Old river channel <i>Potkovica</i>	Terrestrial surveying method of the bottom of the old river channel underneath the water table in the vicinity of the foot of embankment at the Kolubara left bank, in average width of up to 50 m, at the distance of 25 m (4 cross-sections, two cross-sections on two locations along the embankment)
	Pumping station Mislodjin	Terrestrial surveying method of the terrain and structures for the creation of a topographic map, with density of points sufficient for the scale 1:1,000

PHASE/SECTION	STRUCTURE	SCOPE OF GEODETIC WORKS
	Critical location – intersection with the route of the highway E-763 <i>Miloš Veliki</i> (km 4+950)	<p>Terrestrial surveying method of the terrain for the creation of a basic topographic data (highway with the structures, embankments, land between the river and embankment), with density of points sufficient for the scale 1:1,000.</p> <p>Terrestrial surveying method of cross-sections of the Kolubara main channel from km 4+700 to km 5+185, in the average width up to 120 m, at the distance of 25 m (20 cross-sections)</p> <p>Survey of the metering station on the critical location</p>
	Underground water supply network PE 32 to the pumping station Mislodjin	<p>Terrestrial surveying method of the terrain along a part of the route in the area of approximately 20 m (10 m on the left and on the right from the route), with density of points sufficient for the scale 1:1,000. Record all intersections of the route with the existing installations and water courses; survey all existing above-ground structures and lines</p>
4 The Kolubara from the upstream end of regulation to the confluence of the Tamnava (r.km 5+440 – r.km 13+660)	Floodgate at the confluence of the Čikovac stream	<p>Terrestrial surveying method of the terrain and structures for the creation of a topographic database, with density of points sufficient for the scale 1:1,000.</p>
5 The Tamnava from the confluence into the Kolubara to the Čemanov most bridge (r.km 0+000 – km 13+850)	Confluence of the Suvaja stream and cutting of the river bend	<p>Terrestrial surveying method of the terrain and structures for the creation of a topographic database, with density of points sufficient for the scale 1:1,000</p> <p>Terrestrial surveying method of cross-sections of the existing Tamnava main channel from km 3+230 to the location of the future upstream partition, at the distance of 25 m</p>
	Confluence of the Trstenica	<p>Terrestrial surveying method of the terrain and structures for the creation of a topographic database, with density of points sufficient for the scale 1:1,000</p>
	Critical location – intersection with the route of the highway E-763 <i>Miloš Veliki</i> (km 9+300)	<p>Terrestrial surveying method of the terrain and structures for the creation of a topographic database, with density of points sufficient for the scale 1:1,000</p>
	Pipe culverts in the body of the embankment (2 culverts at e.km 10+527 and e.km 12+257)	<p>Terrestrial surveying method of the terrain and structures for the creation of a topographic database, with density of points sufficient for the scale 1:1,000</p>

- *Geological investigation works with preparation of geological elaborate*

The additional geotechnical investigation works for the creation of the Design for the construction permit (and Construction design) of the structures for the protection of Obrenovac from the Kolubara and the Tamnava floods include exploratory boreholes and geophysical-geolectrical testing in the design area and at the locations of borrow-pits for estimation of the quality of the material that will be incorporated into the body of the embankment.

It is necessary to perform the following geotechnical investigation works:

- Exploratory geomechanical and geotechnical drilling: 18 boreholes with the individual depth of 5-7 m, along the left and right inundation of the Kolubara for estimation of the quality of the material from the excavation of the flood channel with the supporting laboratory geomechanical testing of soil samples (estimation of 30 soil samples);
- Exploratory drilling at the borrow-pit locations (around 5 borrow pits of the estimated area 200x200 m, with 6 boreholes per borrow-pit with the individual depth of approximately 5m), with the supporting laboratory geomechanical testing of soil samples (estimation of 40 soil samples);
- Resistivity profiling – 2 profiles on the water with 120 m each, in the old river channel *Potkovicica* at the locations where the route crosses the designed embankment;
- Resistivity profiling, along the profiles with the total length of approximately 2500 m', at the locations where the presence of bad material is observed in the body of the existing embankment of the Kolubara;
- Resistivity profiling at the borrow-pit locations (5 borrow-pits of the estimated area of 200x200m, with 2 profiles of 240 each) , the total length of the profiles around 2400m'.

The locations of potential borrow-pits where the investigation works are going to be conducted shall be determined by the Client.

Geological investigation works are conducted in accordance with the Design of engineering-geological investigation, which is to be created prior to performance of investigation works. The Design of engineering-geological investigation defines the concept and methodology of investigation, with the type and scope of investigation works. Design of engineering-geological investigation is to be developed in compliance with the Law on mining and geological research (*Official Gazette of the Republic of Serbia* 101/2015, 95/2018 – other law, and 40/2021) and in accordance with the Rulebook on the conditions, criteria and content of the designs for all types of geological investigation (*Official Gazette of the Republic of Serbia*, 45/2019 and 72/2021). Special Designs of engineering-geological investigation are developed for additional investigation works within the scope of the Design and for the purpose of performance of works at the locations of potential borrow-pits.

Designs of engineering-geological investigation are a subject to technical revision that is conducted by a licensed designing company, which fulfils the requirements proscribed by the law.

On the basis of the results of the performed geological investigation works, there should be made Surveys on geotechnical conditions for the construction for each structure and potential borrow-pits in accordance with the applicable Law on mining and geological research and the applicable Law on planning and construction. These Surveys are to be attached to the Designs for construction permit.

Task 2: Design for relocation of installations

During the development of the Conceptual solution and Preliminary design, it was noticed that the routes of the designed flood protection structures intersect with the existing water supply and electrical installations. If these installations should be relocated, it is necessary to develop technical documentation and surveys.

The designs of relocation of water supply infrastructure have to be done for the existing structures:

- main steel pipeline Ø 500 at the entrance to Obrenovac;
- pipeline PE Ø 160 along the embankment of the Kolubara left bank;

- pipeline PE Ø 32 with the connection to the main pipeline Ø 500 for the pumping station *Mislodjin*.

in the form of:

- Conceptual solution;
- Preliminary design;
- Design for construction permit;
- Construction design;

Content of the Conceptual solution:

- Book 0: Main book
- Book 1: Design of hydrotechnical installations

Content of the Preliminary design:

- Book 0: Main book
- Book 2.1: Structural design
- Book 3: Design of hydrotechnical installations

Content of the Design for construction permit:

- Book 0: Main book
- Book 2.1: Structural design
- Book 3: Design of hydrotechnical installations

Content of the Construction design:

- Book 0: Main book
- Book 2.1: Structural design
- Book 3: Design of hydrotechnical installations

The designs for relocation of low and medium voltage electrical installations should be done for existing structures:

- E10 power lines which intersect with the river stream (r.km 1+890, r.km 3+132, r.km 3+158, r.km 3+760, r.km 3+840);
- E35 power lines which intersect with the river stream (r.km 2+833, r.km 2+864);
- E35 power line which goes over the embankment on the left bank at km 5+270 along the route of the designed embankment;
- E10 power line in the body of the embankment on the right bank from the bridge at the entrance to Obrenovac to the pumping station *Mislodjin*;
- E10 power line along the foot of the embankment on the right bank upstream from the bridge at the entrance to Obrenovac, in the length of approximately 765 m;
- E10 power line along the route of the designed embankment on the right bank from e.km 2+950 to e.km 3+700;
- power line along the foot of the embankment MNN from the substation (TS) 10/0.4 kV *Milorci 3* at the upstream end of the embankment on the Tamnava left bank.

in the form of:

- Conceptual solution;
- Preliminary design.

Surveys regarding the impact of transmission lines 110 kV, 220 kV and 400 kV on the construction of the protection of Obrenovac from the Kolubara and the Tamnava floods have to be made for the following:

- transmission line 121/2 (no. 121/2, 110 kV, substation TC Belgrade10- substation TC TENT A SP) – goes over the crest of the designed embankment at km 4+670 along the route of the right embankment and at km 4+470 along the route of the left embankment);
- transmission line 213/1 (no. 213/1, 220 kV, substation TS Bajina Bašta – substation TS Obrenovac) – located almost in parallel to the embankment route (km 7+415 – km 7+625 along the embankment route);
- transmission line 412 (no. 412, 400 kV, substation TS Belgrade 8 – substation TS Obrenovac) – crosses over the crest of the designed embankment at km 11+496 along the route of the designed embankment;
- transmission line 436 (no. 436, 400 kV, substation TS Kragujevac 2 – substation TS Obrenovac) – intersects with the designed embankment at km 12+145 along the embankment route;
- transmission line 220 kV (no. 204 substation TS Bajina Bašta – substation TS Belgrade 3) – crosses over the crest of the designed embankment of the Tamnava at km 10+030 and at km 11+981 along the embankment route;
- transmission line 2x400 kV (substation TS Obrenovac – substation TS Bajina Bašta) – crosses over the crest of the designed embankment of the Tamnava at km 13+047 along the embankment route;
- transmission line 220 kV (no. 213/1 substation TS Bajina Bašta – substation TS Obrenovac) – crosses over the crest of the designed embankment on the Tamnava at km 13+329 along the embankment route.

Designs for relocation of installations and surveys of impact shall not be made in accordance with the defined phases, but for each structure separately.

Technical documentation and surveys for relocation of infrastructure are to be created all in accordance with the applicable Laws and Rulebooks governing this subject matter.

Task 3: Hydrological-hydraulic study

The Preliminary design determined the route and dimensions of the embankments and regulation works in the flood channels of the Kolubara and the Tamnava based on the results of 1D steady flow hydraulic modelling (water levels calculated for the adopted relevant discharges).

It is necessary to perform revision and verification or correction of the dimensions of the structures proposed in the Preliminary design on the basis of the additional hydrologic-hydraulic analyses of floods in the Kolubara river basin. New analysis shall be used to determine the adverse impacts of the Kolubara and the Tamnava floods more precisely and with more details. Additional calculations should be made for the existing climate conditions and for the conditions of climate change in different scenarios. The ensemble of global and regional climate models should be used to define the change in precipitation quantity as the impact of climate change.

Implementation of the additional hydrologic-hydraulic analyses of flood waters is to be conducted through the development of the following models:

1. COUPLED HYDROLOGICAL-HYDRAULIC 1D MODEL of the Kolubara catchment area which provides the inputs to the INTEGRAL 2D HYDRAULIC model in the area of regulation works in the flood channel from the confluence into the Sava to the high grounds near Mislodjin;
2. INTEGRAL 2D HYDRAULIC MODEL of the Kolubara from the confluence into the Sava to the confluence of the Tamnava and the Tamnava from the confluence into the Kolubara to the Čemanov most bridge.
3. PARTIAL (DETAILED) 2D HYDRAULIC MODELS which encompass critical locations on the Kolubara and the Tamnava (up to 5 locations max.) that have been determined previously during the creation of the documentation or to which the results of the integral model indicate. The influence of the Sava river shall be taken into account during development of the Hydraulic model.

Relevant quantities for the design of hydrotechnical structures (design criteria) are associated with unfavourable hydrological situations with a certain (characteristic) probability of exceeding. The most

frequent cause of forming the unfavourable hydrological situation on large catchment areas, such as the Kolubara catchment area, is heavy or moderate rainfalls which lasts for several days and occurs in the larger part of the catchment area. Occurrence of precipitation in larger part of the catchment area leads to coincidence of high discharges on the tributaries, due to which an extreme flood wave is formed in the recipient. This was confirmed in previous floods, especially during the 2014 flood wave. Besides this, the level of the Sava at the confluence of the Kolubara is also significant, since it can significantly increase the adverse effects of a flood wave on the territory of the city municipality of Obrenovac.

When developing a hydrological-hydraulic study, forming of a model, making calculations and processing and analysis of the results, it is necessary to fulfil the following:

- Since, in addition to the current hydrometeorological conditions, it is necessary to consider the impact of climate change, hydrological studies must be carried out on a mathematical model of the transformation of precipitation into runoff (taking into account the stochastic components through the input parameter – rain).
- Generate hydrological events with a certain (characteristic) probability of exceeding, that is, form synthetic waves of flood waters on all inlet profiles of 2D hydraulic models.
- Relevant hydraulic parameters (especially levels, duration of levels and velocities of flow – spatial disposition and intensity of velocities in the areas of the designed structures) are to be determined according to the results of 2D hydraulic models obtained by coupling with hydrologic scenarios and transformation of probability of occurrence on the entire zone of the design. Particularly, at critical locations, there should be created partial 2D hydraulic models of higher precision with which relevant design parameters can be checked. The results obtained with integral model are to be used as input parameters in calculation with partial 2D hydraulic model.

Using the developed models, it is necessary to conduct a series of calculation and analyses on the basis of which the designed technical solutions for hydrotechnical structures in the watercourse channel will be confirmed or innovated in relation to the solutions from the Preliminary design, in the sense of dimensions, selection of a type of material, necessary quantity of material, etc.

Calculations should be made for existing climate conditions and conditions of climate change. In relation to this, it is necessary to create relevant technical documentation.

Content of Hydrological-hydraulic study:

Book 1: Report on the coupled hydrological-hydraulic 1D model

- Concept, theoretical base and applied software
 - Configuration, geometrical and functional characteristics of the model
 - Calculated values of rain elements with characteristic probabilities of occurrence in existing climate conditions and in conditions of climate change for the selected scenario
 - Calculated discharges with characteristic probabilities of occurrence
 - Overview of scenarios which form hydrological situation with characteristic probabilities of occurrence

Book 2: Report on the integral hydraulic model

- Concept, theoretical base and applied software
- Configuration, geometrical and functional characteristics of the model for the designed state of the structures at the observed area
- Results of the performed hydrological-hydraulic calculations
- Overview of critical locations
- Calculated values of parameters of flow of integral model (water levels; velocities – intensity and distribution; traction forces...)

Book 3: Reports on partial hydraulic models

- Configuration of the partial model with more precise overview of the designed state at the selected critical locations

- Hydraulic modelling of events according to the output values from the integral model
- Calculated values of parameters of flow at the critical locations

Hydrological and hydraulic models should be developed and delivered in open mode so that they can be harmonized with the early warning system (RNU) Kolubara and that they can facilitate future activities regarding the development of RNU Kolubara and usage of the system after the construction of the designed structures.

All used basic data, input data for calculations and results of analyses and calculations have to be delivered through a software solution which must enable a detailed overview of the results published in the reports of the hydrological-hydraulic study. The software solution must include the following:

- GIS database: a GIS database with the used basic data, calculation results and designed structures.
- Calculation database: Database with input data for hydrological-hydraulic calculations and with detailed calculation results.
- Data management layer: Server components that serve for managing data access, processing and providing the data stored in databases.
- User tool for viewing modelling results: A software component that serves as a user interface for coupled hydrological-hydraulic calculations and processing of the results. It is delivered as a set of installation files.

Task 4: Design for construction permit

Designs for construction permit are developed for the purpose of obtaining a construction permit. The designs for construction permit must contain technical solutions of reconstruction of the structures for the protection of Obrenovac from the Kolubara and the Tamnava floods, in accordance with the adopted division into phases/sections.

A Design for construction permit must be harmonized with the existing Location conditions and be in accordance with the guidelines from the Report of State revision committee on the performed expert revision of the Preliminary design.

Development of a design for construction permit should be harmonized with the solutions defined within the Preliminary design. On the basis of previously conducted geodetic and geological investigation works, for each phase/section, the Designer will make a separate design for construction permit which defines the spatial position of the structures and regulation works, functionality, spatial shaping, structural system, dimensions of main structural elements, selection of construction materials, basic requirements for the structure, etc.

On the basis of previously obtained Location conditions, results of investigation works and report of the revision committee on the performed expert review of the Preliminary design, with the designs for construction permit, which are the subject matter of these Terms of Reference, the following shall be determined:

- routes and dimensions of reconstructed embankments, based on the results of calculations;
- technical solutions of regulation works in the Kolubara and the Tamnava channels;
- structural characteristics of hydrotechnical facilities within the scope of the design (according to the Preliminary design), based on new static and filtration calculations;
- technical conditions, technologies and organization of regulation works and works on construction/reconstruction of the structures for the flood protection using autochthonous materials and/or material from borrow-pits;
- calculation of works, selection of material for installation, bill of quantities;
- basic optimization of soil mass balance (with qualitative classification), as well as optimization of transport distances significant for determining unit prices;
- technical solutions for local and linear contact with other infrastructural facilities (road and railway infrastructure, transmission lines, water supply pipeline, sewerage, gas pipeline, etc.) and neighbouring facilities;

- investment value of hydrotechnical – regulation works and hydrotechnical structures with the priced bill of quantities.

Due to the size of the embankment, the available quantities of autochthonous material are not sufficient, therefore, borrow pits shall have to be used. The Client shall determine locations of borrow-pits. In order to rationalize the costs of the reconstruction of the embankment with the significant participation of supplementary quantities of quality material, it should be considered the possibility of using part of the material from the excavation from the land between the embankment and the river at the Kolubara, which is carried out during the performance of regulation works in the Kolubara flood channel. On the basis of the additional geological investigation works, it should be determined the quantity that can be incorporated into the body of the reconstructed embankment, and this quantity should be included into total balance of masses. The balancing of soil masses should be adjusted to the level of technical documentation.

The Designer should also provide designer assistance in the procedure of obtaining construction permit.

Design for construction permit is composed of the following parts::

- textual documentation;
- numeric documentation;
- graphical documentation.

Textual documentation contains:

- general data on the location of a structure;
- databases and description of the conducted preliminary investigation;
- data on geotechnical conditions of founding of RC retaining structures;
- description of harmonization with the Location conditions;
- description of technical solution and characteristics of the structure;
- data on the structure of the facilities;
- description of the envisaged material;
- identification of potential temporary borrow-pits and potential temporary dumping sites the locations of which are to be determined by the Client;
- data on the accompanying facilities and equipment;
- description of stages and phases of construction;
- other relevant data.

Numerical documentation contains:

- results of calculation of 2D hydraulic model (Abstract from Hydrological-hydraulic study);
- calculation of stability (determining the safety coefficient for sliding, overturning and floating for RC retaining structures);
- structural design of RC retaining structures;
- control of cracks in RC retaining structures;
- calculation of load bearing capacity of soil and soil settlement;
- priced bill of quantities.

Graphical documentation contains drawings and graphical annexes in appropriate scale:

- layout;
- detailed layout;
- longitudinal sections;
- cross-sections;
- other necessary drawings and overviews;
- cadastral-topographic plan with the overview of the structures.

Report on geotechnical conditions for construction is to be attached to the designs for construction permit.

Designs for construction permit are subject to technical control that should be organized by the Client and conducted by a licenced design company which fulfils the criteria required by law.

Designs and surveys per phases/section include:

Design for construction permit for the protection of Obrenovac from the Kolubara and the Tamnava floods
Phase 1: the Kolubara from the confluence into the Sava to the existing bridge at the entrance to Obrenovac (r.km 0+000 – r.km 3+080)

Book 0: Main book

Book 1: Design of engineering structure

Book 1.1: Reconstruction of the embankment on the left bank (e.km 0+000 – e.km 2+530) and structures on the embankment route

Book 1.2: Reconstruction of the embankment on the right bank (e.km 0+000 – e.km 2+910) and structures on the embankment route

Book 1.3: Regulation of the Kolubara river channel (r.km 0+000 – r.km 3+080)

Survey on geotechnical conditions of construction

Geodetic survey

Abstract from the design for construction permit

Design for construction permit for the protection of Obrenovac from the Kolubara and the Tamnava floods
Phase 2: the Kolubara in the area of the existing bridge at the road Belgrade-Obrenovac (r.km 3+080 – r.km 3+130)

Book 0: Main book

Book 1: Design of engineering structure

Book 1.1: Reconstruction of the embankment on the left bank (e.km 2+530 – e.km 2+580)

Book 1.2: Reconstruction of the embankment on the right bank (e.km 2+910 – e.km 2+950)

Book 1.3: Regulation of the Kolubara river channel (r.km 3+080 – r.km 3+130)

Survey on geotechnical conditions of construction

Geodetic survey

Abstract from the design for construction permit

Design for construction permit for the protection of Obrenovac from the Kolubara and the Tamnava floods
Phase 3: the Kolubara from the bridge on the road Belgrade-Obrenovac to the upstream end of regulation of the channel and embankment on the right bank (r.km 3+130 – r.km 5+440)

Book 0: Main book

Book 1: Design of engineering structure

Book 1.1: Reconstruction of the embankment on the left bank (e.km 2+580 – e.km 4+880)

Book 1.2: Reconstruction of the embankment on the right bank (e.km 2+950 – e.km 4+943)

Book 1.3: Regulation of the Kolubara river channel (r.km 3+130 – r.km 5+440)

Survey on geotechnical conditions of construction

Geodetic survey

Abstract from the design for construction permit

Design for construction permit for the protection of Obrenovac from the Kolubara and the Tamnava floods
Phase 4: the Kolubara from the upstream end of regulation to the confluence of the Tamnava (r.km 5+440 - r.km 13+660)

Book 0: Main book

Book 1: Design of engineering structure
Reconstruction of the embankment on the left bank to the confluence of the Tamnava (e.km 4+880 –e.km 13+003) with the reconstruction of the floodgate Čikovac (e.km 8+730)

Survey on geotechnical conditions of construction

Geodetic survey

Abstract from the design for construction permit.

Design for construction permit for the protection of Obrenovac from the Kolubara and the Tamnava floods
Phase 5: the Tamnava from the confluence into the Kolubara to the Čemanov most bridge (r.km 0+000 – r.km 13+850)

Book 0: Main book

Book 1: Design of engineering structure

Book 1.1: Reconstruction of the embankment on the left bank (e.km 0+000 – e.km 13+501)

Book 1.2: Cutting of the river bend of the Tamnava river channel in the area of the confluence of the Suvaja stream

Survey on geotechnical conditions of construction

Geodetic survey

Abstract from the design for construction permit

The Consultant shall develop an overall implementation plan and schedule for the project. The schedule will also be based on the proposed contract packaging and will incorporate realistic time estimates for the related procurement activities. The description of all activities and their implementation shall be part of this Task.

Task 5: Construction design

Construction designs are made for the purpose of construction and performance of works. Construction design further develops details and technological solutions defined in the Design for construction permit.

For linear infrastructural facilities, within the Construction design, details and technological solutions are further developed within the boundaries of the construction area, defined with the design for construction permit. A Construction design contains parts of design which are necessary for performance of construction works, craft works, installation works and other works, and it determines structural-technical, technological and exploitative features of a structure with the equipment and installations, technical-technological and organizational solutions for the construction of a structure, investment value of the structure, and the conditions regarding maintenance of the structure. Construction designs give overview of all elements of hydrotechnical works and hydrotechnical structures which have been defined in the Designs for construction permit. For the purpose of construction, within the special chapters of the Construction design, details and technological solutions of hydrotechnical works and facilities are elaborated.

Construction design contains the following parts:

- textual documentation;
- numeric documentation;
- graphical documentation.

Textual documentation contains:

- basic data and description of the conducted preliminary investigation;
- description of technical solution and characteristics of the structure;
- data on geotechnical conditions for foundation of RC structures;
- data on the structure of the facilities;
- description of the envisaged materials;

- description of temporary borrow-pits and temporary dumping sites;
- data on the accompanying facilities and equipment;
- description of stages and phases of construction;
- technical conditions for construction.

Numerical documentation contains:

- abstracts from hydraulic calculations, calculations of load bearing capacity and soil settlement, calculation of stability and structural analysis;
- priced bill of quantities.

Graphical documentation in the Construction design should contain:

- layout;
- detailed layout;
- longitudinal sections;
- cross-sections;
- formwork schedule for RC retaining structures;
- bending schedule for RC retaining structures with specification of reinforcement;
- drawings, schemes and details of construction works, and craft works;
- schemes and details with the instructions for installation of elements;
- technological schemes;
- drawings and details of construction technology;
- schemes and overviews of construction phases;
- other necessary drawings and overviews;
- layouts and cross-sections of temporary borrow-pits and temporary dumping sites;
- cadastral-topographic plan with the overview of the structures.

The following should be attached to the Construction designs:

- Designs of geodetic setting-out (created on the basis of the elements given in the Design for construction permit)
- Elements for development of the Plans of preventive measures. Plans of preventive measures are to be created by the Investor in accordance with the regulations governing safety and health at work on temporary or movable construction sites.
- Elements for development of the Study on warning and evacuation of people and mechanization and Plan for flood protection during performance of works on reconstruction of the embankment and works in the channels of the Kolubara and the Tamnava. In the Plan for flood protection, there will be defined the actions in case of occurrence of flood waters of the Kolubara, the Tamnava, and small tributaries during the performance of works.

A list is given below of the Construction designs and surveys of hydrotechnical regulation of the Kolubara and the Tamnava – reconstruction of the embankment and works in the flood channels of the Kolubara and the Tamnava, per phases/sections:

Construction design for the protection of Obrenovac from the Kolubara and the Tamnava floods
Phase 1: the Kolubara from the confluence into the Sava to the existing bridge at the entrance to Obrenovac (r.km 0+000 – r.km 3+080)

- | | |
|-----------|--|
| Book 0: | Main book |
| Book 1: | Design of engineering structure |
| Book 1.1: | Reconstruction of the embankment on the left bank (e.km 0+000 –e.km 2+530) and structures in the embankment body |

Book 1.2: Reconstruction of the embankment on the right bank (e.km 0+000 – e.km 2+910) and structures in the embankment body

Book 1.3: Regulation of the Kolubara river channel (r.km 0+000 – r.km 3+080)

Design of geodetical setting-out

Plan of preventive measures

Survey on warning and evacuation of people and mechanization and Plan of protection against floods during the performance of works on reconstruction of the embankment on the Kolubara left bank, area *Obrenovac*

Survey on warning and evacuation of people and mechanization and Plan of protection against floods during the performance of works on reconstruction of the embankment on the Kolubara right bank, the area *Barič-Mislodjin*

Construction design for the protection of Obrenovac from the Kolubara and the Tamnava floods Phase 2: the Kolubara in the area of the existing bridge at the road Belgrade-Obrenovac (r.km 3+080 – r.km 3+130)

Book 0: Main book

Book 1: Design of engineering structure

Book 1.1: Reconstruction of the embankment on the left bank (e.km 2+530 – e.km 2+580) and structures in the embankment body

Book 1.2: Reconstruction of the embankment on the right bank (e.km 2+910 – e.km 2+950) and structures in the embankment body

Book 1.3: Regulation of the Kolubara river channel (r.km 3+080 – r.km 3+130)

Design of geodetical setting-out

Plan of preventive measures

Survey on warning and evacuation of people and mechanization and Plan of protection against floods during the performance of works on reconstruction of the embankment on the Kolubara left bank, area *Obrenovac*

Survey on warning and evacuation of people and mechanization and Plan of protection against floods during the performance of works on reconstruction of the embankment on the Kolubara right bank, area *Barič-Mislodjin*

Construction design for the protection of Obrenovac from the Kolubara and the Tamnava floods Phase 3: the Kolubara from the bridge on the road Belgrade-Obrenovac to the upstream end of regulation of the channel and embankment on the right bank (r.km 3+130 – r.km 5+440)

Book 0: Main book

Book 1: Design of engineering structure

Book 1.1: Reconstruction of the embankment on the left bank (e.km 2+580 – e.km 4+880) and structures in the embankment body

Book 1.2: Reconstruction of the embankment on the right bank (e.km 2+950 – e.km 4+943) and structures in the embankment body

Book 1.3: Regulation of the Kolubara river channel (r.km 3+130 – r.km 5+440)

Design of geodetical setting-out

Plan of preventive measures

Survey on warning and evacuation of people and mechanization and Plan of protection against floods during the performance of works on reconstruction of the embankment on the Kolubara left bank, area *Obrenovac*

Survey on warning and evacuation of people and mechanization and Plan of protection against floods during the performance of works on reconstruction of the embankment on the Kolubara right bank, area *Barič-Mislodjin*

Construction design for the protection of Obrenovac from the Kolubara and the Tamnava floods
Phase 4: the Kolubara from the upstream end of regulation to the confluence of the Tamnava (r.km 5+440 - r.km 13+660)

Book 0: Main book

Book 1: Design of engineering structure
Reconstruction of the embankment on the left bank to the confluence of the Tamnava (e.km 4+880 –e.km 13+003) with the reconstruction of the floodgate Čikovac (e.km 8+730)

Design of geodetical setting-out

Plan of preventive measures

Survey on warning and evacuation of people and mechanization and Plan of protection against floods during the performance of works on reconstruction of the embankment on the Kolubara left bank, area *Obrenovac*

Construction design for the protection of Obrenovac from the Kolubara and the Tamnava floods
Phase 5: the Tamnava from the confluence into the Kolubara to the Čemanov most bridge (r.km 0+000 – r.km 13+850)

Book 0: Main book

Book 1: Design of engineering structure

Book 1.1: Reconstruction of the embankment on the left bank (e.km 0+000 – e.km 13+501) and structures in the embankment body

Book 1.2: Cutting of river bend of the Tamnava channel in the area of the Suvaja stream confluence

Design of geodetical setting-out

Plan of preventive measures

Survey on warning and evacuation of people and mechanization and Plan of protection against floods during the performance of works on reconstruction of the embankment on the Kolubara left bank, area *Obrenovac*

These Terms of Reference do not encompass investigation-designing activities during the construction (geological investigation works, monitoring during the performance of works, design supervision, changes and supplements of the Construction designs, development of the As-built designs).

5. AVAILABLE REFERENCE DOCUMENTS

The following surveys and designs have been prepared so far by the Investor and can be used by the Bidder as a reference:

1. Topography surveys:
 - Survey of the main river bed for Kolubara river (year 2019);
 - LIDAR survey and data collection (year 2019);
2. Geodetic surveys (year 2019) as a base for preparation of Preliminary design;
3. Prefeasibility study (year 2015)
4. Cadastral surveys
5. Planning documentation (Spatial plan of Republic of Serbia, spatial plan of municipality Ub and Obrenovac)
6. Urban design project
7. Location permit.

6. REPORTING REQUIREMENTS, DELIVERABLES AND TIME SCHEDULE

The Consultant shall prepare and submit the following key deliverables for review and approval:

Inception Report. The Draft and Final Inception Report should outline the work plan, key issues requiring guidance and decisions, and proposed design options to be considered as per Feasibility Study conclusions. The Inception Report will include an updated study schedule.

Monthly Progress and Project Trends Reports. A progress and trends report shall be submitted one week after the end of each month. The report shall cover all activities undertaken during the month and indicate any activities that are delayed or likely to be delayed. The Report shall highlight issues that require urgent resolution and shall include updated staffing and study schedules. "Project Trends" will look at the forecast of project completion with a proactive approach; it should define the measures the Consultant has taken or intends to take in order to keep the Tasks on schedule. Based on the "Project Trends", the Consultant shall timely re-schedule its effort so as to ensure the completion of the services on schedule, with the contract ceiling unchanged.

Task Reports. Draft and Final Task Reports shall be submitted on the individual tasks as detailed in the Table hereinbelow:

Report Number	Deadline for deliverable (calendar months after signing the Contract)
1. Inception report	After 1 month
2. Task 1: Investigation works	After 3 months
2.1 Topography survey	After 2 months
2.2 Geology survey	After 3 months
3. Task 2: Design for relocation of installations	After 15 months
4. Task 3: Hydrological-hydraulic study	After 5 months
5. Task 4: Design for construction permit	After 6 months
6. Task 5: Construction design	After 14 months

The Consultant will prepare all reports in Serbian. Inception Report, Monthly Progress and Project Trends Reports shall be submitted in both English and Serbian. The reports will be reviewed by the relevant consultants within the MAFWM PIU in calendar days given in the table after the submission of each deliverable and the World Bank will be supporting the MAFWM on review of these outputs.

7. SERVICES AND FACILITIES TO BE PROVIDED BY THE ADMINISTRATION

PIU will provide the Consultant with all the information and designs and other documents needed by the Consultant for the proper execution and completion of the work.

8. SUPERVISION OF THE WORK BY THE ADMINISTRATION

The reports preparation will be monitored by the PIU staff. Corrective action can be requested whenever necessary.

9. TIME, DURATION AND WORKPLACE

The assignment is expected to be implemented within 15 months from contract signature. The minimum required input is expected to be:

1. Key staff: 35 man/months.
 2. Non-key staff 75 man/months
 3. Other staff 110 man/months
- Public Participation Meetings will be conducted in Obrenovac (at least 2 meetings, but continuous engagement is also expected in line with the development of site-specific SEP that would cover for all 3 phases-planning/preparation, construction and operation) and the relevant impacted settlement. The SEP will include stakeholder engagement and public participation meetings that will cover the planning/preparation, construction and operation phases of the center.

10. PROFILE OF THE CONSULTANT

The Consultant will be a company or a Joint Venture of companies with relevant previous project experience in providing similar services related to the tasks specified in these ToR and similar investment Projects using procedures and policies of the International Financial Institutions, notably the World Bank, EBRD, EIB.

The Consultant must provide independent, impartial technical, cost, strategic, management, financial, and legal advice. As such, the Consultant will not be permitted to have a commercial interest in any other contracts or agreements related to the Project.

Qualification requirements of the Consultant:

1. Possession of license P080G3 - for hydrotechnical projects for regulation works to protect urban areas and rural areas larger than 300 ha from high water is mandatory. The license can be provided from one of JV members, but not from the Sub-Contractor.
2. Have extensive experience in the field of services mentioned above. The required experience should be demonstrated by:
 - At least 1 contract in last 10 years with references in the field of design of coupled hydrological-hydraulic 1D models, which refer to river courses with a minimum (model) length of 50 km;
 - At least 1 contract in last 10 years with references in the field of design of 2D hydraulic models of 1st order watercourses, minimum model length 10 km;
 - At least 1 contract in last 10 years with references from the field of delivered and implemented software systems with the same or higher functionality than the requirements from this Terms of Reference;
 - At least 1 contract in last 10 years with references in the field of preparation of technical documentation (conceptual project, design for construction permit, construction design, i.e. appropriate) on watercourses of the 1st order for protection against high water in urban areas and rural areas larger than 300 ha;

Details of the referenced assignments would include the total contract(s) value and service(s) value, location(s), number of staff involved in the contract(s)/service(s), name and contact details of the Employer(s), name of partners for contract(s) execution, source(s) of financing, type of services provided, period of services provided contract(s), a brief description of the contract(s)/service(s), contract completion date.

The Consultant shall employ suitably qualified experts and other professionals who will carry out their duties according to responsibilities and/or authorities specified in these TOR. The Consultant will demonstrate equal opportunities in mobilizing and managing human resources. CVs of proposed staff will not be evaluated during the shortlisting phase.

Only Consultants that meet the qualification requirements will be considered for the shortlist. The evaluation criteria to establish the shortlist are:

- Core business and years in business (20 points)
- Past experience in similar assignments (70 points)
- Firms organization and availability of core staffing (10 points)

Consultant team

The Consultant's team of individual consultants available under the assignment have include minimum the following experts: (i) Project manager; (ii) Senior Civil Hydro Engineer, (iii) Senior Civil Structural Engineer, (iv) Senior Geotechnical Engineer,

Key Staff Qualifications

Project Manager

General Responsibilities

S/he will be responsible for the coordination of the entire Project.

Qualifications and Responsibilities

- At least Master degree (or adequate) in civil engineering,
- Design License of Serbian Chamber of Engineering type 310 or 313 or 314
- Minimum 15 years of professional experience,
- Previous experience in managing the flood protection or dam projects. Compliance with the relevant IFI Standards or Environmental and Social Policies (international standards) in the last ten years would be an advantage,

Senior Civil Hydro Engineer

General Responsibilities

S/he will be responsible for the hydro-civil part of design of the Project.

Qualifications and Responsibilities

- At least Master degree (or adequate) in civil engineering,
- Design License of Serbian Chamber of Engineering type 313 or 314
- Minimum 15 years of professional experience,
- Previous experience in preparing Preliminary design, or Feasibility study in flood protection or dam projects. . ,

Senior Civil Structural Engineer

General Responsibilities

S/he will be responsible for the civil structure part of design of the Project.

Qualifications and Responsibilities

- At least Master degree (or adequate) in civil engineering.
- Design License of Serbian Chamber of Engineering type 310
- Minimum 10 years of professional experience,

Previous experience in preparing Preliminary design, or Feasibility study in flood protection or dam projects

Senior Geotechnical Engineer

General Responsibilities

S/he will be responsible for the civil structure part of design of the Project.

Qualifications and Responsibilities

- At least Master degree (or adequate) in geology engineering.
- Design License of Serbian Chamber of Engineering type 391
- Minimum 10 years of professional experience,
- Previous experience in preparing Preliminary design, or Feasibility study in flood protection or dam projects..

11. SELECTION

The consulting firm will be selected under the provisions of the World Bank Procurement Regulations for Borrowers under Investment Project Financing” dated July 1, 2016, revised on November 2017 and August 2018, in accordance with Quality and Cost Based Selection, Lump - Sum based Contract.

12. ANNEXES

ANNEX 1: DATA TO BE PROVIDED BY THE EMPLOYER

The Employer shall provide the following documents within 10 days of contract commencement:

- Location conditions;
- report of the State revision committee on the conducted expert revision of the Preliminary design;
- urbanistic and planning documents;
- applicable cadastral basic data and copies of the plans of parcels;
- locations of potential borrow-pits and dumping sites;
- access to the locations where investigation works are envisaged;

The Employer shall provide the following documents timely, during the contract implementation:

- technical control of the Design for construction permit;
- other available documentation and data significant for the development of the design documentation.

ANNEX 2: COMPLIANCES WITH REGULATIONS IN REPUBLIC OF SERBIA

Technical documentation must be created professionally and with high quality, in compliance with the applicable laws and bylaws, standards and rules of the profession.

Having in mind the significance and size of the design, as well as the type and scope of activities, which are the subject matter of the Terms of Reference, permanent communication between the Designer and the Client is necessary for providing the support for reaching timely and relevant decisions during implementation of works on the design.

Technical documentation is to be developed all in accordance with the Law on planning and construction (*Official Gazette of the Republic of Serbia*, nos. 72/09, 81/09 - correction, 64/10 decision of the Constitutional Court, 24/11 and 121/12, 42/13 - decision of the Constitutional Court, 50/2013 - decision of the Constitutional Court, 98/2013 - decision of the Constitutional Court, 132/14, 145/14, 83/18, 31/19, 37/19 – other law, 9/20, 52/21 and 62/23), Water Law (*Official Gazette of the Republic of Serbia*, nos. 30/2010, 93/2012, 101/2016, 95/2018), Law on environmental protection (*Official Gazette of the Republic of Serbia*, nos. 135/2004, 36/2009, 36/2009 - other law, 72/2009 - other law, 43/2011 - decision of the Constitutional Court, 14/2016, 76/2018, 95/2018 - other law and 95/2018 - other law), Law on environmental impact assessment (*Official Gazette of the Republic of Serbia*, nos. 135/2004, 36/2009), Law on waste management (*Official Gazette of the Republic of Serbia*, nos. 36/2009, 88/2010, 14/2016 and 95/2018 - other law), Law on energy (*Official Gazette of the Republic of Serbia*, nos. 145/2014, 95/2018 - other law, 40/2021 and 35/2023 - other law), and bylaws (Rulebook on the procedure for implementing the integrated procedure electronically (*Official Gazette of the Republic of Serbia*, no. 68/2019); Rulebook on the content, method and procedure of preparation and the method of control of technical documentation according to the class and purpose of the facilities (*Official Gazette of the Republic of Serbia*, nos. 72/2018, 77/2015, 58/2016, 96/2016, 72/2018 and 73/2019); Rulebook for civil engineering structures (*Official Gazette of the Republic of Serbia*, nos. 89/2019, 52/2020 and 122/2020); Design of engineering-geological investigation, and Survey on geotechnical conditions of construction are to be developed in accordance with the Law on mining and geological research (*Official Gazette of the Republic of Serbia*, nos. 101/2015, 95/2018 - other law and 40/2021), Rulebook on the conditions, criteria and content of the designs for all types of geological investigations (*Official Gazette of the Republic of Serbia*, nos. 45/2019 and 72/2021), Rulebook on the content of the designs for geological investigations and surveys on the results of geological investigations (*Official Gazette of the Republic of Serbia*, nos. 51/96 and 45/2019), Rulebook on the required level of knowledge of the engineering geological properties of the terrain for the purposes of planning, design and construction (*Official Gazette of the Republic of Serbia*, no. 51/96), Rulebook on technical norms for the construction of overhead power lines with a nominal voltage from 1 kV to 400 kV (*Official Journal of the Socialist Federal Republic of Yugoslavia*, no. 65/88, and *Official Journal of the Federal Republic of Yugoslavia*, no. 18/92), Rulebook on technical norms for the construction of low-voltage overhead lines (*Official Journal of the Socialist Federal Republic of Yugoslavia*, no. 6/92), Regulation on the conditions of

delivery and supply of electricity (*Official Gazette of the Republic of Serbia*, nos. 63/13 and 91/2018), Rules on the operation of the distribution system (*Official Gazette of the Republic of Serbia*, no. 71/17)).

In case that during the development of these designs, a new bylaw is reached regarding the necessary scope and content of technical documentation for obtaining permits, consents and necessary solutions, in accordance with the new Law on Planning and Construction, the Service Provider is obliged to act according to it.

Designs for relocation of the installations have to be printed in six copies, and the abstracts from the technical documentation should be printed in the sufficient number.

Designs for construction permit, Surveys on geotechnical conditions for construction, Geodetic surveys are to be printed in six copies each, and the abstracts from the technical documentation should be printed in the sufficient number for the integrated procedure of issuing construction permit.

Construction designs, Designs of geodetic ranging, elements for creation of the Plan of preventive measures, Survey on warning and evacuation of people and mechanization, and Plan for protection against floods during the performance of works on the reconstruction of the embankment have to be printed in six copies each, and the abstracts from the technical documentation should be printed in the sufficient number as well.

ANNEX 3: INDICATIVE OUTLINE OF SITE-SPECIFIC STAKEHOLDER ENGAGEMENT PLAN (SEP):

Acronyms and Abbreviations

1. Introduction / Project Description
 - a. Introduction
 - b. Project Overview
 - c. Objectives of SEP
 - d. Summary of Analysis of Alternatives
2. Regulations and Requirements
 - a. Local requirements in Serbia
 - b. World Bank requirements
3. Brief Summary of Previous Stakeholder Engagement Activities
 - a. *E.g. Consultations prior to the SEP*
 - b. *E.g. Consultations carried out within the scope of a past project that could be meaningful for the SEP activities of the current project*
 - c. *E.g. Communication with NGOs, etc.*
 - d. *E.g. lessons learned from past projects*
 - e. *E.g. Other documented stakeholder engagement activities - interviews, workshops, etc. where feedback from relevant stakeholders is collected.*
4. Stakeholder Identification and Analysis
 - a. Project affected parties
 - b. Other interested parties
 - c. Disadvantaged/vulnerable individuals or groups
 - d. Brief information on the interest and impact of the stakeholders on the project
5. Stakeholder Engagement Program
 - a. The purpose and timing of the stakeholder engagement program (the main objectives of the stakeholder engagement program and the program envisaged for various stakeholder engagement activities)
 - b. Suggested strategy for disclosure of information (what information will be disclosed, in what format, and which methods will be used to communicate this information to each of the relevant stakeholder groups)
 - c. Suggested strategy for consultation (methods to be used for consultations with each stakeholder group)
 - d. Suggested strategy for receiving opinions of vulnerable groups
 - e. Deadlines (information is provided regarding deadlines for project phases and key decisions. Deadlines for the submission of opinions are specified)
 - f. Review of opinions
 - g. Project phases in the future (explaining that people will be informed as the project progresses, including reporting on the project's environmental and social performance, implementation of the stakeholder engagement plan, and the grievance mechanism)
6. Resources and Responsibilities for Implementing Stakeholder Engagement Activities
 - a. Implementation Arrangements
 - b. Deadlines
 - c. Roles and Responsibilities
 - d. Estimated Budget
7. Grievance Mechanism
 - a. Grievance process (receiving, processing and directing complaints to the relevant units, resolving complaints and intervening as required, monitoring and reporting)
 - b. Contact information for Grievance Mechanism
8. Monitoring and Reporting
 - a. Monitoring reports to be prepared during the project (by components, if applicable)
 - b. Ensuring the participation of stakeholders in monitoring activities
 - c. Reporting back to stakeholder groups
9. References

Attachments: records of meetings or consultations, stakeholder map analysis or charts, detailed budget, grievance application form, etc.

ANNEX 4: LEGAL FRAMEWORK FOR ENVIRONMENTAL IMPACT ASSESSMENT STUDY (EIA STUDY)

- a) Constitution of Serbia ("Official Gazette of RoS", No. 98/06)
- b) Law on Environmental Protection ("Official Gazette of RoS" No. 135/04, 36/09, 72/09, 43/11, 14/16 and 95/2018),
- c) Law on Environmental Impact Assessment ("Official Gazette of RoS" No. 135/04, 36/09),
- d) [The Law on Waste Management \("Official Gazette of RoS" No. 36/09, 88/10, 14/16 and 95/18\)](#),
- e) The Law on Occupational Safety and Health ("Official Gazette of RoS" No. 101/05, 91/15 and 113/17),
- f) [Law on Planning and Construction \("Official Gazette of RoS" No. 72/09, 81/09, 56/10, 24/11, 121/12, 42/13, 50/13, 98/13, 132/14, 145/14, 83/18, 31/19, 37/19, 9/20, 52/21\)](#),
- g) [Law on Nature Protection, \("Official Gazette of RoS" No. 36/09, 88/10, 91/10, 14/16 and 95/18, 71/21\)](#),
- h) [Decree on establishing the List of Projects for which the Impact Assessment is mandatory and the List of projects for which the EIA can be requested \("Official Gazette of RoS" No.114/08\)](#)
- i) Rulebook on the contents of requests for the necessity of Impact Assessment and on the contents of requests for specification of scope and contents of the EIA Study ("Official Gazette of RoS" No. 69/05)
- j) Rulebook on the contents of the EIA Study ("Official Gazette of RoS" No. 69/05)
- k) Rulebook on the procedure of public inspection, presentation and public consultation about the EIA Study ("Official Gazette of RoS" No. 69/05)
- l) Rulebook on the work of the Technical Committee for the EIA Study ("Official Gazette of RoS" No. 69/05)
- m) Law on confirmation of convention on information disclosure, public involvement in process of decision making and legal protection in the environmental area ("Official Gazette of RoS", 38/09)

In preparing the ESIA and other required ES instruments and documents, the Consultant is required to follow the related laws and regulations of Serbia (not limited thereto), as well as the below listed documents of the World Bank:

- [World Bank Environmental and Social Framework \(ESF\) and Guidance Notes for Loan Beneficiaries;](#)
- [World Bank Group General Principles of Environmental, Health and Safety Guidelines \(EHS\);](#)
- [World Bank Group EHS Guidelines applicable to Water and Sanitation;](#)
- [World Bank Group EHS Guidelines applicable to Electric Power Transmission and Distribution;](#)

ANNEX 5: PRECONDITIONS OBTAINED FROM INSTITUTE FOR NATURE CONSERVATION

РЕПУБЛИКА СРБИЈА
ЗАВОД ЗА ЗАШТИТУ ПРИРОДЕ СРБИЈЕ
НОВИ БЕОГРАД, Др Ивана Рибара бр. 91
Тел: +381 11/2093-802; 2093-803;
Факс: +381 11/2093-867

ЈАВНО ВОДОПРИВРЕДНО ПРЕДУЗЕЋЕ
„СРБИЈАВОДЕ“ БЕОГРАД

Примљено:

Служба	Бр.	Датум	Својеручно
Ж	8063	/	Б

Завод за заштиту природе Србије, Београд, Ул др Ивана Рибара бр. 91, на основу чл. 9. и чл. 57 Закона о заштити природе („Службени гласник РС“, бр. 36/2009, 88/2010, 91/2010–исправка, 14/2016 и 95/2018–други закон) и члана 136. Закона о општем управном поступку („Службени гласник РС“, бр. 18/2016 и 95/2018 - аутентично тумачење), поступајући по захтеву заводни бр. 6628 од 18.08.2020. године, Јавно водопривредног предузећа „Србијаводе“, Булевар уметности 2А, 11070 Нови Београд, за издавање услова заштите природе за потребе израде Урбанистичког пројекта реконструкције насипа Колубаре и Тамнаве и моста на путу Београд – Обреновац, дана 08-10. 2020. године под бр. 019- 2074/ 4, доноси:

РЕШЕЊЕ

1. Подручје за које се ради Урбанистички пројекат реконструкције насипа Колубаре и Тамнаве и моста на путу Београд – Обреновац се делом налази у обухвату заштићених подручја Споменик природе „Група стабала хрста лужњака код Јозића колибе“ у режиму III (трећег) степена заштите и подручја Споменик природе „Обреновачки Забран“ у режиму III (трећег) степена заштите. Сходно томе, издају се следећи услови заштите природе:
 - 1) Радови на реконструкцији могу се пројектовати и извести на подручју постојећег левог насипа Колубаре, од ушћа у Саву до ушћа Тамнаве; постојећег левог насипа реке Тамнаве, од ушћа у Колубару до Темановог моста; постојећег десног насипа реке Колубаре од ушћа у Саву до Мислођина;
 - 2) Планирана намена површине мора бити усклађена са наменом одређеном планом вишег реда;
 - 3) У оквиру заштићених подручја СП „Група стабала хрста лужњака код Јозића колибе“ и СП „Обреновачки Забран“ забрањује се било каква активност која би довела у питање билшки опстанак заштићених стабала, садња било каквог другог зеленила, промена намене заштићене површине, постављање табли и других обавештења на заштићеним стаблима, раскопавање и депоновање земље;
 - 4) Планирати решења којима ће се обезбедити очување хидролошког режима неопходног за функционалност и еколошку одрживост заштићених природних добара СП „Група стабала хрста лужњака код Јозића колибе“ и СП „Обреновачки Забран“;
 - 5) Урбанистичке параметре за реконструкцију одредити према правилима уређења и грађења која су дефинисана важећим законским и планским актима;
 - 6) У свим фазама рада пројектовати таква решења и мере којима ће се спречити, односно онемогућити загађење ваздуха, земљишта, подземних и површинских вода;
 - 7) Предвидети да се за спровођења радова на реконструкцији максимално користе постојећи приступни путеви;

Увидом у Централни регистар заштићених природних добара и документацију Завода, а у складу са прописима који регулишу област заштите природе, утврђени су услови из диспозитива овог решења. Предметно подручје се делом налази у обухвату заштићених подручја Споменик природе „Група стабала хрста лужњака код Јозића колибе“ у режиму III (трећег) степена заштите и подручја Споменик природе „Обреновачки Забран“ у режиму III (трећег) степена заштите.

Споменик природе „Група стабала хрста лужњака код Јозића колибе“ (Решење о стављању под заштиту природног добра Група стабала хрста лужњака Код Јозића колибе Бр.501-8/96-ХП-01 - Скупштина града Београда од 01.02.1996. године; Решење о измени решења о стављању под заштиту природног добра „Група стабала хрста лужњака код Јозића колибе“ бр. 501-542/05-ХП-01 од 30. 05. 2005. године; Решење о измени решења о стављању под заштиту природног добра „Група стабала хрста лужњака код Јозића колибе“ бр. 501-847/10-С од 01. 12. 2010. године) чини шест појединачних стабала који су остатак аутохтоних заједница хрста и јасена. Стабла су витална, са добро развијеним и формираним крошњама, доминирају простором, а целом комплексу "Јозића колиба" дају пејзажну атрактивност. Просечна старост свих шест стабала износи око 200 година.

Простор који обухвата Споменик природе „Обреновачки Забран“ (Решење о проглашењу заштићеног подручја Обреновачки забран бр. 501-149/13-С-20 - Привремени орган града Београда од 29.11.2013. године) је стављено под заштиту ради очувања и унапређења примарних предеоних вредности и пејзажних обележја комплекса са високом вегетацијом аутохтоног састава, значајног елемента у систему зелених површина Обреновца који повезује градске и ванградске зоне зеленила и доприноси регулацији микроклиматских услова, као и ради стварања услова за одрживи развој рекреативно-здравствених и туристичких садржаја, односно планско уређење и контролисано коришћење простора.

Пршљенчице, алге класе Charophyceae, реда Charales су група вишећелијских макрофитских алги које расту у стајаћим или текућим водама са нижом концентрацијом хранљивих материја (олиго до мезотрофне воде). Не подносе органско ни хемијско загађење, а многе ни већу замућеност, те су индикатори вода високог квалитета. Губитак одговарајућих станишта је условно да се велики број врста нађе некој од IUCN категорија угрожености. У Србији је седам врста пршљенчица строго заштићено јер су на националном нивоу ретке и угрожене. Једна од њих је врста *Chara globularis*, која је забележена старим рукавцима реке Колубаре код Обреновца, а која је угрожена на националном нивоу (VU категорија угрожености према IUCN-у - рањива врста) и као таква је строго заштићена врста у Србији.

Такође, готово све врсте птица које потенцијално насељавају предметни простор имају статус „строго заштићена дивља врста“ у складу са Правилником о проглашењу и заштити строго заштићених и заштићених дивљих врста биљака, животиња и гљива („Службени гласник РС“, бр. 5/2010, 47/2011, 32/2016 и 98/2016).

Законски основ за доношење решења: Закон о заштити природе („Службени гласник РС“, бр. 36/2009, 88/2010, 91/2010–исправка, 14/2016 и 95/2018-други закон); Закон о заштити животне средине („Службени гласник РС“, бр. 135/04, 36/2009 - др. закон, 72/2009 – др. закон, 43/2011 одлука – УС, 14/2016 и 76/2018), Решење о стављању под заштиту природног добра Група стабала хрста лужњака Код Јозића колибе Бр.501-

8/96-XIII-01 - Скупштина града Београда од 01.02.1996. године; Решење о измени решења о стављању под заштиту природног добра „Група стабала храста лужњака код Јозића колибе“ бр. 501-542/05-XIII-01 од 30. 05. 2005. године, Решење о измени решења о стављању под заштиту природног добра „Група стабала храста лужњака код Јозића колибе“ бр. 501-847/10-С од 01. 12. 2010. године, Решење о проглашењу заштићеног подручја Обреновачки забран бр. 501-149/13-С-20 - Привремени орган града Београда од 29.11.2013. године, Уредба о режимима заштите („Службени гласник РС“, бр. 31/2012).

Реконструкција насипа Колубаре и Тамнаве и моста на путу Београд – Обреновац може се реализовати под условима дефинисаним овим решењем, јер је процењено да активности на њеној реализацији неће значајно утицати на природне вредности подручја.

На основу свега наведеног, одлучено је као у диспозитиву овог решења.

Подносилац захтева је ослобођен од плаћања таксе у складу са чланом 18. Закона о републичким административним таксама („Службени гласник РС“, бр. 43/2003, 51/2003-исправка, 61/2005, 101/2005-др. закон, 5/2009, 54/2009, 50/2011, 93/2012, 65/2013-др. закон, 83/2015, 112/2015, 113/2017, 3/2018-исправка, 95/2018, 86/2019, 90/2019-исправка и Усклађени динарски износи из Тарифе републичких административних такси – 98/2020).

Упутство о правном средству: Против овог решења може се изјавити жалба Министарству заштите животне средине у року од 15 дана од дана пријема решења. Жалба се предаје Заводу за заштиту природе Србије.


ДИРЕКТОР
Александар Драгишић

Прилог 1. Положај насипа Колубаре и Тамнаве и моста на путу Београд-Обреновац у односу на заштићена природна добра и заштићене врсте

Достављено:
- Подносиоцу захтева
- Архива х 2