




Supervision and Environmental Monitoring of River Training and Dredging Works on Critical Sectors on the Danube River

STAKEHOLDERS' FORUM MEETING NO. 02 – 04th May 2018

**Republic of Serbia
Ministry of Construction,
Transport and Infrastructure**



The background of the slide is a faded, grayscale image of a wide river. The river's surface is calm, reflecting the surrounding trees and foliage on the banks. The trees are dense and appear to be deciduous, with some showing signs of autumn. The overall atmosphere is serene and natural.

☐ River Training and Dredging Works Programme

- ❑ **Beneficiary Country**
 - Republic of Serbia
- ❑ **Contracting Authority**
 - Government of the Republic of Serbia. Ministry of Finance. Department for Contracting and Financing of EU Funded Programmes (CFCU)
- ❑ **Final Beneficiary**
 - Government of the Republic of Serbia. Ministry of Construction, Transport and Infrastructure (MCTI). Department of Strategic Planning and Management of Infrastructure Projects
- ❑ **End Recipient Institution**
 - Government of the Republic of Serbia. Ministry of Construction, Transport and Infrastructure (MCTI). Directorate for Inland Waterways
- ❑ **Funding for this project**
 - European Commission – National Programme for Serbia under Instrument for Pre-Accession Assistance (IPA), Transition Assistance and Institution Building Component for the year 2013
- ❑ **S&EM Consultancy Services**
 - ACCIONA INGENIERIA (SPAIN)
- ❑ **Works Contractor**
 - AGROMAH LTD (BULGARIA) in consortium with
 - WATER MANAGEMENT BUSSINESS COMPANY REGULACIJE, LIMITED LIABILITY COMPANY, (REPUBLIC OF SERBIA) and
 - COMPANY FOR THE DESIGN ENGINEERING AND CONSTRUCTION KOLUBARA DOO (REPUBLIC OF SERBIA)



OBJECTIVE

The overall objective of this project is the improvement of navigation conditions on the Danube River in accordance with the national policy and strategy provisions and with the respect to the Danube Commission Recommendations and the EU transport system development plans in order to ensure fast, safe, reliable and environmentally friendly transportation, smooth flow of freight and mobility of people.

The Construction activities will cover Danube River stretch in the Republic of Serbia on six critical sectors from the chainage km 1287+000 to km 1195+000



CONDITIONS TO BE FOLLOWED BEFORE, DURING AND AFTER CONSTRUCTION WORKS:

- 1) Works Contract Requirements (PRAG procurement procedure);
- 2) General Conditions (FIDIC Red Book);
- 3) Particular Conditions (Parties' obligations with supplement, amendment and derogations);
- 4) Technical Specifications (Serbian Standards and Legislations regarding Constructions or European equivalent Standards, Environmental limitations, Engineer's Requirements and Construction requirements of all activities;
- 5) The Design Documentation (Drawings, Danube Commission Recommendation)
- 6) Tender Documents.

PROGRAMME AND PROJECT IMPLEMENTATION SCHEDULE (PPIS):

According to the General and Particular Conditions, the Works Contractor was obliged to prepare and submit the PPIS to all parties involved. The content is:

- 1) General information and conditions for execution of works:
 - locations of the Construction site
 - materials
 - Engineer's Requirements
- 2) Construction method:
 - installation of Gauging Stations
 - method of measurements
 - construction of structures
 - dredging works
- 3) Schedule of activities:
 - timing of the Works
 - Order of Construction Works
 - available equipment
 - list of personnel and workers
 - Gantt chart

LOCATIONS OF THE CONSTRUCTION WORKS:

Construction Works consist of:

- ✓ construction of several river structures in 3 critical sectors;
- ✓ dredging works in 5 selected critical sectors.



Nº	Name of critical sector	Type of works	Chainage from	to
18	Susek	Dredging A	1285+000	1283+950
		Dredging B	1282+650	1282+050
19	Futog	Dredging	1266+400	1265+000
		Detached groyne	1263+350	
		Chrevon	1262+700	
21	Arankina Ada	Dredging	1246+600	1245+300
22	Čortanovci	Dredging	1240+300	1239+350
		Sill nº 1	1237+700	
		Sill nº 2	1237+150	
		Sill nº 3a	1236+150	
		Sill nº 3b	1236+000	
23	Beška	Dredging	1229+600	1227+400
24	Preliv	Chrevon nº 1	1200+600	
		Chrevon nº 2	1199+800	

MATERIALS:

According to the TS and the Final Design, the following materials should be used by the Works Contractor :

- 1) Geotextile: (Under the base layer $d_{min}=4$ mm)
- 2) Crushed stone (6/15 cm): Base layer $d=55$ cm, above the geotextile.
- 3) Crushed stone (15/45 cm): Core of the structure above the base layer

Materials	Unit	Quantity (calculated in the Final Design)
Geotextile	m ²	52.998,00
Base layer (6/15 cm)	m ³	29.148,00
Core of the structure (15/45 cm)	m ³	17.860,00
Dredged material	m ³	496.182,00

ENGINEER'S REQUIREMENTS:

According to the TS, the following requirements should be provided by the Works Contractor :

- 1) Principle office;
- 2) Floating site offices;
- 3) Vessel
- 4) Hydrographic survey equipment
- 5) ADCP equipment
- 6) Geodetic equipment
- 7) 6 gauging stations
- 8) 6 IP cameras
- 9) Vehicles

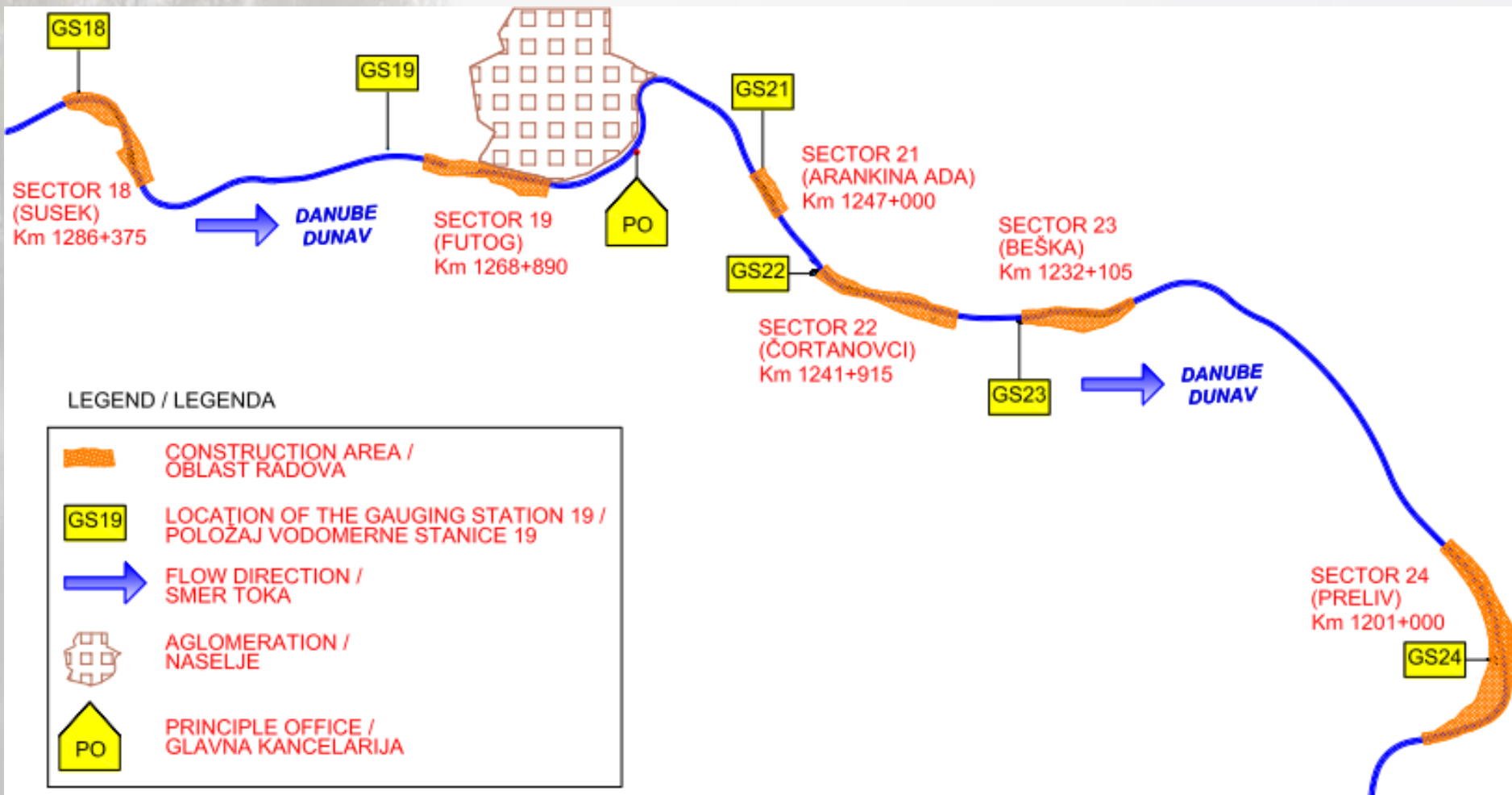
GAUGING STATIONS:

Mandatory facility to be installed prior to start Construction Works are 6 GS (1 GS per critical sector). Each GS will measure the following data:

- 1) Water levels at all stages;
- 2) Water temperature;
- 3) Air temperature;
- 4) Wind velocity and direction;
- 5) Ice presence.



LOCATIONS OF THE GAUGING STATIONS:



METHOD OF MEASUREMENTS:

Before the start of the Works, the Works Contractor and the Engineer will jointly perform the following activities:

- 1) Calibration of the equipment (bathymetric and geodetic equipment);
- 2) Visual inspection of existing structures at the site;
- 3) Measuring of the cross section profiles of the structures;
- 4) Mesuring the river bed cross section profiles.

Measurement prior to the implementation of activities shall be the basis for the determining the work quantities and the payments of the executed works.

CONSTRUCTION OF THE STRUCTURES:

The works Contractor has an obligation of constructing three (3) types of structures on the Danube River:

- 1) 3 Chevrons
- 2) 1 detached groyne;
- 3) 4 sills.

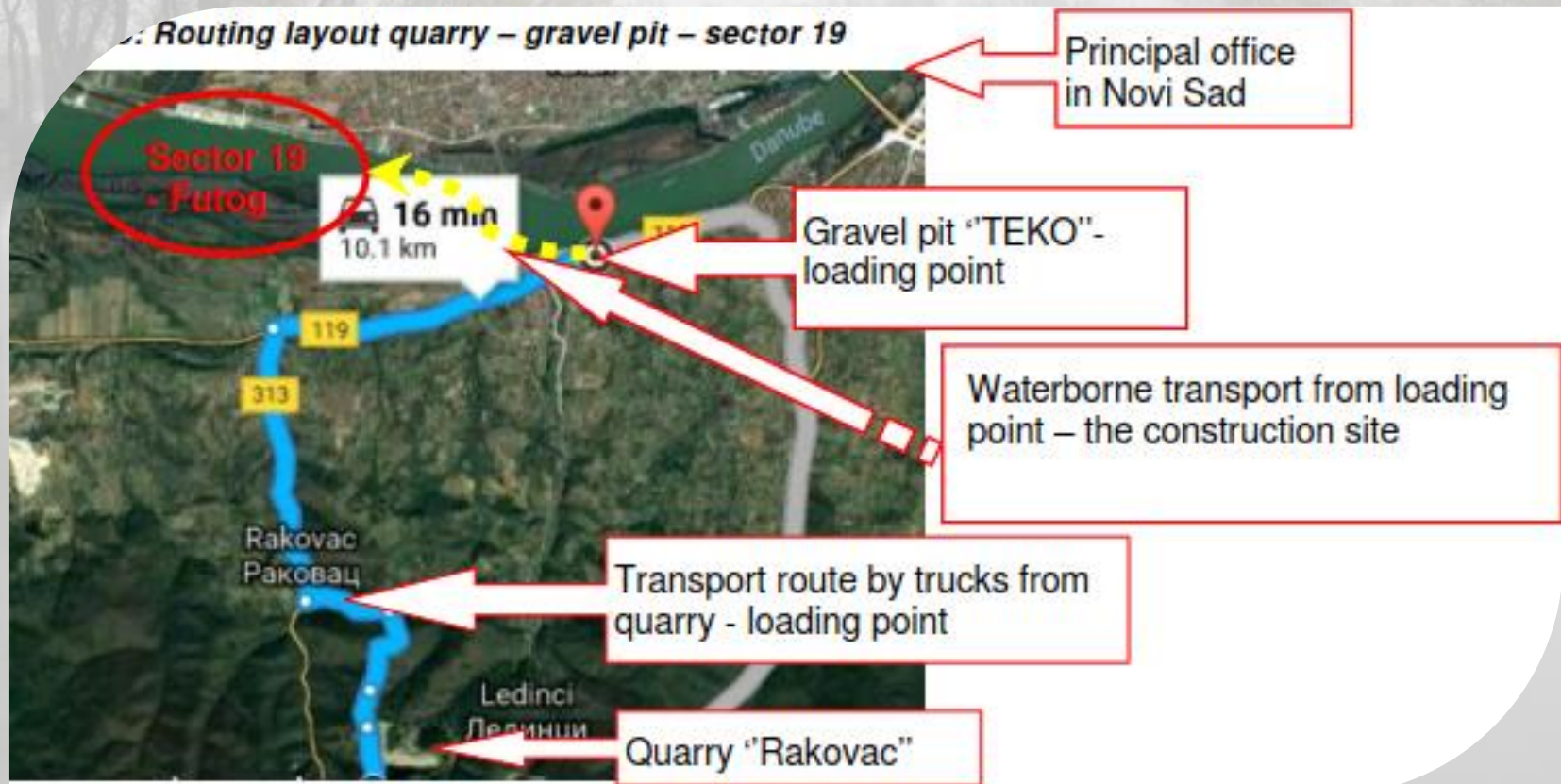
All structures are made of the same materials:

- 1) Geotextile: supplied from the manufacturer in the form of rolls and will be stocked in the barges protected from the sunlight and damages.



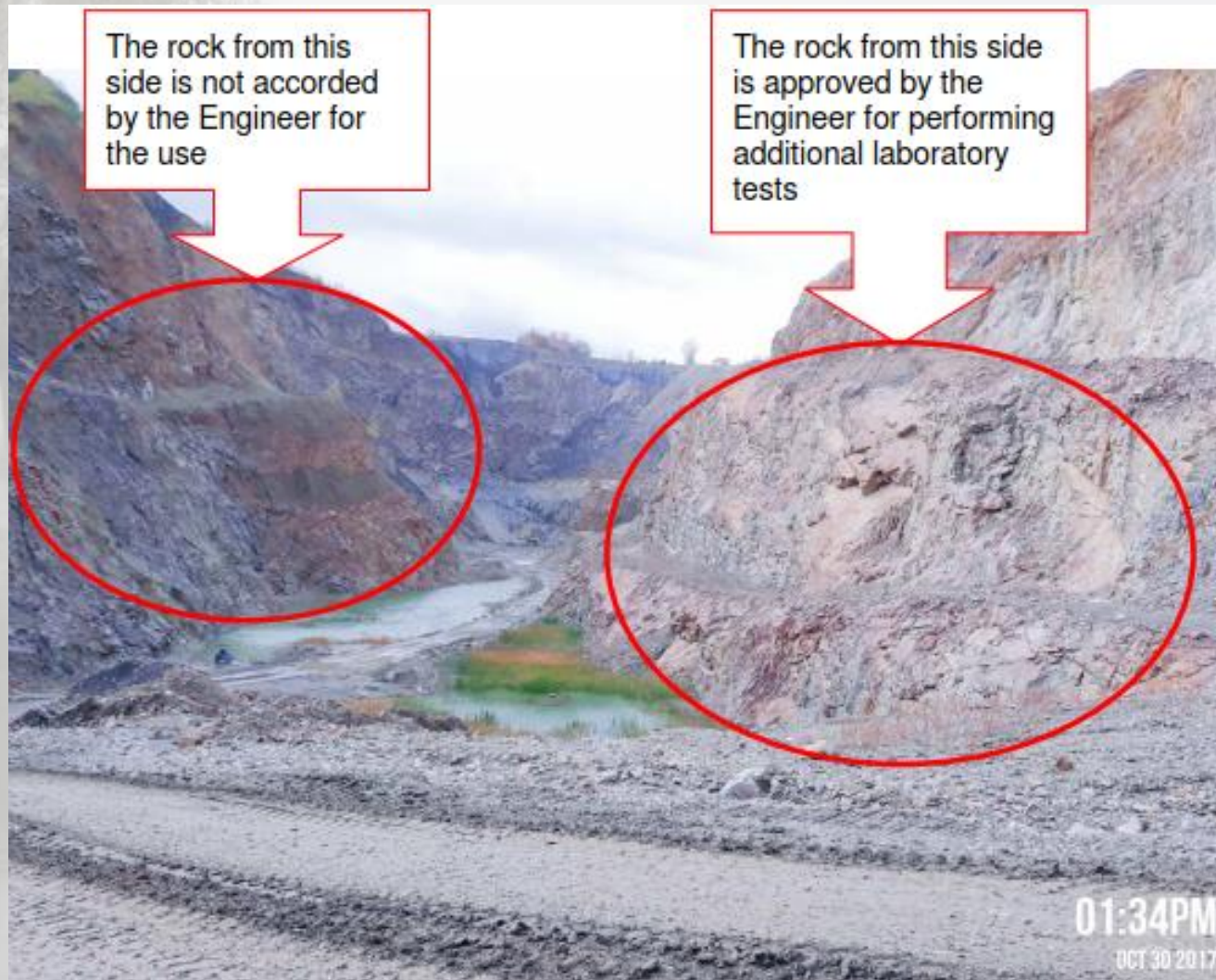
CONSTRUCTION OF THE STRUCTURES:

- 2) The rock material with gradings (6/15 cm) and (15/45 cm) will be produced in selected Quarry „Rakovac“ located in the National Park of Fruška Gora, from where the rock is going to be extracted by means of blasting, produced in primary substation and transported with tracks to the stockpile, and by barges to the construction site.



CONSTRUCTION OF THE STRUCTURES:

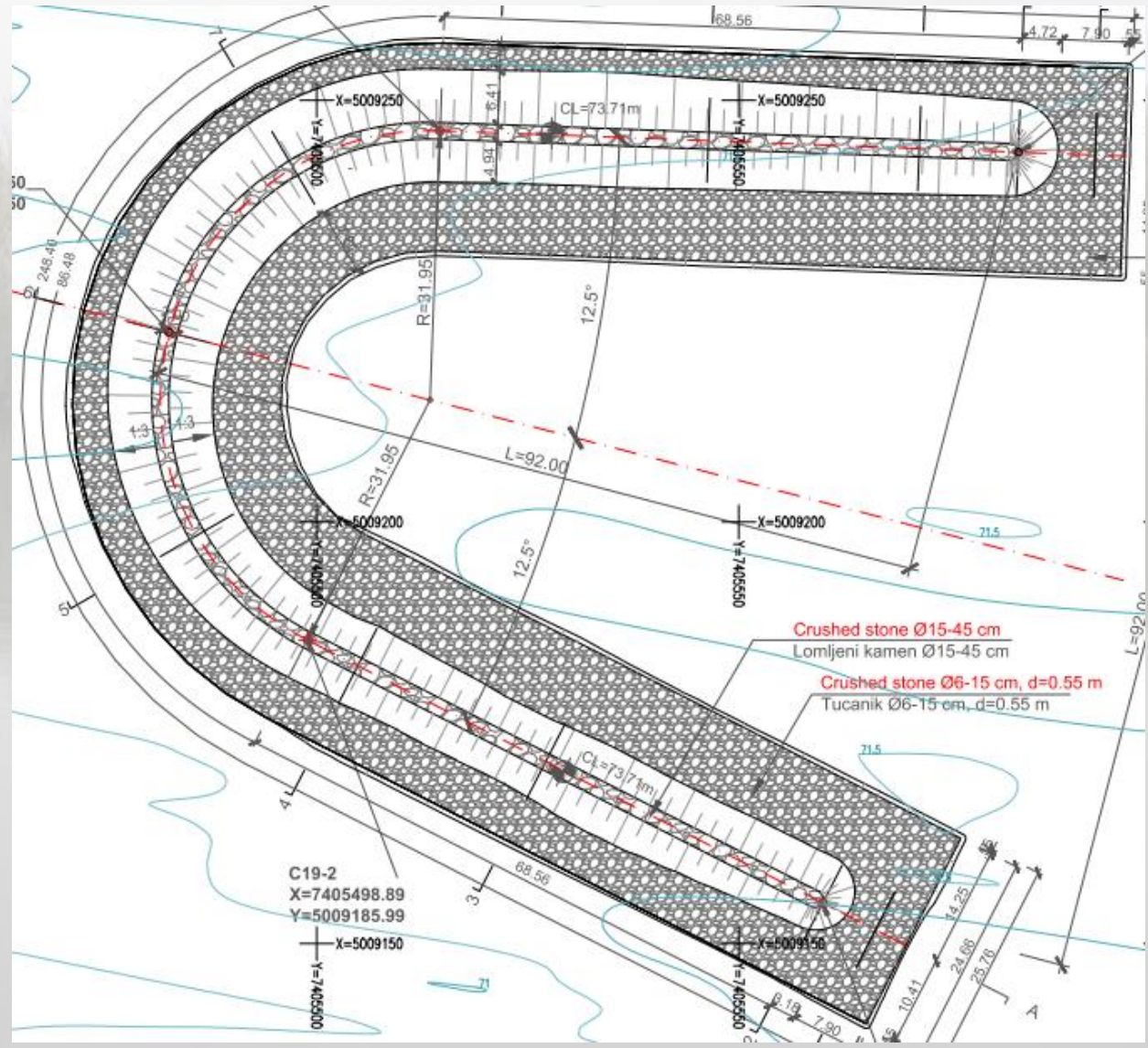
Open pit mine of the quarry „Rakovac“



CONSTRUCTION OF THE STRUCTURES:

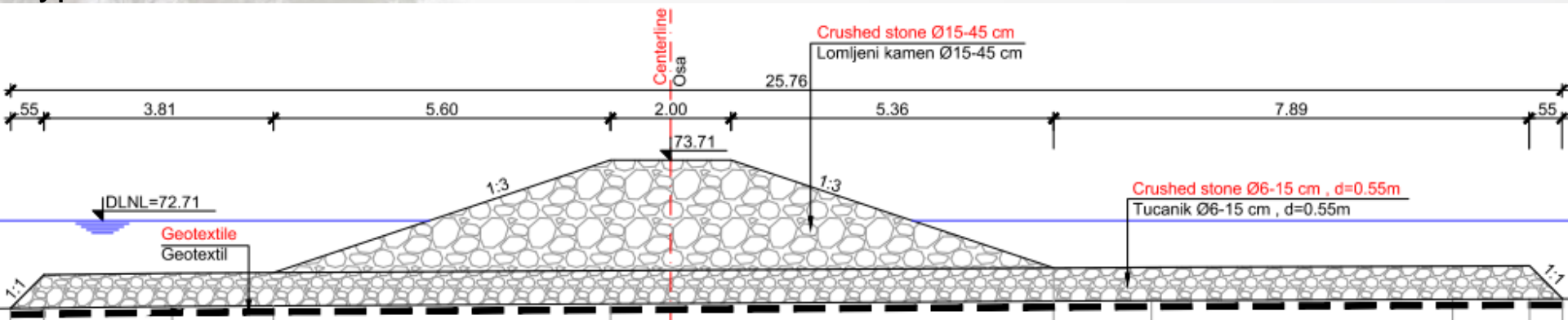
Top view of the Chevron:

Chevron:



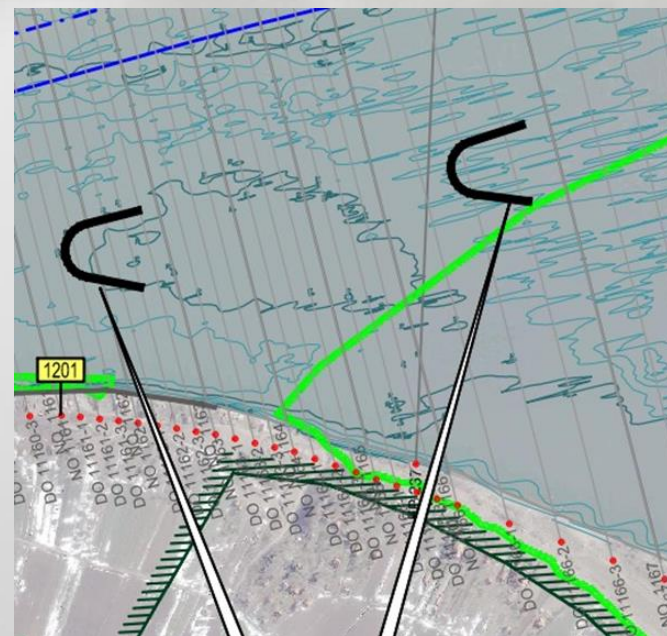
CONSTRUCTION OF THE STRUCTURES: Chevron:

Typical cross section of the Chevron:



Construction Works are planned in:

- Sector 19 – Futog;
- Sector 24 - Preliv



CONSTRUCTION OF THE STRUCTURES:

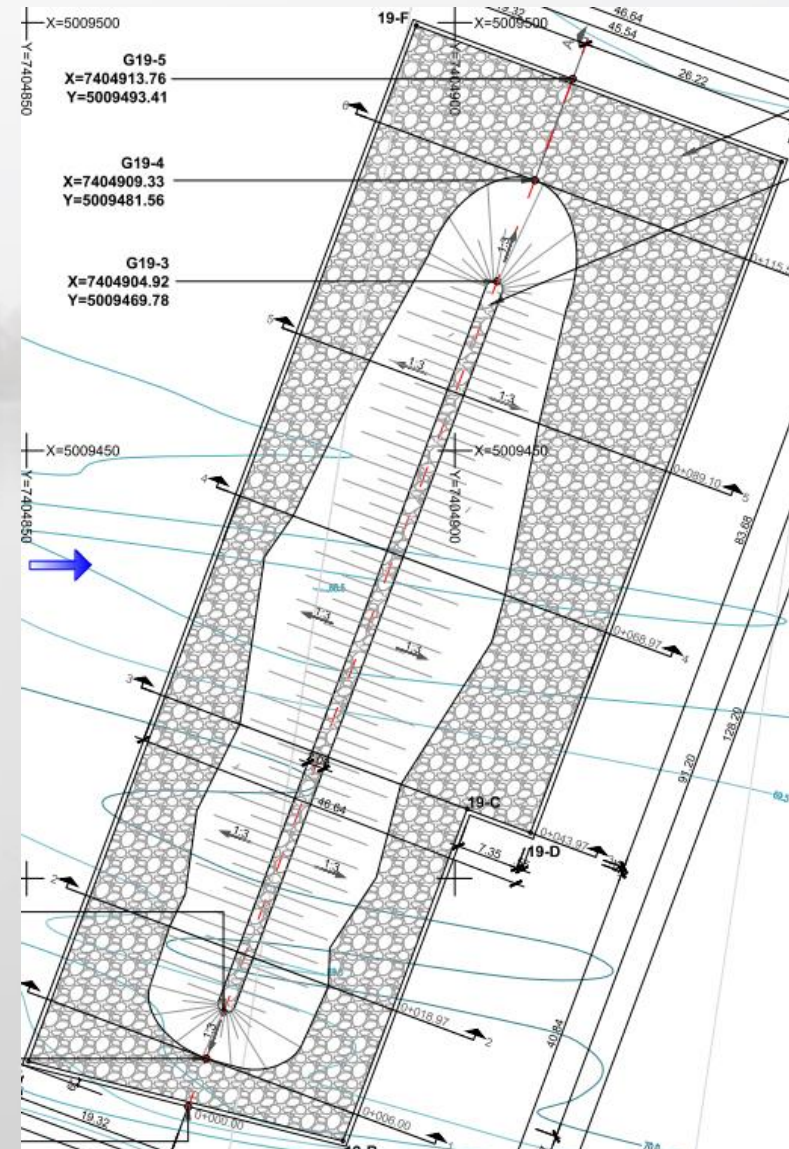
Top view of the detached groyne:

Construction Works are planned in:

- Sector 19 – Futog



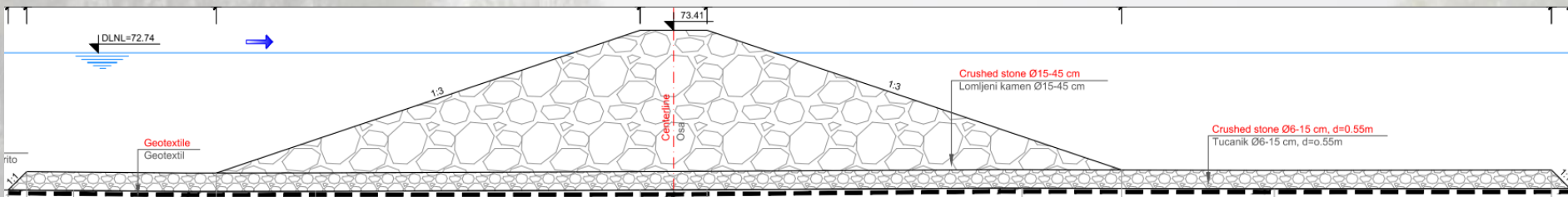
Detached groyne:



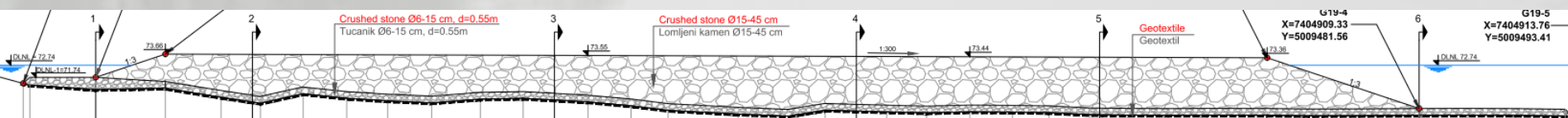
CONSTRUCTION OF THE STRUCTURES:

Detached groyne:

Typical cross section of the detached groyne:



Typical longitudinal profile of the detached groyne:

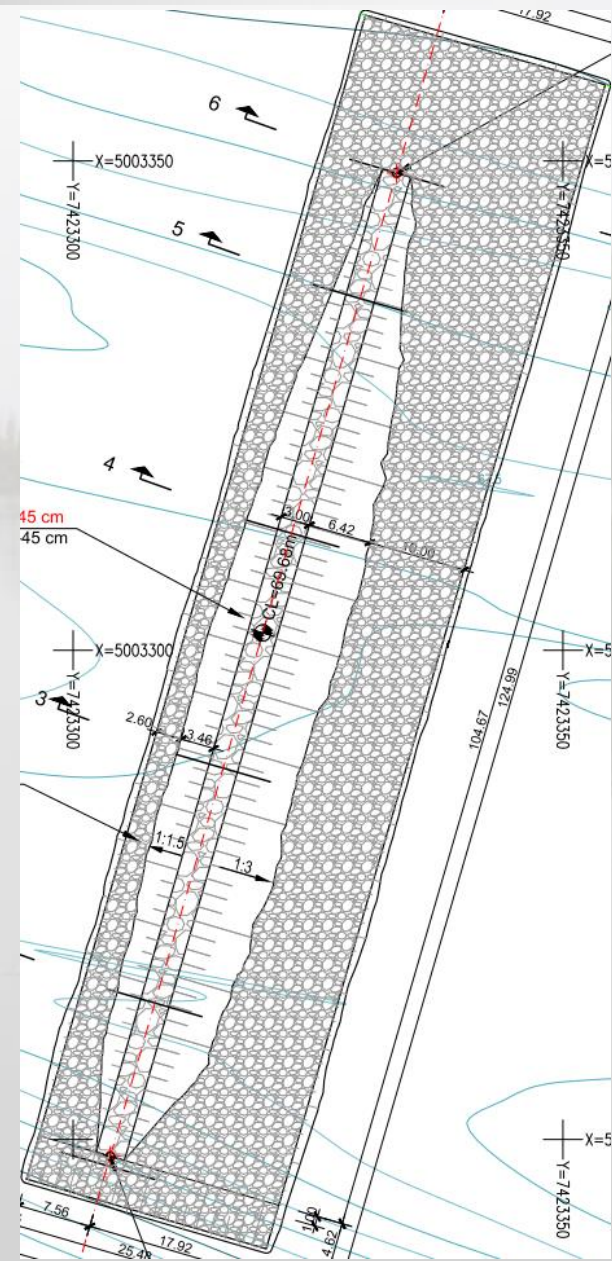
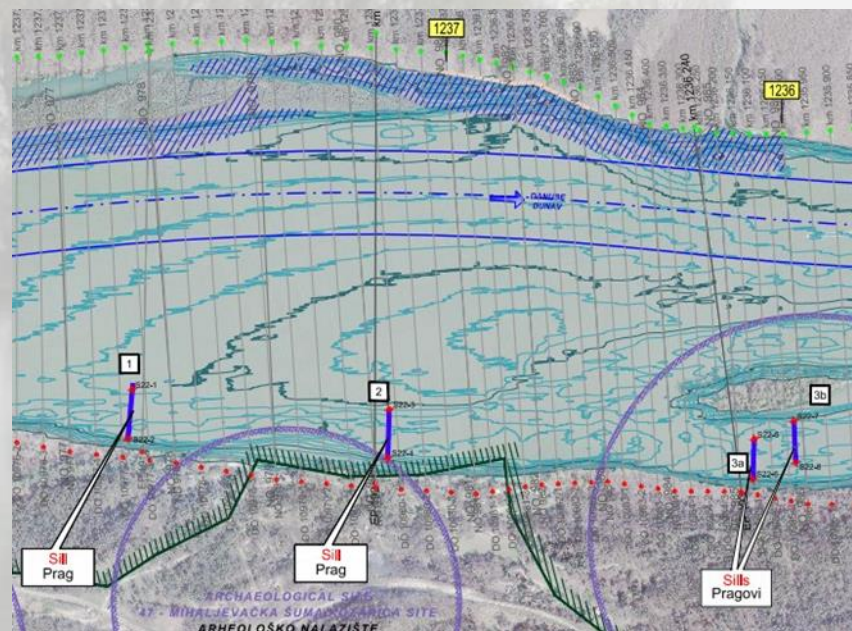


CONSTRUCTION OF THE STRUCTURES:

Construction Works are planned in:
- Sector 21 – Čortanovci

Sill:

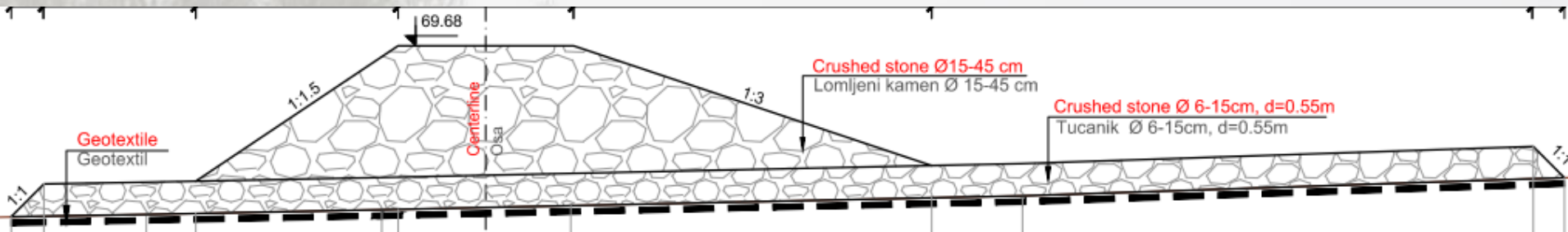
Top view of the
sill:



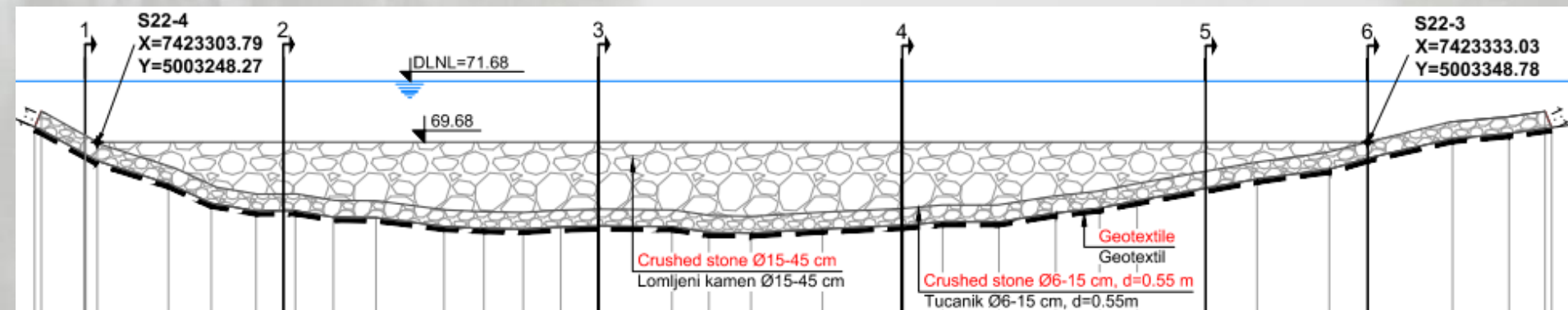
CONSTRUCTION OF THE STRUCTURES:

Sill:

Typical cross section of the sill:



Typical longitudinal profile of the sill:

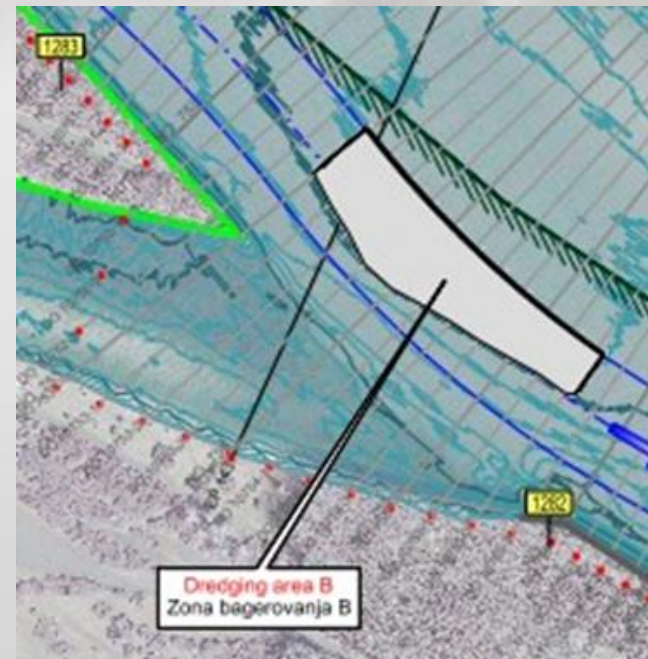
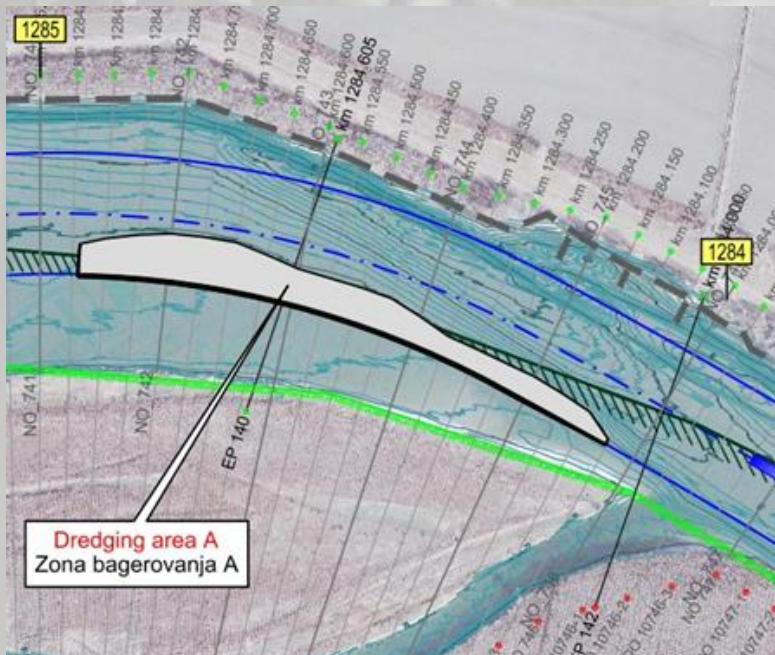


DREDGING WORKS:

Dredging is an excavation activity to be carried out underwater below the fairway in order to keep waterways navigable and comply with the Danube Commission Recommendations.

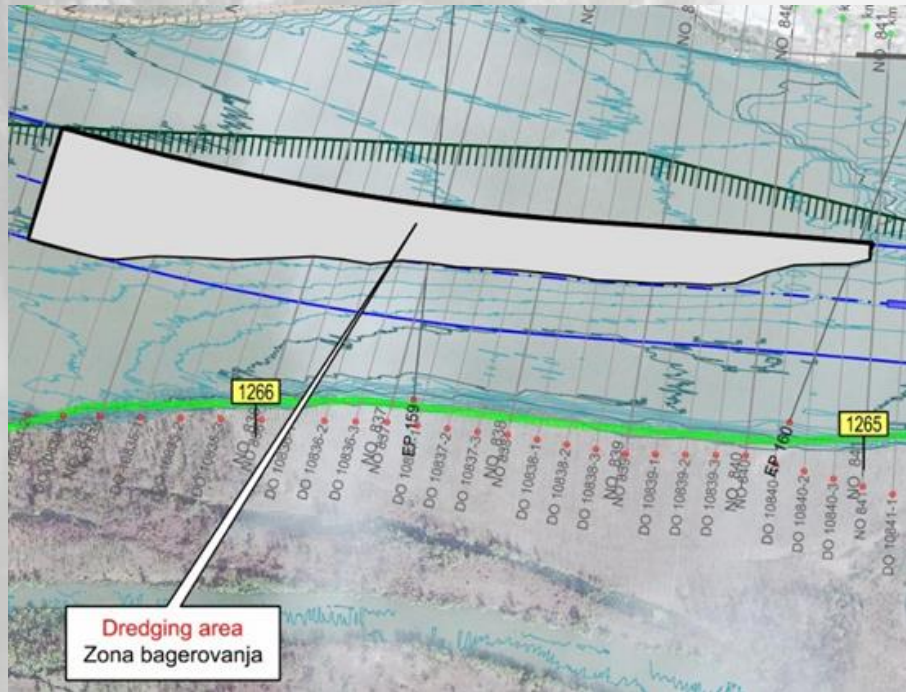
Dredging activities are planned in the following sectors according to bathymetric surveys in 2012:

1) Critical sector 18 – Susek:

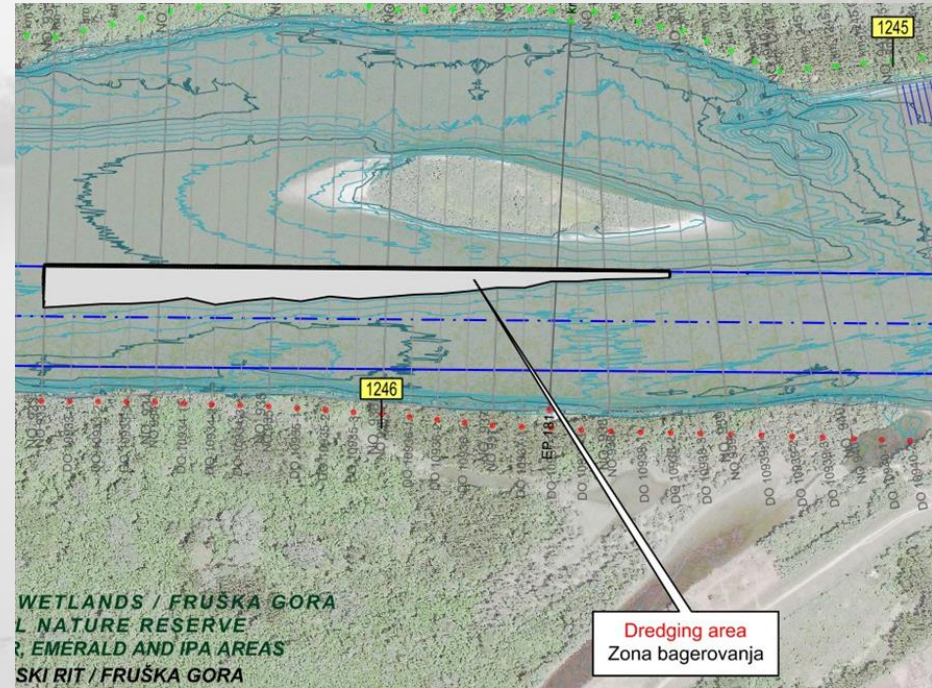


DREDGING WORKS:

2) Critical sector 19 - Futog

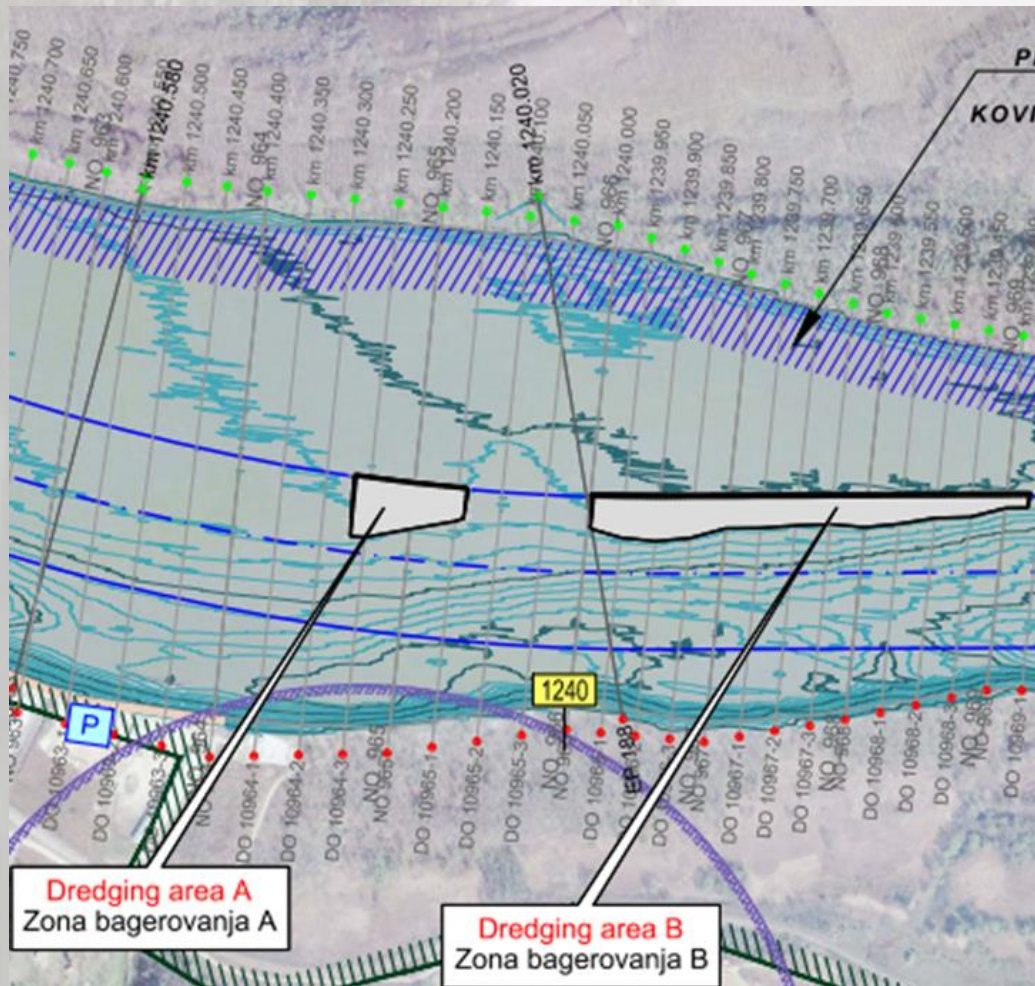


3) Critical sector 21 – Arankina ada

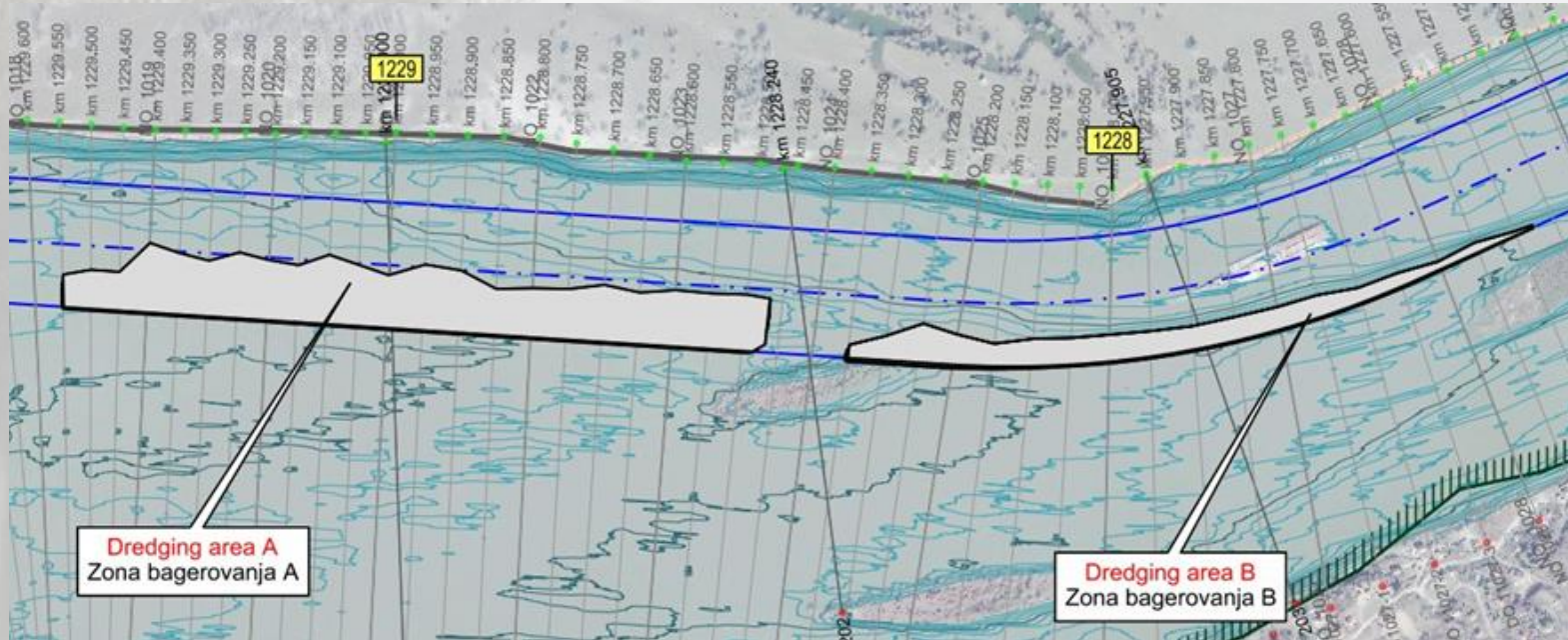


DREDGING WORKS:

4) Critical sector 22 – Čortanovci

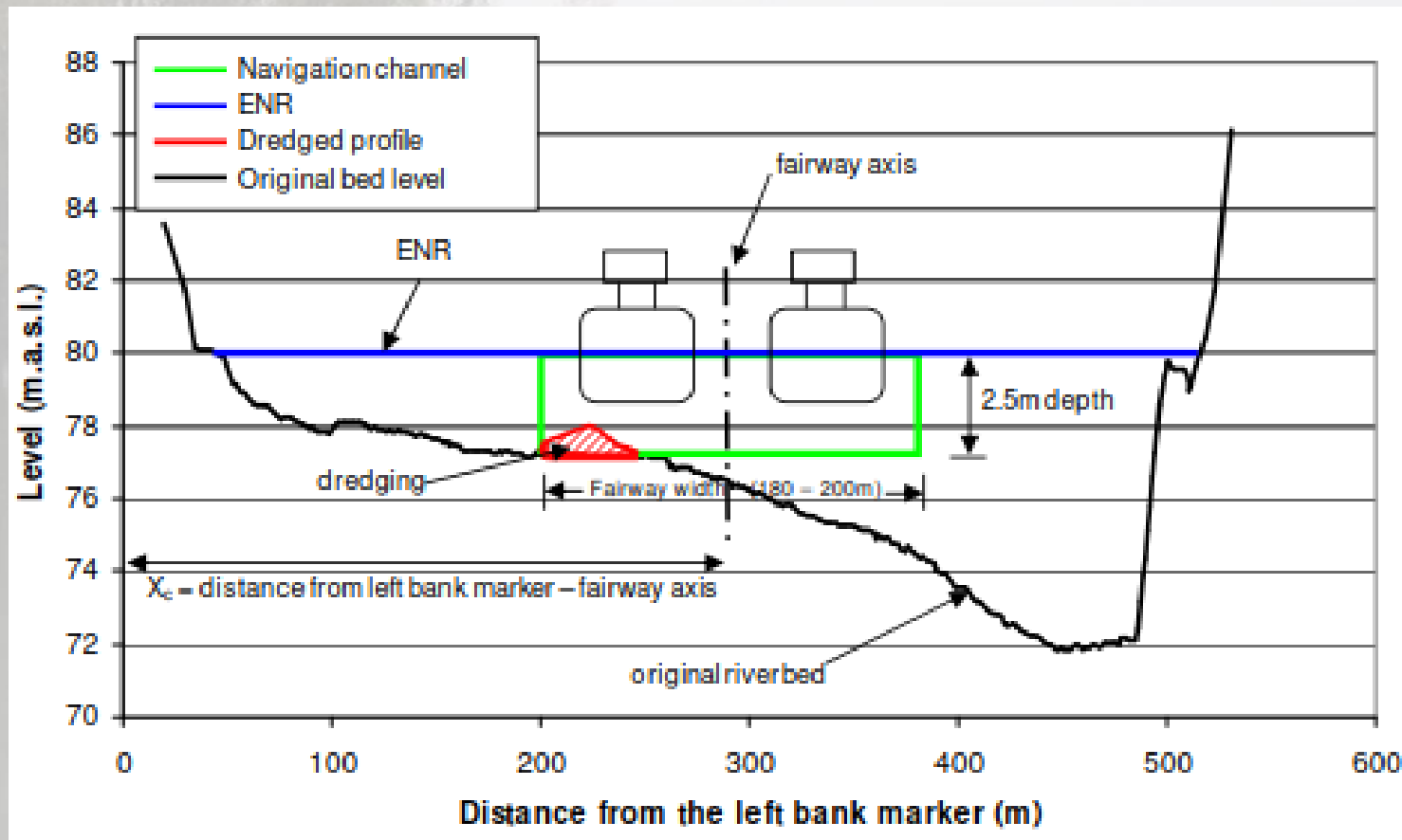


5) Critical sector 23 – Beška



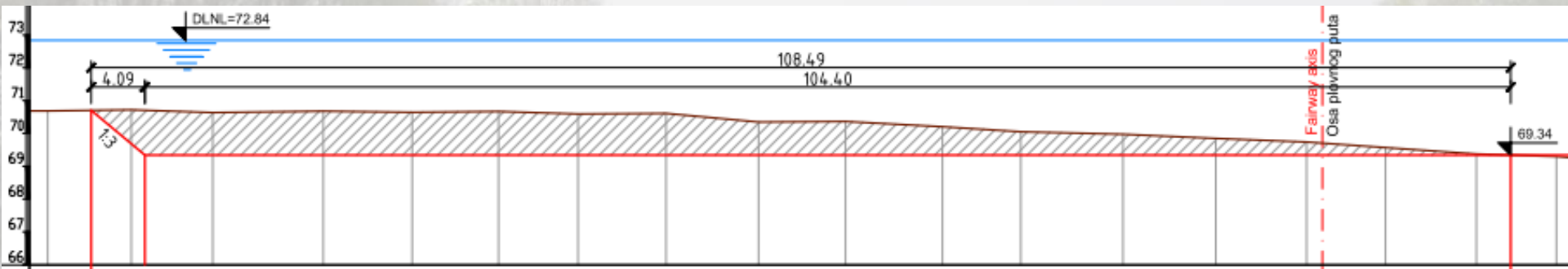
DREDGING WORKS:

Typical river bed cross section with characteristic fairway dimensions



DREDGING WORKS:

Example of river bed cross section prepared according to the bathymetric survey carried out in 2012:



Disposal area:

The dredged sediment from the river bed bottom will be deposited in the Danube River at upstream location.

The disposal areas are foreseen at a maximum distance of 2 km upstream of the dredged area in the river.

- ❑ According to the comparison, between performed bathymetric surveys from the periods 2012 and the summer 2017, along the critical sectors during DLNL, the River bed has been changed in the following manner:
- ❑ At water levels in Danube River close to DLNL, the navigation becomes frequently critical and less safe in certain stretches of the critical sectors due to changes of the river bed below the fairway. Several modifications of the fairway are performed in all critical sectors by the MCTI-Direction of Inland Waterways in order to ensure safety navigation such as:
 - The width of the fairway is reduced to the minimum of 80 meters;
 - The alignments of the fairway as well as the fairway axis are frequently modified, especially in the sector 19 (Futog).

ORDER OF CONSTRUCTION WORKS:

The Construction Works will be executed in the following sequence:

- During year 2018 and 2019: construction of the structures
- During year 2019 and 2020: execution of the dredging works

Construction Works should follow certain conditions:

- 1) The Works Contractor will perform dredging activities upon completion of the construction of all structures;
- 2) Gauging Stations shall be supplied and installed by the Works Contractor at each critical sector prior to starting the Constructions Works;
- 3) The Works Contractor will execute the works in accordance with the environmental limitations imposed by the Institute for Nature Conservation of Vojvodina Province;
- 4) The Works Contractor is allowed operating only from the waterside at each of the construction site.

TIMING OF THE WORKS:

According to submitted Contractor's Works Programme, the general timing of works is presented in the table below:

Item	Activity	Starting date
1	Handover and commissioning of Gauging Stations	02.07.2018
2	Start Construction Works of the first structure (detached groyne 19.1) in the critical sector 19-Futog	16.07.2018
3	End of structure constructions (Chevron 24.2) in the critical sector 24-Preliv	04.08.2019
4	Start dredging works in the critical sector 18-Susek	14.08.2019
5	End of dredging works in the critical sector 23-Beška	19.09.2020
6	End of Construction Works	28.09.2020

AVAILABLE EQUIPMENT:

List of equipment for Construction Works of structures:

No.	Equipment	Quantity
1	Geotextile placing equipment-roller	1
2	Rock placing plant with integrated excavator	2
3	Tugboat	2
4	Self unloading barges	2
5	Transportation barges	2

AVAILABLE EQUIPMENT:

List of equipment for dredging works:

No.	Equipment	Quantity
1	Dredger	2
2	Rock placing plant with integrated excavator	2
3	Tugboat	2
4	Self unloading barges	2

Geotextile placing equipment:



AVAILABLE EQUIPMENT:

Rock placing plant with excavator:



AVAILABLE EQUIPMENT:

Barges and tugboat:



AVAILABLE EQUIPMENT:

Dredger “Titan”:



Dredger “Ljubičevo”:



LIST OF PERSONNEL AND WORKERS:

List of workers to be engaged for execution of works:

No.	Workers	Number
1	Skilled workers	29
2	Mechanics	3
3	Machine operators	10
4	Skilled staff- Sailors	12
5	Unskilled workers	4

List of personnel to be engaged for execution of works:

No.	Personnel	Number
1	Project manager	1
2	Site manager	1
3	Site engineer	1
4	Quality control engineer	1
5	Health and safety officer	1
6	Surveyors	2
7	Technicians	4

GANTT CHART:

The Works contractor submitted the Gantt chart, and based on:

- 1) Necessary time for carrying out work activities by means of available equipment and personnel;
- 2) Environmental Restrictions (restricted period from 1st April to 15th July);
- 3) Working and non-working days (7 days/week, from 7:00 am to 6:00 pm;
- 4) Quantity of material.

Thank you for your attention

