REPUBLIC OF SERBIA
MINISTRY OF EUROPEAN INTEGRATION

MINISTRY OF FINANCE
Department for Contracting and Financing of
EU Funded Programmes

This project is financed by
the European Union

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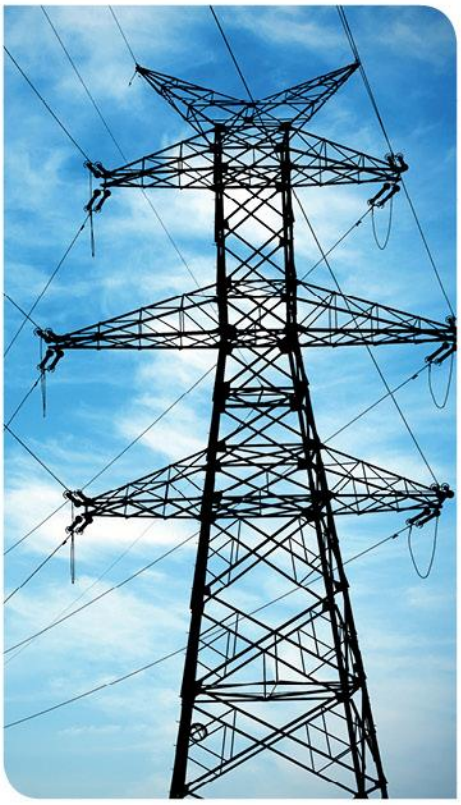

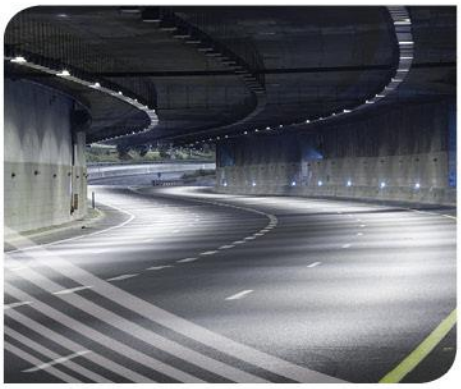

Updated Environmental Impact Assessment study for the project of rehabilitation, adaptation and reconstruction of navigation lock of HPP "Djerdap 2", Rev 1

Project holder: Ministry of Construction, Transport and Infrastructure
Sector for water transport and safety of navigation

EU PPF
PROJECT PREPARATION FACILITY

DOCUMENT CONTROL SHEET

Contracting Authority:	**Delegation of the European Union to the Republic of Serbia** **Ministry of Finance - Department for Contracting and Financing of EU Funded Programmes (CFCU)**
Project Title:	**EU PPF - Project Preparation Facility**
Beneficiary Country:	**Republic of Serbia**
Service Contract Number:	**48-00-00204/2014-28**
Identification Number:	**EuropeAid/137119/IH/SER/RS**

This project is implemented by the consortium of Louis Berger, GIZ, Stantec, Louis Berger doo and Epcco.

Project Holder:

Republic of Serbia, Ministry of Construction, Transport and Infrastructure

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List of abbreviations and acronyms

NL	Navigation lock
DG NEAR	(EU) Directorate General for European Neighbourhood Policy and Enlargement Negotiations
EUD/EUDEL	European Union Delegation (to the Republic of Serbia)
DTD	Danube-Tisa-Danube
EAR	European Agency for Reconstruction
EU	European Union
HPNS	Hydropower navigation system
IPA	(EU) Instrument for Pre-Accession Assistance
IPF	(EU) Infrastructure Project Facility
JASPERS	(EU) Joint Assistance to Support Projects in European Region
CM	Cadastar municipality
MEI	Ministry for European Integration
MoCTI	Ministry of Construction, Transport and Infrastructure
MEP	Ministry of Environmental Protection
IFIs	International Financial Institutions
MoF - CFCU	Ministry of Finance - Department for Contracting and Financing of EU Funded Programmes
NAD	Needs of the Republic of Serbia for International Assistance 2014-17 with projections until 2020’
NIPAC	National IPA Coordinator
NIC	National Investment Committee
PT	Project Task
PLC	Programmable logic controller
WWTP	Waste Water Treatment Plant
PPF6	Project Preparation Facility 6 – Project Preparation of Investment Projects
PPF7	Project Preparation Facility 7
PPF8	Project Preparation Facility 8
EIA	Environmental Impact Assessment
SIP	Stakeholder Involvement Plan
SIDA	Swedish International Development Cooperation Agency
PSC	Project Steering Committie
HPP	Hidropower plant
HPNS	Hydropower and navigation system
SCADA	Supervisory control and data acquisition

Content

Annexes:

Annex 1 – Layout of navigation lock of HPNS "Djerdap 2"

Annex 2 – Layout plans

Annex 3 – Official letter from the Republic of Romania to the Republic of Serbia reagrding elements for EIA Study

GENERAL INFORMATION

8000064546041

ИЗВОД О РЕГИСТРАЦИЈИ ПРИВРЕДНОГ СУБЈЕКТА

Република Србија
Агенција за привредне регистре

ОСНОВНИ ИДЕНТИФИКАЦИОНИ ПОДАТАК

Матични / Регистарски број	20407441

СТАТУС

Статус привредног субјекта	Активан

ПРАВНА ФОРМА

Правна форма	Друштво са ограниченом одговорношћу

ПОСЛОВНО ИМЕ

Пословно име	DRUŠTVO ZA ZAŠTITU ŽIVOTNE SREDINE I ODRŽIVI RAZVOJ DVOPER DOO BEOGRAD (STARI GRAD)
Скраћено пословно име	DVOPER DOO BEOGRAD

ПОДАЦИ О АДРЕСАМА

Адреса седишта

Општина	Београд-Стари Град
Место	Београд-Стари Град
Улица	Нушићева
Број и слово	10
Спрат, број стана и слово	4 / 20 /

ПОСЛОВНИ ПОДАЦИ

Подаци оснивања

Датум оснивања	11. април 2008

Време трајања

Време трајања привредног субјекта	Неограничено

Претежна делатност

Шифра делатности	7120
Назив делатности	Техничко испитивање и анализе

Остали идентификациони подаци

Порески Идентификациони Број (ПИБ)	105557340

Подаци од значаја за правни промет

Дана 09.07.2020. године у 13:16:03 часова

Текући рачуни

170-0030005721012-08
170-0030005721006-26
170-0030005721001-41
340-0000010043135-83
170-0030005721011-11
170-0030005721002-38
340-0000011024778-74
170-0030005721004-32

Подаци о статуту / оснивачком акту

Не постоји обавеза овере измена оснивачког акта

Датум важећег статута

Датум важећег оснивачког акта

Законски (статутарни) заступници

Физичка лица

1. Име: Небојша — Презиме: Покимица
   ЈМБГ: 0101972780015
   Функција: Директор
   Ограничење супотписом: не постоји ограничење супотписом

Директори / чланови одбора директора

Директори

Чланови одбора директора

1. Име: Небојша — Презиме: Покимица
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Прокуристи

Појединачна прокура

1. Име: Ратко — Презиме: Ђорђевић
   ЈМБГ: 0405943330077

Чланови / Сувласници

Подаци о члану

Пословно име: DVOKUT-ECRO DOO

Регистарски / Матични број: 00539651

Дана 09.07.2020. године у 13:16:03 часова

Држава	Хрватска

Подаци о капиталу

Новчани

износ	датум
Уписан: 3.000,00 EUR, у противвредности од 247.026,90 RSD	
Уписан: 3.752.973,10 RSD	
Уплаћен: 3.000,00 EUR, у противвредности од 247.026,90 RSD	28. март 2008
Уплаћен: 3.752.973,10 RSD	4. март 2015

	износ(%)
Удео	**100,000000000000**

Основни капитал друштва

Новчани

износ	датум
Уписан: 3.000,00 EUR, у противвредности од 247.026,90 RSD	
Уписан: 3.752.973,10 RSD	
Уплаћен: 3.000,00 EUR, у противвредности од 247.026,90 RSD	28. март 2008
Уплаћен: 3.752.973,10 RSD	4. март 2015

Регистратор Миладин Маглов

Дана 09.07.2020. године у 13:16:03 часова

Страна 3 од 3

ИНЖЕЊЕРСКА КОМОРА СРБИЈЕ

ЛИЦЕНЦА

ОДГОВОРНОГ ПРОЈЕКТАНТА

На основу Закона о планирању и изградњи и
Статута Инжењерске коморе Србије

УПРАВНИ ОДБОР ИНЖЕЊЕРСКЕ КОМОРЕ СРБИЈЕ
утврђује да је

Тања Т. Радовић

дипломирани инжењер технологије
ЛИБ 11580077263

одговорни пројектант
технолошких процеса

Број лиценце
371 M423 13

ПРЕДСЕДНИК КОМОРЕ
Милован Главоњић
дипл. инж. ел.

У Београду,
4. јула 2013. године

Број: 12-02/342662
Београд, 25.03.2019. године

На основу члана 75. Статута Инжењерске коморе Србије ("СГ РС", бр. 88/05,16/09 и 27/16), а на лични захтев члана Коморе, Инжењерска комора Србије издаје

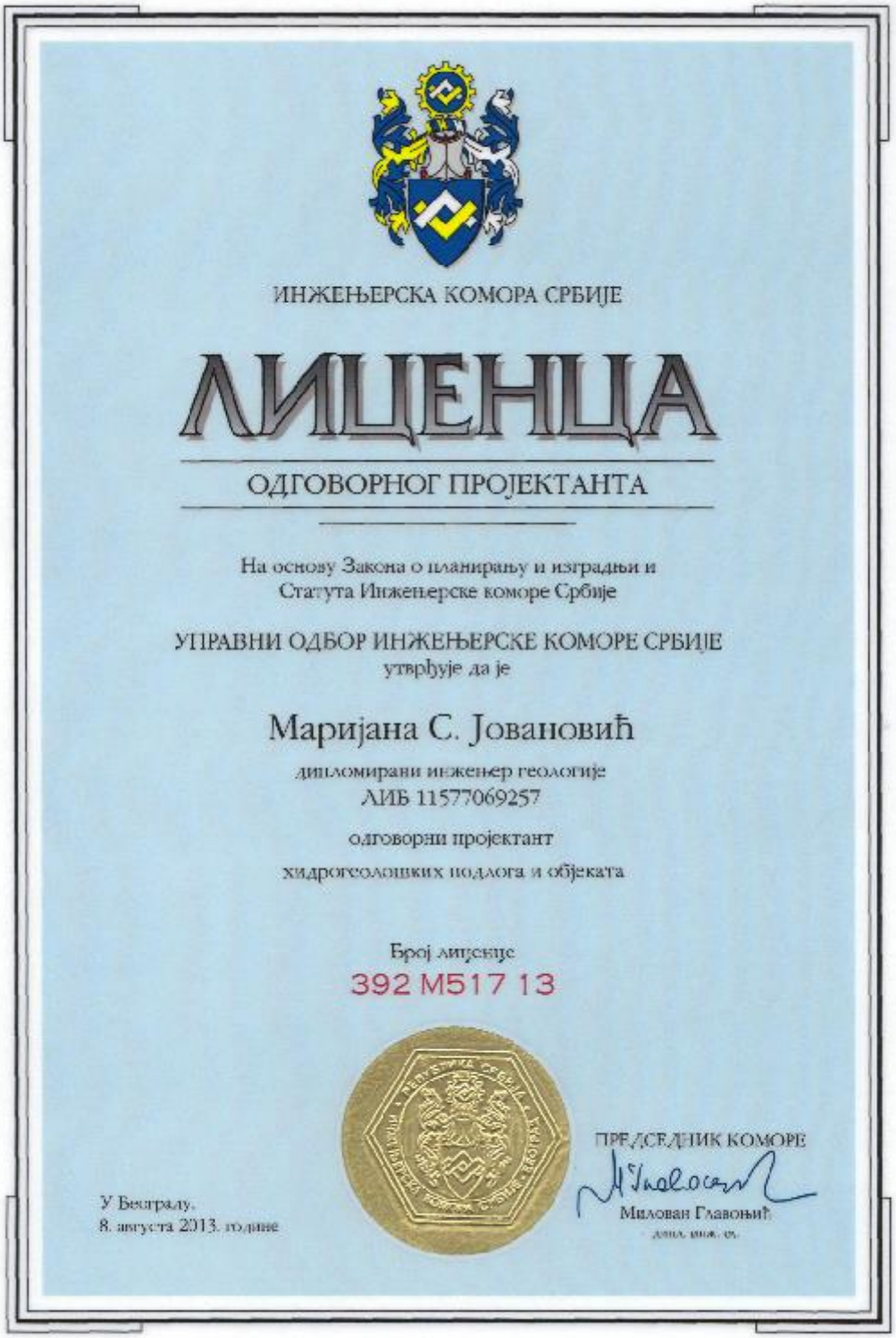
ПОТВРДУ

Којом се потврђује да је Тања Т. Радовић, дипл.инж.техн.
лиценца број
371 М423 13
за
одговорног пројектанта технолошких процеса

на дан издавања ове потврде члан Инжењерске коморе Србије, да је измирио обавезу плаћања чланарине Комори закључно са 04.07.2019. године, као и да му одлуком Суда части издата лиценца није одузета.

М.П.

Потпредседник Управног одбора
Инжењерске коморе Србије
Латинка Обрадовић, дипл. грађ. инж.



ИНЖЕЊЕРСКА КОМОРА СРБИЈЕ

ЛИЦЕНЦА

ОДГОВОРНОГ ПРОЈЕКТАНТА

На основу Закона о планирању и изградњи и
Статута Инжењерске коморе Србије

УПРАВНИ ОДБОР ИНЖЕЊЕРСКЕ КОМОРЕ СРБИЈЕ
утврђује да је

Маријана С. Јовановић

дипломирани инжењер геологије
ЛИБ 11577069257

одговорни пројектант

хидрогеолошких подлога и објеката

Број лиценце
392 М517 13

ПРЕДСЕДНИК КОМОРЕ
Милован Главоњић

У Београду,
8. августа 2013. године

Број: 02-12/405935
Београд, 24.02.2021. године

На основу члана 14. Статута Инжењерске коморе Србије ("СГ РС", бр. 36/19) а на лични захтев члана Коморе, Инжењерска комора Србије издаје

П О Т В Р Д У

Којом се потврђује да је Маријана С. Јовановић, дипл. инж. геол.
лиценца број
392 М517 13
за
одговорног пројектанта хидрогеолошких подлога и објеката

на дан издавања ове потврде члан Инжењерске коморе Србије, да је измирио обавезу плаћања чланарине Комори за текућу годину, односно до 08.08.2021. године, као и да му није изречена мера пред Судом части Инжењерске коморе Србије

М.П.

Председница Инжењерске коморе Србије
Марица Мијајловић, дипл. инж. арх.

ИНЖЕЊЕРСКА КОМОРА СРБИЈЕ

ЛИЦЕНЦА

ОДГОВОРНОГ ИЗВОЂАЧА РАДОВА

На основу Закона о планирању и изградњи и
Статута Инжењерске коморе Србије

УПРАВНИ ОДБОР ИНЖЕЊЕРСКЕ КОМОРЕ СРБИЈЕ
утврђује да је

Маријана С. Јовановић

дипломирани инжењер геологије
ЛИБ 11577069257

одговорни извођач радова
на изради хидрогеолошких подлога

Број лиценце
492 H778 13

У Београду,
8. августа 2013. године

ПРЕДСЕДНИК КОМОРЕ
Милован Главоњић
дипл. инж. ел.

Број: 02-12/405934
Београд, 24.02.2021. године

На основу члана 14. Статута Инжењерске коморе Србије ("СГ РС", бр. 36/19) а на лични захтев члана Коморе, Инжењерска комора Србије издаје

П О Т В Р Д У

Којом се потврђује да је Маријана С. Јовановић, дипл. инж. геол.
лиценца број
492 H778 13
за
одговорног извођача радова на изради хидрогеолошких подлога

на дан издавања ове потврде члан Инжењерске коморе Србије, да је измирио обавезу плаћања чланарине Комори за текућу годину, односно до 08.08.2021. године, као и да му није изречена мера пред Судом части Инжењерске коморе Србије

М.П.

Председница Инжењерске коморе Србије
Марица Мијајловић, дипл. инж. арх.

Република Србија
МИНИСТАРСТВО ГРАЂЕВИНАРСТВА, САОБРАЋАЈА И ИНФРАСТРУКТУРЕ

ЛИЦЕНЦА

ОДГОВОРНОГ ПРОЈЕКТАНТА

На основу члана 162. Закона о планирању и изградњи

МИНИСТАРСТВО ГРАЂЕВИНАРСТВА, САОБРАЋАЈА И ИНФРАСТРУКТУРЕ

утврђује да је

Наташа Ђ. Ђокић
дипломирани инжењер геологије

ималац лиценце одговорног пројектанта за

СТРУЧНУ ОБЛАСТ
геолошко инжењерство

УЖУ СТРУЧНУ ОБЛАСТ
хидрогеологија

Број лиценце
А20И0091619

ПОТПРЕДСЕДНИЦА ВЛАДЕ
И МИНИСТАРКА
Проф. др Зорана З. Михајловић

У Београду, 21.10.2020. године

Број: 02-12/406006
Београд, 25.02.2021. године

На основу члана 14. Статута Инжењерске коморе Србије ("СГ РС", бр. 36/19) а на лични захтев члана Коморе, Инжењерска комора Србије издаје

ПОТВРДУ

Којом се потврђује да је Наташа Ђ. Ђокић, дипл. инж. геол.
лиценца број

А20I 00916 19

за

одговорног пројектанта за стручну област геолошко инжењерство, ужа стручна област хидрогеологија (ознака ГтП 10-02)

на дан издавања ове потврде члан Инжењерске коморе Србије, да је измирио обавезу плаћања чланарине Комори за текућу годину, односно до 09.03.2021. године, као и да му није изречена мера пред Судом части Инжењерске коморе Србије

Председница Инжењерске коморе Србије
Марица Мијајловић, дипл. инж. арх.

1 INTRODUCTION

Over the past three decades, transport infrastructure and inland waterway transport in Serbia have suffered negative impacts due to lack and inadequate maintenance resulting from various internal and external factors. Serbia has not had the opportunity to improve the infrastructure of inland waterways, using modern and advanced solutions to respond to these challenges, which has led to problems in water transport. For that reason, the revitalization of infrastructure networks is one of the main priorities of Serbia.

In 2007 and 2008, the European Agency for Reconstruction (EAR) financed the Development of project and tender documentation for the revitalization of Serbian navigation locks "Djerdap 1" and "Djerdap 2" (Ref. EuropeAid/123966/D/SER/IU), which was implemented a consortium of companies Witteveen + Bos and Nebest from the Netherlands and Energoprojekt-Hidroinzenjering from Serbia. Within the project documentation prepared in accordance with the standards of the European Union, a procedure for assessing the impact of the project on the environment has been initiated. In that context, and in accordance with the provisions of the Law on Environmental Impact Assessment ("Official Gazette of RS", No. 135/2004) and other relevant legislation, a Study on Environmental Impact Assessment of the navigation lock revitalization was prepared. The Study was approved on October 8, 2009 by the Ministry of Environment and Spatial Planning of the Republic of Serbia, number 353-02-00692/2009-02.

Upon completion of the project and technical documentation (including the Environmental Impact Assessment Study), the works on the adaptation of the ship navigation lock of HPP "Djerdap 2" were mostly not performed, except for regular and overhaul maintenance.

Taking into account the current condition of the facilities and equipment of the navigation lock, the development of the Preliminary design, Preliminary design and Feasibility study for the rehabilitation, adaptation and reconstruction of the navigation lock system "Djerdap 2" was started. With the development of the conceptual design, there was a need to update the existing Study on Environmental Impact Assessment of the project of revitalization of the navigation lock "Djerdap 2".

Based on the request of the Ministry of Construction, Transport and Infrastructure (project holder), the Ministry of Environmental Protection of the Republic of Serbia determined the scope and content of the updated study (Decision No. 353-02-150 / 2021-03 of March 8, 2021) and the updating of the Study was proceeded.

As a signatory to the ESPOO Convention (Law on Ratification of the Convention on Environmental Impact Assessment in a Transboundary Context, “Official Gazette of RS - International Agreements”, No. 102/2007), the Ministry of Environmental Protection of the Republic of Serbia notified the Ministry of Environment, Water and Forests of the Republic of Romania on the project in question and submitted an updated Environmental Impact Assessment Study in English. Taking into account the project notification and the Updated Study on the Environmental Impact Assessment of the Project, the Ministry of Environment, Water and Forestry submitted its opinion which is given in Annex 3.

As part of the preparation of the Study, an assessment of the transboundary environmental impact of the project of rehabilitation, adaptation and reconstruction of the navigation lock of HPP "Đerdap 2" was performed. It is estimated that the planned works will not have an impact on the environment of Romania, that is, on the quality of air, water, population, phytocenoses present on the territory of Romania, as well as on ichthyofauna and other environmental factors. It is estimated that the environmental impact of the works, with the applied measures to reduce the impact, as well as due to the large flow of the Danube River, will be concentrated on the immediate environment of the works.

The Updated Study and the Request for granting consent to the Updated Study was submitted to the Ministry of Environmental Protection of Republic of Serbia on March 30, 2021. Updated Study was available to public, and public presentation and debate on the Study held in Negotin on May 7, 2021. The study authors have received objections of the technical commission on the Updated Study.

In accordance with the opinion of the Ministry of Environment, Water and Forests of the Republic of Romania, and with the opinion of the Technical Comission formed for the Study assessment in the Republic of Serbia and in order to clarify the impacts, amendment of the following chapters of the Study was made: chapter *3 Description of location*, subchapter: *Flora, fauna and natural values*; *7.1.2 Impact of the project during the execution of works on the quality of surface waters and water regime*; *7.1.4 Impacts of the project during the execution of works on the quality of river sediment*; *7.1.7 Impacts of the project during the execution of works on the ecosystem*; *7.2 Impacts during the operation of the navigation lock*; *9 Transboundary impact*; chapter *10.2 Protection measures during the execution of works*, subchapters: *Air quality protection measures*, *Water quality protection measures, River sediment quality protection measures*, *Ecosystem protection measures*.

1.1 Background for the Study

The following substrates were used in the study of the impact assessment:

- Relevant legislation of the Republic of Serbia, the European Union and the International Convention
- Conditions of the competent bodies and organizations
- Technical documentation.

1.1.1 Legislation

EU Legislation

1. Directive on the assessment of the effects of certain public and private projects on the environment 2011/92 / EU, as amended by Directive 2014/52 / EU
2. Directive 2001/42 / EC of the European Parliament and of the Council on the assessment of the effects of certain plans and programs on the environment

3. Water Framework Directive 2000/60 / EC, as amended by Decision no. 2455/2001 / EC, Directive 2008/32 / EC, Directive 2008/105 / EC, Directive 2009/31 / EC, Directive 2013/39 / EU, Directive 2013/64 / EU, Directive 2014/101 / EU
4. Directive 92/43 / EEC on the conservation of natural habitats and of wild fauna and flora, as amended by Directive 97/62 / EC, Regulation 1882/2003, Directive 2006/105 / EC and Directive 2013/17 / EU
5. Directive 2009/147 / EC on the conservation of wild birds, as amended by Directive 2013/17 / EU and Regulation (EU) 2019/1010)

International Conventions

1. Convention on Environmental Impact Assessment in a Transboundary Context (Law on Ratification of the Convention on Environmental Impact Assessment in a Transboundary Context, “Official Gazette of RS - International Agreements”, No. 102/2007),
2. Kyoto Protocol to the United Nations Framework Convention on Climate Change (Law on Ratification of the Kyoto Protocol to the United Nations Framework Convention on Climate Change, "Official Gazette of RS", No. 88/2007 and 38/2009),
3. Convention on the Conservation of Migratory Species of Wild Animals (Law on Ratification of the Convention on the Conservation of Migratory Species of Wild Animals, "Official Gazette of RS - International Agreements", No. 102/2007),
4. Multilateral Agreement of the Countries of Southeast Europe on the Implementation of the Convention on Environmental Impact Assessment in a Transboundary Context (Law on Ratification of the Multilateral Agreement of the Countries of Southeast Europe on the Implementation of the Convention on Environmental Impact Assessment in a Transboundary Context, "Official Gazette of RS", no. 12/18),
5. Convention on Cooperation for the Protection and Sustainable Use of the Danube River (Law on Ratification of the Convention on Cooperation for the Protection and Sustainable Use of the Danube River ("Official Gazette of the FRY - International Agreements", No. 2 / 2003-26)).

Legislative of the Republic of Serbia

1. Law on Environmental Impact Assessment ("Official Gazette of RS", No. 135/04 and 36/09),
2. Law on Strategic Environmental Assessment ("Official Gazette of RS", No. 135/04, 88/10)
3. Law on Planning and Construction ("Official Gazette of RS", No. 72/2009, 81/2009 - corrigendum, 64/2010 - US decision, 24/2011, 121/2012, 42/2013 - US decision, 50/2013 - decision US, 98/2013 - decision US, 132/2014, 145/2014, 83/2018, 31/2019 and, 37/2019 - other law and 9/2020);
4. Law on Environmental Protection ("Official Gazette of RS", No. 135/2004, 36/2009, 36/2009 - other law, 72/2009 - other law, 43/2011 - US decision, 14 / 2016, 76/2018 and 95/2018 - other law);
5. Law on Nature Protection ("Official Gazette of RS", No. 36/09, 88/10, 91/10 - amended, 14/16, 95/18 - other law);

6. Rulebook on proclamation and protection of strictly protected and protected wild species of plants, animals and fungi ("Official Gazette of RS", No. 5/10, 47/11, 32/16, 98/16);
7. Law on Protection against Non-Ionizing Radiation ("Official Gazette of RS", No. 36/09);
8. Law on Ionizing Radiation Protection and Nuclear Safety ("Official Gazette of RS", No. 36/09 and 93/12);
9. Law on Cultural Heritage ("Official Gazette of RS", No. 71/94, 52/11 - other law, 99/11 - other law, 6/20 - other law);
10. Law on Transport of Dangerous Goods ("Official Gazette of RS", No. 88/10, 104/16 - other law, 83/18 - other law);
11. Law on Chemicals ("Official Gazette of RS", No. 36/09, 88/10, 92/11, 93/12 and 25/215);
12. Law on Fire Protection ("Official Gazette of RS", No. 111/09);
13. Law on Disaster Risk Reduction and Emergency Management ("Official Gazette of RS", No. 87/2018);
14. 1Law on Air Protection ("Official Gazette of RS", No. 36/2009 and 10/2013);
15. Decree on conditions for monitoring and air quality requirements ("Official Gazette of RS", No. 11/2010, 75/2010 and 63/2013);
16. Law on Waters ("Official Gazette of RS", No. 30/2010, 93/2012, 101/2016, 95/2018 and 95/2018 - other law);
17. Law on Land Protection ("Official Gazette of RS", No. 112/15);
18. Law on Environmental Noise Protection ("Official Gazette of RS", No. 36/2009 and 88/2010);
19. Law on Waste Management ("Official Gazette of RS", No. 36/2009, 88/2010, 14/2016 and 95/2018 - other law);
20. Law on Packaging and Packaging Waste ("Official Gazette of RS", No. 36/09, 95/18-other law)
21. Law on Safety and Health at Work ("Official Gazette of RS", No. 101/05, 91/151 and 113/17 - other law) and relevant bylaws.

1.1.2 Conditions of competent bodies and organizations

1. Location conditions, Ministry of Construction, Transport and Infrastructure, number: 350-02-00056 / 2020-14, Date: 13.3.2020. yr.
2. Water conditions, Ministry of Agriculture, Forestry and Water Management, Republic Water Directorate, number: 325-05-00191 / 2020-07, Date: 10.3.2020. yr.
3. Conditions for safety of water transport, Ministry of Construction, Transport and Infrastructure, Directorate for Waterways, number: 11 / 70-1, Date: 25.02.2020. yr.
4. Water traffic safety conditions, Ministry of Construction, Traffic and Infrastructure, Sector for Water Traffic and Navigation Safety, Harbor Master's Office, number: 342-2-15 / 2020-02, Date: 19 February 2020. yr.
5. Conditions of fire protection, Ministry of Internal Affairs, Sector for Emergency Situations, Directorate for Preventive Protection, 09.4 number 217-295 / 20, Date: 21.02.2020. yr.

6. Conditions regarding the country's defense, Ministry of Defense, Sector for Material Resources, Directorate for Infrastructure, number: 3159-2, Date: February 19, 2020. yr.

1.1.3 Technical Documentation

The Preliminary Design and the Feasibility Study for the Rehabilitation, Adaptation and Reconstruction of the navigation lock HPNS "Djerdap 2" were used to prepare the Impact Assessment Study.

CONTENT OF THE PRELIMINARY DESIGN AND FEASIBILITY STUDY OF SANITATION, ADAPTATION AND RECONSTRUCTION OF THE NAVIGATION LOCK HENS "DJERDAP 2":

ARCHIVAL PROJECT

18072-IDP-00	**0. MAIN NOTEBOOK**, "Energoprojekt-Hidroinženjering" a.d. Belgrade, August 2020, Belgrade
	1. ARCHITECTURE PROJECT, "Energoprojekt-Hidroinženjering" a.d. Belgrade, April 2020, Belgrade
18072-IDP-I-01	CONTROL TOWER GONDOLA
18072-IDP-I-02	TECHNOLOGICAL ROOMS
	2. CONSTRUCTION PROJECT, "Energoprojekt hidroinženjering" a.d., April 2020.
18072-IDP-II-01.1	CONTROL TOWER GONDOLA
18072-IDP-II-01.2	TECHNOLOGICAL ROOMS
18072-IDP-II-01.3	CONCRETE FACILITIES
18072-IDP-II-02.1	ROAD PROJECT
	3. HYDROTECHNICAL INSTALLATIONS PROJECT, "Energoprojekt hidroinženjering" a.d., April 2020.
18072-IDP-III-01	WORKS ON THE EMBANKMENT ON THE RIVER SIDE OF THE DOWNSTREAM BERTHING AREA
	4. ELECTRIC POWER INSTALLATIONS PROJECT, "Energoprojekt hidroinženjering" a.d., April 2020.
18072-IDP-IV-01	ELECTROHYDRAULIC DOOR AND CLOSURE DRIVE CONTROL SYSTEM
18072-IDP-IV-02	ELECTROHYDRAULIC DRIVE NETWORK CONTROL SYSTEM
18072-IDP-IV-03	POWER SUPPLY CONSUMER POWER SUPPLY SYSTEM ELECTRIC ENERGY
18072-IDP-IV-04	TRAFFIC SIGNALING SYSTEM
18072-IDP-IV-05	HEATING, VENTILATION AND AIR CONDITIONING SYSTEM
18072-IDP-IV-06	EXTERIOR AND INTERIOR LIGHTING SYSTEM
18072-IDP-IV-07	DISCHARGE AND DRAINAGE SYSTEM
18072-IDP-IV-08	GUIDE AND DOOR THRESHOLD HEATING SYSTEM
18072-IDP-IV-09	CRANES
18072-IDP-IV-10	STABLE FIRE EXTINGUISHING SYSTEM

18072-IDP-IV-11	CENTRAL LUBRICATION SYSTEM OF WORKING DOOR DOORS
18072-IDP-IV-12	ACCOMPANYING SYSTEMS water level measurement system system for measuring meteorological parameters, sound system, radar system, video surveillance system conversation recording system, radio communication system, vessel detection system telephony system
	5. TELECOMMUNICATION AND SIGNAL INSTALLATIONS PROJECT, "Energoprojekt-Hidroinženjering" a.d. Belgrade and "GARDAL" d.o.o. Nis, Belgrade, April 2020
18072-IDP-V-01	AUTOMATIC FIRE ALARM SYSTEM
	6. MACHINE INSTALLATION PROJECT
18072-IDP-VI-01	ELECTROHYDRAULIC DOOR AND CLOSURE DRIVES, "Energoprojekt-Hidroinženjering" a.d. Belgrade, April 2020
18072-IDP-VI-02	ELECTROHYDRAULIC PLANTS OF THE PROTECTIVE NETWORK, "Energoprojekt-Hidroinženjering" a.d. Belgrade, April 2020
18072-IDP-VI-03	WORKING DOORS LIFTING HEAD, "Energoprojekt-Hidroinženjering" a.d. Belgrade, April 2020
18072-IDP-VI-04	WORKING DOUBLE WING DOORS, LOWER HEAD, "Energoprojekt-Hidroinženjering" a.d. Belgrade, April 2020
18072-IDP-VI-05	HYDROMECHANICAL EQUIPMENT OF THE PROTECTIVE NETWORK, "Energoprojekt-Hidroinženjering" a.d. Belgrade, April 2020
18072-IDP-VI-06	ENTRANCE GRATING "Energoprojekt-Hidroinženjering" a.d. Belgrade, April 2020
18072-IDP-VI-07	HEATING AND VENTILATION SYSTEM OF OPERATING ROOMS AND CONTROL TOWER, "Energoprojekt-Hidroinženjering" a.d. Belgrade, April 2020
18072-IDP-VI-08	STABLE FIRE EXTINGUISHING SYSTEM, "Energoprojekt-Hidroinženjering" a.d. Belgrade and "Shipping" d.o.o. Belgrade, April 2020
18072-IDP-VI-09	CRANES, "Energoprojekt-Hidroinženjering" a.d. Belgrade, April 2020
18072-IDP-VI-10	DISCHARGE AND DRAINAGE SYSTEM, "Energoprojekt-Hidroinženjering" a.d. Belgrade, April 2020
18072-IDP-VI-11	CENTRAL LUBRICATION SYSTEM OF WORKING DOOR WINGS, "Energoprojekt-Hidroinženjering" a.d. Belgrade, April 2020

18072-IDP-EZP-01	**FIRE PROTECTION STUDY**, "Energoprojekt-Hidroinženjering" a.d. Belgrade and "Cepting" d.o.o. Belgrade, April 2020
18072-IDP-EEE-01	**ENERGY EFFICIENCY STUDY**, "Energoprojekt-Hidroinženjering" a.d. Belgrade, April 2020
18072-SO-01	**FEASIBILITY STUDY**, "Energoprojekt-Hidroinženjering" a.d. Belgrade, April 2020

2 INFORMATION ON PROJECT HOLDER

Name	Republic of Serbia Ministry of construction, transport and infrastructure Sector for water transport and safety of navigation
Adress:	Nemanjina street 22-26 , Belgrade, Serbia
Telephone number:	+38111/3621-698 +38111/3619-491
E- mail:	veljko.kovacevic@mgsi.gov.rs

3 DESCRIPTION OF LOCATION

Hydropower and navigation system "Djerdap 2" administratively belongs to the Bor district, ie the municipality of Negotin. The municipality of Negotin is surrounded by the municipalities of Kladovo, Majdanpek, Bor and Zajecar, and it also borders Bulgaria (border length 41 km) and Romania (border length 35.5 km).

HPNS "Djerdap 2" was built on the stationing km 862 + 800 on the profile "Kusjak", 2 km upstream from the beginning of the Veliko ostrvo (Ostrovul Mare), which divides the Danube into the main course and the left tributary Gogoš.

HPNS "Djerdap 2" is located 80 km downstream from HPNS "Djerdap 1", 70 km from Kladovo, 67 km from the Romanian town of Turn Severin and upstream 2 km from Prahovo and 17 km from the confluence of the Timok and the Danube River.

On the Gogos tributary, about 11.5 km upstream, is stationed the second barrier point of the hydropower and navigation system "Djerdap 2" - the Romanian Gogos dam.

HPP "Djerdap 2" occupies the following cadastral parcels: 15809/4, 15809/5, 15809/6, 5675/2, 5006, all in CM Dusanovac; 7642/1, CM Mihajlovac and 6048/1, CM Prahovo.

Pedological characteristics: The following lands predominate in the area of "Djerdap 2": vertisol, chernozem, fluvial soils and wetland.

Geological structure of HPP "Djerdap 2": Myopliocene, mostly clay-marl rocks, which belong to the layers of tortones, sarmats, upper meots and lower pont, participate in the terrain structure of the regional area around "Djerdap 2". They lie over the Lower Cretaceous formations, which is developed in the carbonate-marly facies, and are covered with thick Quaternary deposits and deposits of the Danube terraces.

Seismic characteristics: Based on seismic hazard maps, seismic parameters for the HPP "Djerdap 2", the maximum earthquake intensity for the return period of 475 years is VIII degrees of the Mercalli scale, and for 975 years VIII-IX degrees of the Mercalli scale.

Hydrological characteristics: The Danube (over 30 km long), Timok, Sikolska river, Jasenička river, Slatinska river and Zamna flow through the territory of the municipality of Negotin.

The flows of the Danube vary in a wide range from 1,500 m^3/s to 16,000 m^3/s, and can reach as much as 23,000 m3/s with a probability of occurring once in 10,000 years. The average multi-year flow of the Danube from 1926 to 1975 on the profile of HPP "Djerdap 2" was 5,656 m^3/s, while the average value of a series of minimum flows was 2,253 m^3/s. The large waters of the Danube are occure in April, partly in May, and the small waters twice a year in mid-September and late January. Absolute annual minimum usually occurs during the winter.

Based on the hydrological data processing of Danube river on the profile of HPP "Djerdap 2", the following characteristic hydrological quantities were obtained:

- high waters of the Danube for the return period of 10,000 years Q0.01% = 22,350 m^3/s, high waters for the return period of 1,000 years Q0.1% = 19,300 m^3/s, for the return period of 100 years Q1% = 16,200 m^3/s,
- minimum waters of the Danube for the return period of 1,000 years Q0.1% = 950 m^3/s, small waters for the return period of 100 years Q1% = 1,070 m^3/s.

The width of the Danube at the site of the navigation lock "Djerdap 2", to the Romanian Veliko ostrvo (Ostrovul Mare), is 500 m.

Proximity to the sanitary protection zone, watercourses and water supply sources: HPP "Djerdap 2", as well as the settlement of Dušanovac, are supplied with drinking water from the spring "Barbaros", which is owned by HPP "Djerdap 2". The spring is formed by three wells and a catchment well. According to the data of the Republic Water Directorate, in the water area of Donji Dunav and the municipality of Negotin, there is a source of public water supply to the settlement "Konace". The area of sanitary protection zones around the spring is 35.74 ha (Zones I and II) and 26.76 ha (Zone III).

Climatic characteristics: The lower Danube basin is characterized by a continental climate. The average annual temperature in Negotin is 12.4 ° C, the warmest months are July and August, and the coldest are January and December. Data on the sum of monthly and annual precipitation show that on average most precipitation is excreted in December, June and May, ie 633.7 mm annually. The area of Negotin and Djerdap

has frequent winds, with average speeds of over 1.5 m/s throughout the year, and the west-northwest wind has the highest frequency.

Flora, fauna and natural values: Since the subject of the Study is a navigation lock, a detailed overview of the ichthyofauna is given, which has undergone the most changes in the composition and structure with the construction of HPNS "Đerdap 2" and the regulation of riverbeds. The changes that occurred with the construction of HPNS primarily refer to the extinction of Black Sea migratory species (Acipenseridae - sturgeon species and Clupeidae - herrings) from Djerdap reservoirs, which were migrating to the Danube, upstream from HPPs, for reproduction and nutrition.

Also, as a consequence of human activities on the regulation and pollution of rivers, as well as excessive fishing, species such as sturgeon (Acipenser Ruthenus), common carp (Cyprinus carpio), catfish (Silurus glanis), pike (Esox lucius), zander (Stizostedion lucioperca), aral asp (Aspius aspius), common barbel (Barbus barbus) are less common in the Danube, while the population of species such as sturgeon, carp, catfish, pike, perch, asp, barbel has been increased. New fish species have also appeared, such as grass carp, bighead carp, silver carp, brown bullhead, pumpkinseed.

In ecological terms, this area is extremely important, because in this river part of the Danube there are still Black Sea species: Sturgeon (Danube sturgeon - Acipenser gueldenstaedti), Beluga (Huso huso), Stellate sturgeon (Acipenser stellatus), Fringebarbel sturgeon (ship sturgeon - Acipenser nudiventris), Danube herring (Alosa caspia), Black sea herring (Alosa immaculata), whose upstream migration was prevented by the construction of a hydropower system.

Sturgeons originated about 200 million years ago and have undergone little morphological change, making them “living fossils”. They show very long generation intervals, tolerance for wide ranges of temperature and salinity, and high resistance to natural predators. The 27 members of the sturgeon order (Acipenseriformes) are confined to the northern hemisphere, inhabiting rivers, lakes and coastal waters in Europe, Asia and North America.

The sturgeon A. ruthenus is the only resident species in the Danube. All other sturgeon species are predominantly anadromous. Five of the six sturgeon species, native in the Danube River Basin, inhabited the Black Sea and entered the Danube for spawning. In the past, Russian sturgeon, Stellate sturgeon, Atlantic sturgeon (very rare, and now extinct from the Danube), Ship sturgeon (nearly extinct in Danube) and Beluga regularly migrated upstream, some even to Vienna and beyond. According to the IUCN (International Union for Conservation of Nature), all anadromous sturgeon species are defined as critically endangered (CR), and the most important endangerment factors are a drastic reduction in the number due to overfishing due to prized meat and even more prized caviar, as well as habitat change, and this is due to other types of needs and purposes of the flow and banks of the Danube and due to the complete blockage of the flow of the Danube by three dams: "Đerdap 1" and "Đerdap 2" at the lower end of the middle course of the Danube (Serbia - Romania) and "Gabčikovo" in the upper part of the middle course of the Danube - Hungary).

With their long reproductive cycles and extensive migration patterns, sturgeons are extremely sensitive to changes in the environment, making them a key indicator of the ecological status of rivers.

Pontian herring: Black Sea and Danube herring migrate from the Black Sea to the "Đerdap 2" dam every spring (March-May, peak during April), and despite the current ban on hunting, they are used as an excellent food resource, fresh and smoked. They are Pelagic spawning fish. Their eggs float freely downstream and develop, so that the young can continue their journey across the Danube to the Black Sea carried by the river current. Upstream passages through the navigation locks of two Djerdap dams are extremely rare and they represent, in addition to sturgeon, the species of fish that are most endangered by the interruption of migratory ways due to the construction of Djerdap dams.

As regards the eel, there are oppsite opinions about its autochthonous origin. Some believe that eels were brought into the Danube and its tributaries from another aquaculture and when they reach the spawing age, they start migrating from the breeding facilities towards Black Sea, Mediterranain or Sargasso Sea, where their natural spawing locations are. As an important argument in support of this standpoint is a negligible number of glass eels and small "elvers" (metamorphosed juveniles) that enter the Danube and migrate upstream. So far, there are no data on the findings of juvenile eels on upstream migrations in the Serbian part of the Danube. Downstream migrations of adult eels, up to 1.5 m long and weighing over 2 kg, occur from early autumn to early winter and are detected by sporadic catches of commercial fishermen and during electric fishing for scientific research purposes (reports of commercial fishermen, personal observations and catches). Younger, "yellow" eels that escape from breeding facilities (Hungary or Croatia) and descend to our parts of the Danube downstream, recreational fishermen sometimes catch with hook tools.

According to the places where eels are caught, it can be concluded that adult specimens travel downstream along the coast, in the coastal area, necessarily where the depth is greater, or farther from the shore, if the depth in the coastal area is insufficient - shallow depth.

The Regional Strategy for the Conservation and Sustainable Management of sturgeon populations in the northwestern part of the Black Sea and the Lower Danube Basin in accordance with the CITES Convention (BSSMAG, 2003) envisages within: 1. Objectives of the strategy and management recommendations, 1.2. Protection of important habitats, 1.2.2. Identifying barriers and other factors within the northwestern part of the Black Sea and the lower Danube that have a negative effect on populations of different sturgeon species, recommendation: to study the possibility and feasibility of building fish passes on the Djerdap 1 and Djerdap 2 dams.

From the Regional Strategy, the Action Plan for the Conservation of Sturgeons (Acipenseridae) in the Danube Basin (Bloesch et al. 2005) emerged. It states as goal 9 the reopening of sturgeon migration routes by enabling upstream and downstream sturgeon passage at dams and other current bariers to sturgeon, and through actions 9.1 - 9.6 taking measures to make dams "Gabčikovo" and "Đerdap 1" and " Djerdap 2" passable for sturgeons by preparing a feasibility study, planning, designing and building migration resources - infrastructure.

The time that was foreseen for the realization of this goal and the implementation of these actions is a maximum of 5 - 10 years. As part of these actions, it was planned to establish effective monitoring and evaluation of the performance of fish passages facilities at Djerdap dams (action 9.3), and it was expected that the constructed fish passages will have a positive effect on other migratory species, especially Pontic herring (Alosa caspia and Alosa immaculata). The governments of Romania and Serbia and Montenegro (then the federal state) were addressed for all the activities to achive Objective 9.

The Action Plan for the Management of Sturgeon Species in the Fishing Waters of the Republic of Serbia, Lenhardt et al. (2005) have addressed the problem of disruption of sturgeon migration pathways in Chapter 2, Protection of Important Habitats and Providing Access to Historically Important Spawning Areas, at points requiring a feasibility study for the construction of undisturbed upstream and downstream sturgeon migrations, as well as other migratory fish species, on Djerdap 1 and Djerdap 2 dams, as well as to consider the introduction of "Catch-and-transfer" system as a temporary measure, and in the chapter "Dynamics, implementation dates and financial sources", funds of EUR 10.000 are envisaged for the development of the feasibility study estimated funds of 10,000 EUR, as well as the construction of fish passages and elevators at dams "Djerdap 1" and " Djerdap 2 ", with funds in the amount that should be determined by the feasibility study.

Based on the Regional Strategy, in the National sturgeon management plan in Romania (Danube Delta National Institute Tulcea 2006), within Chapter A. Measures, points 2. Protection of important habitats, sub-points 2.4 study of the possibility and feasibility of construction of fish passages (trails) on the dams "Đerdap 1" and "Đerdap 2", this regional strategy has been applied.

The River Basin Management Plan (GD 80/2011) for the adoption of the National Management Plan for the Romanian part of the Danube Basin (Mielach et al. 2012), assessed that there are no conditions for the construction of fish paths on dams exceeding 15 m in height. That height is considered the maximum in that study technically feasible for solving the problem of building fish paths. Dams on the Danube and the construction of fish paths on them were excluded from this plan and should , according to the plan, be resolved under the competence of the International Commission for the Protection of the Danube (ICPDR).

ICPDR is currently working on a Feasibility Study - Reconstruction of fish migration routes in the Danube River Basin at the Iron Gate Dam, with EU funding (DG REGIO). The feasibility study aims to identify ways to preserve fish stocks on the Romanian - Serbian border. This study is an important step towards achieving the central goal of the EU Strategy for the Danube River: saving Danube sturgeons from extinction.

The feasibility study aims to analyze the strengths and weaknesses of the proposed project, the opportunities and threats, the resources needed to implement the project and ultimately the success of the project. The study should determine whether the project is technically feasible, economically viable and cost-effective (costs versus environmental benefits). The first phase of the study lasted from 2011 to 2016 and established a dialogue between the ICPDR and relevant stakeholders. The second phase is the preparation of a feasibility

study, which was to be completed in 2020. The third and fourth phases relate to the project development (planned for 2021-2023) and implementation (2024 onwards).

ICPDR coordinates and implements activities together with the National Institute for Research and Development in the Danube Delta (DDNI), Romania, and the Institute for Water Resources Development Jaroslav Cerni (JCI), Serbia. The general objective of the study is to map solutions to achieve the objectives of the EU Strategy for the Danube Region, as well as the ICPDR Strategy for the Conservation and Sustainable Management of the Sturgeon Population.

Location of natural spawning ground

The locations of natural fish spawning ground on the Danube river have been identified on the basis of the Conditions for the development of the General Plan of Inland Water Transport in Serbia, issued by the Institute for Nature Protection of Serbia. The stretch of the Danube downstream from the dam of HPP "Đerdap 2" to the mouth of the river Timok into the Danube (860 - 845 km) is the only remaining breeding ground of sturgeon species: Beluga (Huso huso), Danube sturgeon (Acipenser gueldenstaedti), Stellate sturgeon (Acipenser stellatus), ship sturgeon (Acipenser nudiventris).

For the most fish species, the spawning period covers the period from March 1 to June 30, but for the Danube sturgeon and beluga specially important the period is: March – September.

According to the data from the Central Register of Protected Natural Resources, there are several protected areas on the territory of the municipality of Negotin, however, none of them is close to HPNS (the nearest is 11 km as the crow flies).

The following protected natural assets are located in the immediate and far vicinity of the HPNS "Đerdap 2" navigation lock on the territory of the Republic of Romania:

- Iron Gate Nature Park,
- Iron Gate ROSCI0206,
- Danube Stream - Bazias - Iron Gate ROSPA0026 and
- ROSPA 0011 Blahnita.

Iron Gates Natural Park (115 666 ha; N 44°41’ E 21°56’) is located in Caras Severin and Mehedinti Counties. The natural park declared by the Romanina Law No. 5 of March 6, 2000. The site is situated in South West Romania. It covers an area of approximately 115,665.8 ha, being one of the largest natural parks in Romania (2nd place), with 18 reserveds. The park is protected by the Ramsar Convention. It is a Ramsar site of outstanding beauty that borders the Republic of Serbia along the course of the Danube River. It is mostly covered by forest interspersed with streams and freshwater ponds.

The variety of ecosystems as well as the diversity of species is very high. Many species of flora (about 3700) and fauna (more than 5200) are protected under international, European and national regulations. Such

species include birds like the Imperial Eagle (Aquila heliacal), amphibians like the European Fire-bellied Toad (Bombina bombina), vulnerable fish species such as Acipenser ruthenus, and mammals like the Otter (Lutra lutra). Some plant species are endemic to the area.The large Iron Gates water reservoir serves multiple purposes, from hydropower production to fishing, navigation and leisure activities. It is especially important as a breeding, staging and wintering site for many bird species and regularly supports 20,000 or more water birds.

Iron Gates Natural Park is located more than 30 km upstream from HPNS “Đerdap 2”.

The Iron Gate, ROSCI0206 (rom. Porțile de Fier, ROSCI0206) (125,446.33 ha) is a continental Natura 2000 site protected as the Site of Community Importance (SCI). This area is intended for the protection of 62 terrestrial species listed in Annex II of the Habitats Directive. This area is located more than 30 km upstream in relation to HPNS "Djerdap 2".

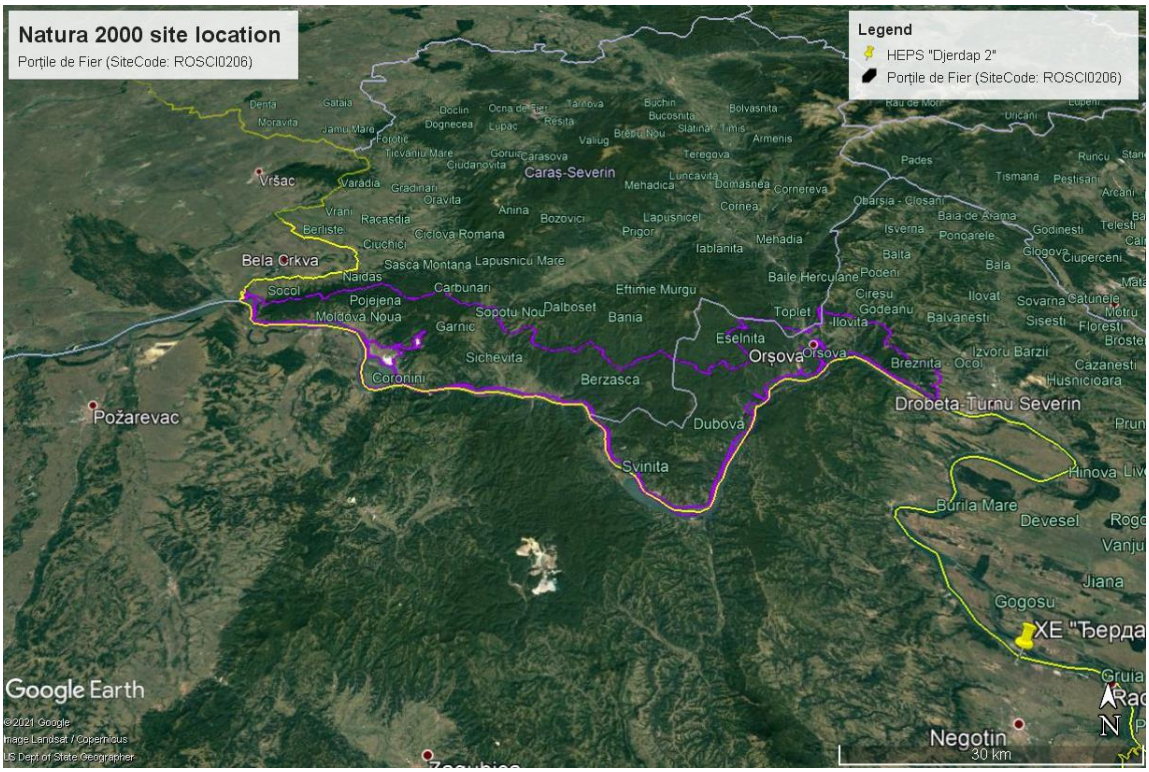


Figure 3.1 - Location of the Natura 2000 site, Iron Gate ROSCI0206, Romania (source: Google Earth, Natura 2000 Network Viever)

The Danube Stream - Bazias - Iron Gate - ROSPA0026 (rom. Cursul Dunării - Bazias - Porțile de Fier, ROSPA0026) is protected as a special area for the protection of avifauna (bird fauna), as an integral part of the Natura 2000 ecological network in Romania. It covers an area of 10,325.90 ha. This area is located more than 30 km upstream in relation to HPNS “Djerdap 2”.

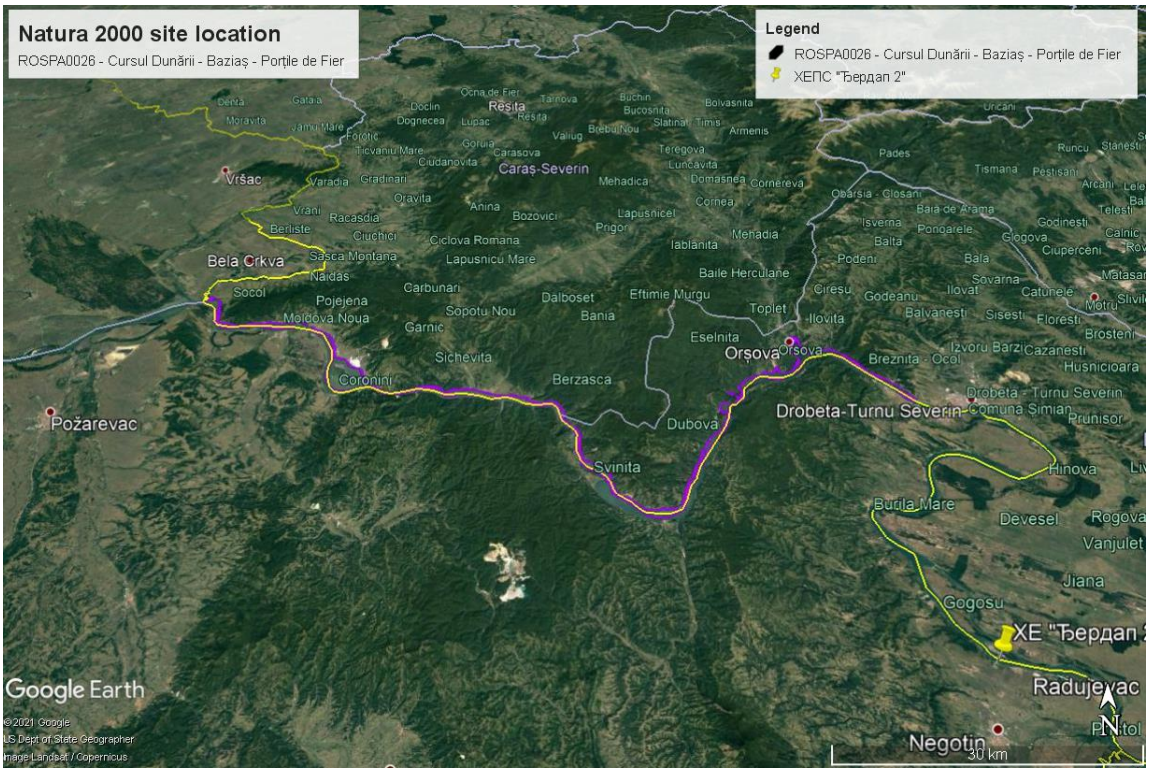


Figure 3.2 - Location of the Special Protected Area Danube Watercourse - Bazias - Iron Gate - ROSPA0026, Romania (source: Google Earth, Natura 2000 Network Viewer)

The site includes the largest and most spectacular river gorge in Europe, which stretches from the entrance of the Danube into the country and upstream of the Iron Gates I dam, with a total length of 134 km. It is one of the few areas where a large number of bird species can be found on a small area, many of them endangered and protected at national, European and even international level. The site offers appreciable food resources and resting places for approximately 200 species of birds, which represents almost half of the number of species present in Romania. The site has been designated for the conservation of the population of 13 species of protected birds at European level, including smew, whooper swan, small cormorant, black stork, great egret and little egret. At the site can be observed 62 migratory birds species of which three species are globally endangered. There is the presence of some southern species that are extremely nesting in Romania such as the red-rumped swallow, crag martin, western black-eared wheatear and cirl bunting. The site also has large colonies of sand martin, which were included in the Nature Reserve Râpa with martins from Divici Valley, but also in a number of areas with special protection status that stand out through a special ecological integrity: Ostrov - Moldova Veche wetland, Calinovăţ Island and the Divici-Pojejena wetland. The following species have the largest flocks on the site: common pochard, common coot, garganey, tufted duck, mallard, but also the common goldeneye, which appears in the much smaller number in the rest of the country. Occasionally, extremely rare northern ducks appear in Romania, such as common eider, velvet scoter, common scoter and long-tailed duck. During the migration period, the site hosts flocks of waterfowl that reach an impressive number of over 50,000 specimens due to the non-freezing waters, the presence of large quiet places and the

existence of an extremely rich food source. This specimens present in the Romanian sector of the Danube, by doubling the number (due to the Serbian sector), demonstrate the special importance of the entire river for the conservation of waterfowl species, which have here a very important migration route that connects the Pannonian Plain and the Balkan Peninsula (Bulgaria - Bosphorus).

Blahnita, ROSPA0011 (rom. Blahnița, ROSPA0011). In the immediate vicinity of HPNS Iron gate II, in Romania, there is the protected area Blahnița, part of the European Ecological Network - Natura 2000. The area Blahnița is protected as a special area for the protection of bird fauna (special protection area - SPA) covering an area of 44 003.30 ha. The Blahnița area starts from the Romanian side of the Danube. It is protected by the decision of the Government of Romania no. 1284 of 24 October 2007. The Blahnița site (since February 2013) is protected by the Ramsar Convention, as a wetland of international importance. It includes two Nature Reserves: Bunget forest and Starmina forest.

Figure 3.3 - Location of the Special Protection Area of bird fauna Blahnița, Romania (source: Google Earth, Natura 2000 Network Viewer)

The protected area (framed in the continental geographical bioregion) is a natural area in the Blahnița river meadow (lakes, rivers, swamps, peat bogs, meadows, deciduous forests, arable land, vineyards and orchards) that provides food, nesting and living conditions for several species of migratory , transient or sedentary birds (some protected by law).

The area of the site is indicated the presence of several bird species of: sparrowhawk (*Accipiter nisus*), great reed warbler (*Acrocephalus arundinaceus*), marsh warbler (*Acrocephalus palustris*), sedge warbler (*Acrocephalus schoenobaenus*), reed warbler (*Acrocephalus scirpaceus*), common sandpiper (*Actitis hypoleucos*), Eurasian skylark (*Alauda arvensis*), northern pintail (*Anas acuta*), ferruginous duck (*Aythya nyroca*), mallard or wild duck (*Anas platyrhynchos*), garganey (*Anas querquedula*), gadwall (*Anas strepera*), gray heron (*Ardea cinerea*), purple heron (*Ardea purpurea*), common pochard (*Aythya ferina*), Eurasian bittern (*Botaurus stellaris*), common goldeneye (*Bucephala clangula*), whiskered tern (*Chlidonias hybridus*), great egre (*Egretta alba*), common reed bunting (*Emberiza schoeniclus*), robin (*Erithacus rubecula*), common kestrel (*Falco tinnunculus*), hobby (*Falco subbuteo*), common moorhen (*Gallinula chloropus*), snipe (*Gallinago gallinago*), white-tailed eagle (*Haliaeetus albicilla*), black-winged stilt (*Himantopus himantopus*) Eurasian wryneck (*Jynx torquilla*), black-headed gull (*Larus ridibundus*), Caspian gull (*Larus cachinnans*) river warbler (*Locustella fluviatilis*), Savi's warbler (*Locustella luscinioides*), smew (*Mergus Albellus*), common merganser (*Mergus merganser*), red-breasted merganser (*Mergus serrator*), white wagtail (*Motacilla alba*), western yellow wagtail (*Motacilla flava*) golden oriole (*Oriolus oriolus*), common spoonbill (*Platalea leucorodia*), dunnock (*Prunella modularis*), Eurasian bullfinch (*Pyrrhula Pyrrhula*), black-crowned night heron (*Nycticorax nyctricorax*), little bittern (*PIxobrychus minutus*), little crake (*Porzana parva*), water rail (*Rallus aquaticus*), goldcrest (*Regulus regulus*), Eurasian penduline tit (*Remiz pendulinus*), whinchat (*Saxicola rubetra*), serin (*Serinus serinus*), little grebe (Tachybaptus ruficollis), reen sandpiper (Tringa ochropus), common tern (*Sterna hirundo*) or song thrush (*Turdus philomelos*).

Due to the scope and size of the project, natural terrain characteristics, the size of the Danube River, the distance of certain protected assets (Iron Gate Nature Park, Iron Gate ROSCI0206, Danube watercourase - Bazias - Iron Gate ROSPA0026), as well as applied measures, the project will not have negative impact to the stated protected natural assets.

Landscape characteristics: Apart from the road number 168 and the uncategorized road which connects the settlement of Prahovo with the road 168, the bank of the Danube in the immediate vicinity of HPP "Djerdap 2" is undeveloped, covered with grass and low vegetation. About two kilometers upstream from Djerdap 2, there is Kusjak beach.

Immovable cultural property: According to the Decision on the determination of immovable cultural property of exceptional and great importance ("Official Gazette of the SRS" No. 47/87), there are no protected immovable cultural property in this area.

Settlements and population: The facilities of the navigation lock HPP "Djerdap 2" are mostly located in the settlement of Dusanovac, while a smaller part belongs to Prahovo and Mihajlovac. The number of inhabitants in the entire municipality has been in constant decline since 1961, and the municipality is also characterized by external migrations of inhabitants (25.84% of the inhabitants of the municipality).

Existing commercial and residential facilities and infrastructure facilities: The following commercial facilities are located in the settlement of Prahovo: IHP Prahovo (Elixir group), Luka Prahovo and NIS bunker station. The backbone of the industrial structure of the economy of the entire municipality of Negotin is the factory IHP Elixir group Prahovo, which produces phosphoric acid and highly concentrated phosphorus fertilizers.

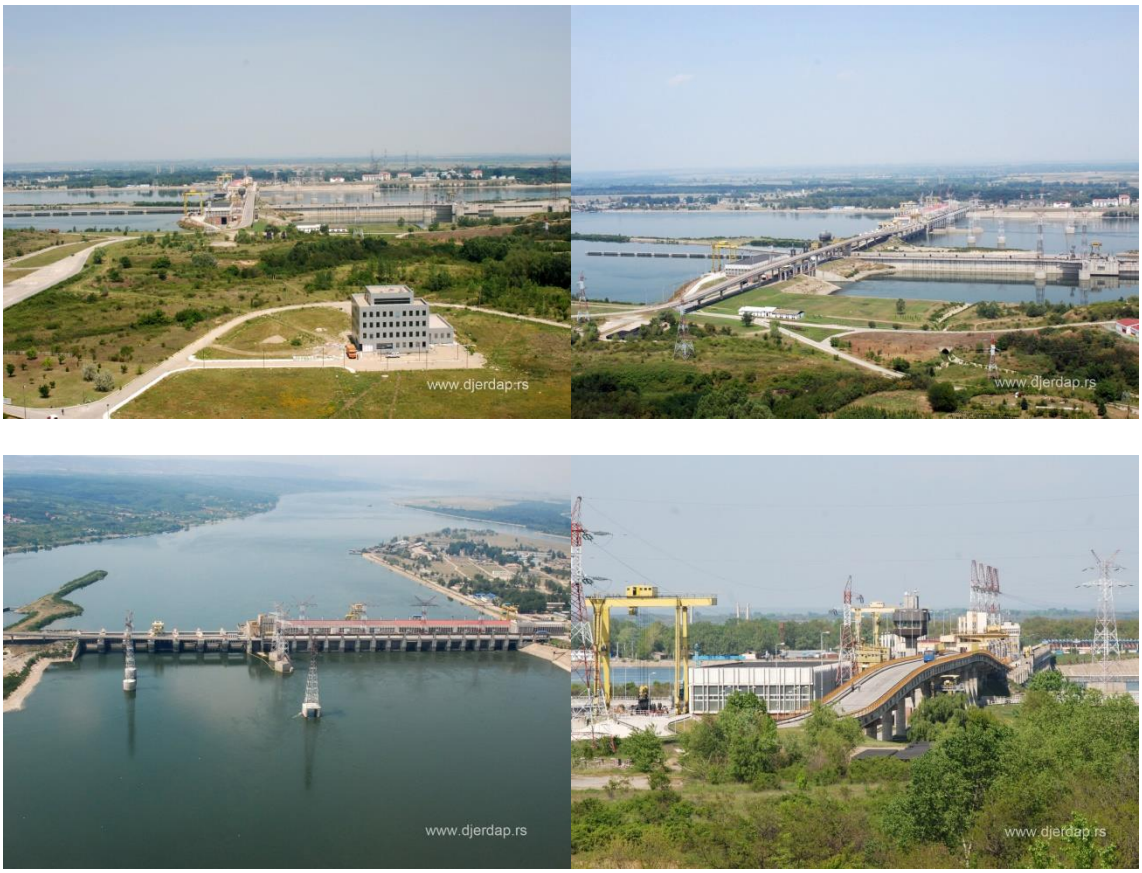


Figure 3.4- Danube bank in the vicinity of HPP Djerdap 2

4 PROJECT DESCRIPTION

4.1 Facilities description

HPNS "Djerdap 2" is the second joint Serbian-Romanian hydroelectric power plant located on the Danube. It consists of a basic power plant, two additional power plants, two overflow dams, two navigation locks and two distribution plants. Each side, Serbian and Romanian, has one of the mentioned facilities.

During the first installation, the entire installed equipment of the ship's lock was made in Romania, whose concept is outdated, but due to regular maintenance on the ship's lock HPP "Djerdap 2", there have been no major emergency situations so far.

Due to the obsolescence of the equipment as well as due to the necessary strengthening of the equipment on the deceleration front, due to the increase in the level of the upstream lake, it is necessary to adapt the equipment, devices and systems according to the following criteria:

- Expiration of working life, which increases the cost of exploitation, i.e. maintenance of constructed systems;
- High exploitation risk that in addition to failures, due to the instability of the parameters, delays may occur due to mechanical breakage of the drive equipment;
- Impossibility to procure spare parts on the market, due to the cessation of production of equipment parts older than 20 years
- as well as repairing damage to the reinforced concrete parts of the ship's lock.

The adaptation of the navigation lock of HPP "Djerdap 2" will enable the smooth flow of river traffic on the Danube.

The Serbian lock is located along the right bank of the main course of the Danube. It has one chamber with access from the upstream accumulation lake when the translation is done in the downstream direction, and with access from the lower water zone when the translation is done in the upstream direction. In terms of construction, it consists of several functionally dependent facilities and units:

- Upstream berthing area (width 100 - 180 m and length 510 m),
- Upstream (upper) head,
- Lock chamber (width 34 m and useful length 310 m)
- Control tower,
- Downstream (lower) head,
- Downstream berthing area (width 100 - 180 m and length (river line) 510 m, i.e. 100 -180 m (coastline)).
- Layout of navigation lock layout is given in figure 4-1 and in Annex 1.

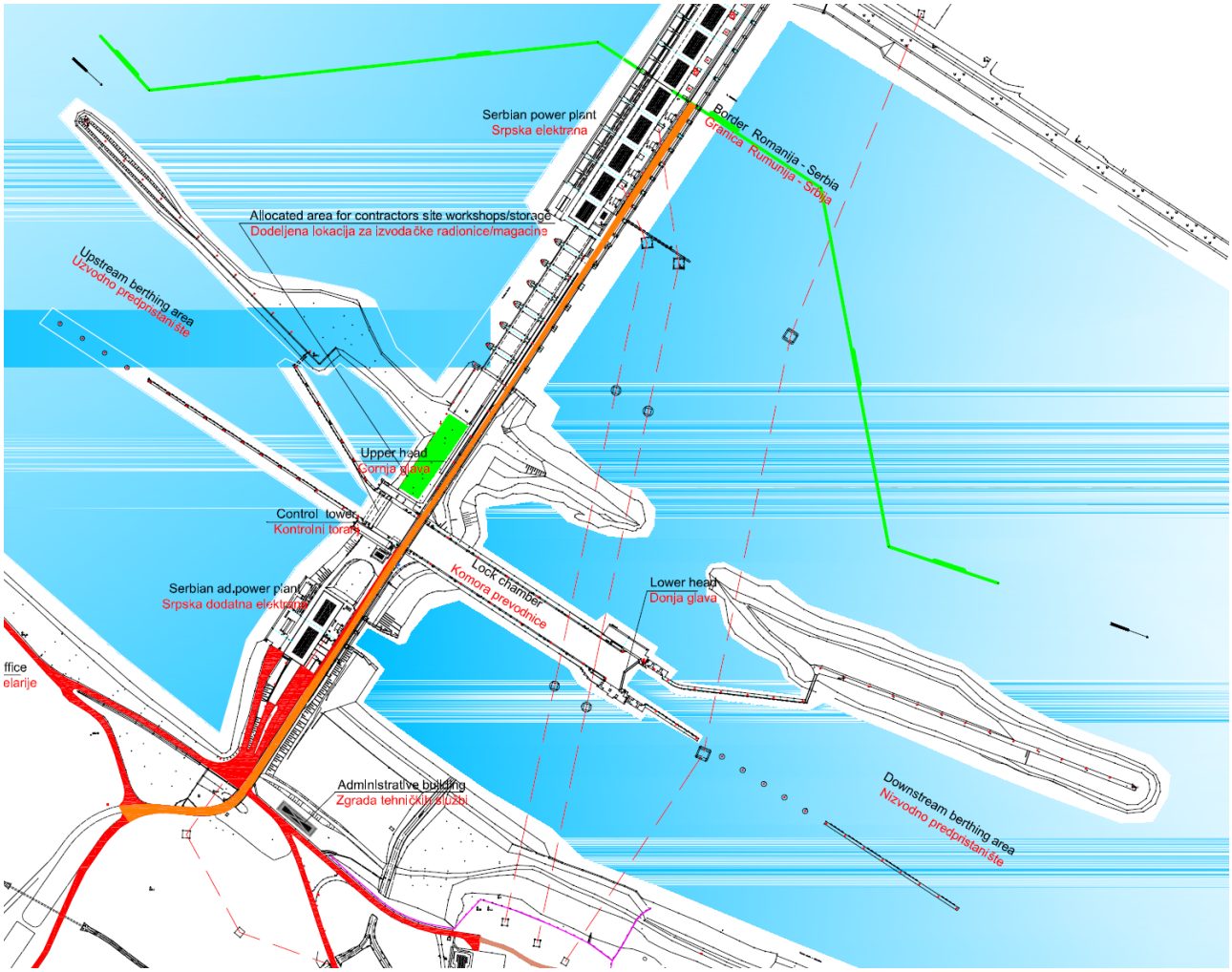


Figure 4.1. Layout of navigation lock at HPP Djerdap 2

4.2 Description of planned works

4.2.1 Architectural works

Architectural works include the rehabilitation of the control tower gondola and the reconstruction and modernization of technological premises.

Control tower gondola remediation

Remediation of the navigation lock control tower gondola at the HPP "Djerdap 2" includes craft works inside the gondola, adaptation of all rooms and craft works related to the replacement of installed (existing) materials that line the gondola. The project envisages all the necessary and reqiured works, as well as the use of modern materials.

The conceptual design envisages the following:

- Removal of dilapidated waterproofing and installation of new thermal and hydro insulation using modern materials, in accordance with the recommendations of the Study on Energy Efficiency,
- Dismantling of the existing fence on the roof of the gondola of the command tower and installation of a new metal fence with anti-corrosion coating and final painting, as well as installation of metal climbers with a back guard,
- Removal of the glass facade of the gondola and installation of a semi-structural facade.
- Removal of load-bearing floorboards supported by a space grid, inspection of existing roof prefabricated concrete slabs and installation of new floor slabs; and roof slabs if needed.
- Dismantling of the existing metal sheets of the upper and lower lining of the gondola and installation of flat aluminum panels 5 cm thick on the appropriate substructure. Thermal insulation of the lower slab of the gondola will be performed at the lower side of the prefabricated concrete slabs.
- Dismantling of existing suspended ceilings and installation of new, non-combustible ceilings made of modern materials, over a fireproof substructure. Thermal insulation will be placed above the suspended ceiling.
- Removal of existing floor coverings inside the gondola and installation of new ones (antistatic floor in the control room and server room, PVC floor in the entrance hall and room for heating and ventilation systems, PVC flooring, ceramic tiles in the toilet).
- Removal of paint and smoothing compound from all interior walls and ceilings in the bathroom and re-smoothing and painting.
- Removal and replacement of floor and wall ceramic tiles, dismantling and replacement of internal plumbing and sanitary elements.
- Replacement of wooden doors and glass aluminum partitions with aluminum doors and fixed glazed partitions with glass doors.

Reconstruction and modernization of technological premises

Within the navigation lock at HPP "Djerdap 2", there are technological premises for storing electrical machinery that initiates the opening and closing of doors at the navigation lock.

The scope of architectural (craft) works envisages the replacement of existing materials which have been used to finish the interior of the technological premises (walls, ceilings and floors). Craft works are planned to repair the existing damage, which endangers the employees and the work of electrical and mechanical equipment, as well as the navigation lock, and include the following works:

- Installation of new paved, metal covers for the entry of equipment, in all technological premises. It is planned to install new, prefabricated, thermally insulated covers, with all the necessary additional elements for support and fastening.
- Removal of damaged layers on walls and ceilings. Filling all cracks, painting with dispersive paint. Plastering the walls to a height of 2.2 m and laying ceramic tiles.
- Dismantling of all corrugated sheet metal coverings, as well as supporting frames made of metal profiles and installation of new metal coverings in a metal frame made of box metal profiles with anti-corrosion protection and final painting with metal paint.
- Dismantling of clinker ceramic tiles in all technological premises, the floors will be leveled with a rabbed cement screed with the necessary falls and new, clinker ceramic tiles will be installed on the appropriate glue, with the construction of a plinth.

4.2.2 Rehabilitation of constructions

As part of the rehabilitation of the ***control tower constructions***, it is necessary to perform the following works:

- repair of the supporting steel lattice of the control tower gondola (detailed inspection of all elements of the steel rod lattice, connection sheets and all connections, repair of observed damages, replacement of individual parts of the steel lattice for which inspection indicates the need for restoration and corrosion protection)
- repair of the concrete pillar of the gondola and the roof concrete slab (preparation of the surface by cleaning, sandblasting or applying high pressure jets, removal of the damaged layer of concrete if any, possible cleaning of reinforcement and repair if necessary, application of mortar on a sound surface, filling all holes in concrete at the points of the form anchoring, care of concrete surface.

As part of the construction works on the rehabilitation of the HPNS "Djerdap 2" navigation lock, the reconstruction of the ***technological and transformer rooms*** on the coastal and river side of the lock chamber is planned. Reconstruction works should include all technological rooms on the upper and lower head, rooms with transformer, diesel generator, cable and FP galleries.

It is necessary to perform all necessary repairs of concrete in order to prevent leakage and wetting on the walls and ceilings of rooms and galleries by grout injection, removal of existing equipment stands and their adaptation in accordance with the requirements of new equipment and equipment manufacturer's proposal; construction of a reinforced concrete base for accommodating a diesel unit near the mixing station - left side of the lock, upstream head. Prior to the installation of the equipment, the technological premises must be repaired, arranged and cleaned.

The project of rehabilitation, adaptation and reconstruction of concrete facilities of the navigation lock envisages works for repair of identified damages on construction objects, as follows:

- Repair of damage to the concrete surfaces of the pillars and the quay wall of the upstream berthing area, damage to the concrete surfaces of the chamber and the heads of the lock, as well as damage to the concrete surfaces of the quay wall of the downstream berthing area by the method of the manual repair of the concrete.
- Repair of cracks in concrete surfaces in the chamber and in the zones of the lock’s heads, concrete surfaces of the quay wall of the upstream berthing area by grout injections.
- Crystallization on the inner walls of the chamber and in the zones of the lock's heads.

4.2.3 Roads

The project includes the reconstruction of the existing internal roads on the both sides, along the lock chamber, which are defined as Road 1 and Road 2, and which are in the function of the subject system, as well as the access area to the control tower, defined as Road 3. Longitudinal and transverse cracks, rutting and potholes with a tendency of further expansion were observed on the roads.

As a proposal for the reconstruction of the subject traffic areas, it is necessary to remove existing layers of the asphalt, all to the reinforced concrete slabs or to the supporting layer of asphalt, and then do the cleaning and spraying of the concrete base with the emulsion. A polyester fiber geocomposite will be placed over the prepared surface. Then, if necessary, construct a slope layer of AB 8 in a thickness of 3 to 5 cm, and new asphalt as a final layer of AB 11 in a thickness of 5 cm.

4.2.4 Hydraulic part

The slope of the river side of the embankment in the downstream berthing area was damaged due to effect of water flow and waves during the operation of the hydroelectric power plant. The upstream spike of the embankment in the downstream berthing area is eroded and therefore it is necessary to repair the upstream spike and repair the part of the slope on the river side of the embankment of the downstream berthing area.

It is envisaged that the crown of the embankment of the downstream pre-port will be brought to the projected elevation of 40 m above sea level with the slopes of the embankment at a slope of 1: 2.5. The body of the

embankment is formed of sandy-gravel material. The flattening of the embankment crown by embankment will be done up to the level of 39.5 m above sea level. The crown of the embankment will be covered with a layer of brakestone 0.5 m thick, with brakestone granulation of 31.5 - 63 mm.

The slopes of the embankment in the downstream berthing area will be protected by a stone embankment (150 - 800 mm on the part of the slope below the elevation of 36 m above sea level and 75 - 400 mm between the elevation of 36 m above sea level and the crown of the embankment). The stone cladding is laid from the level of the embankment crown - 40 m above sea level to the level of 27.2 m above sea level. A layer of stone, 1.0 m thick, is placed on a filter layer 0.5 m thick. Under the filter layer, the installation of geotextiles is envisaged as a preventive measure of protection against soil suffocation under the filter.

At the upstream end, it is projected that the embankment of the berthing area ends with a circular skittle. The lining of the stone embankment is placed on the upstream spike of the embankment and continues in the downstream direction on both sides of the embankment. On the bank side of the embankment slope, the stone embankment is placed at a length of 39 m, all the way to the pedestrian bridge zone, and on the river side, the slope of the stone embankment is placed at a length of 157 m.

Stone material for the filter layer, curtain (breakstone) and lining (stone charge) will be procured from the existing quarry "Slatina", which is located on the road to the village of Slatina.

Earthworks on the rehabilitation of the existing embankment will be performed by floating machinery.

Figure 4.2 - Embankment on the river side in the downstream berthing area at HPNS "Djerdap 2"

Figure 4.3 - Upstream spike of the embankment on the river side of the downstream berthing area at HPNS "Djerdap 2"

4.2.1 Electrical power installations

The project envisages the complete **replacement of the existing 6.3 kV voltage cells** on the lower head of the navigation lock, as well as the installation of a disconnection-switching block on the 6.3 kV side of the transformer on the uppear head of the navigation lock. The project also envisages the replacement of 10 kV cables..

Due to changes in the concept of electrohydraulic shutter drives, the **replacement of power transformers** with new, double-winding dry-type transformers, power 1600 kVA, transmission ratio 6.3 ± 2 x 2.5% / 0.4 kV is also planned. Transformers will be delivered and installed in appropriate factory housings. The existing transformers are dry, double-wound, with a transmission ratio of 6.3 ± 2 x 2.5% / 0.4 kV, power 1000 kVA.

The project envisages the complete **replacement of the existing 0.4 kV distribution lines**, on both navigation lock heads, as well as the power cables for the power supply of the newly designed and existing consumers, which will remain in operation even after navigation lock adaptation. The electric power equipment that is the subject of replacement includes the following: 0.4 kV main switchboard, 0.4 kV sub-distribution cabinets in all technological rooms, 0.4 kV switchboard in the control tower and power cables. The concept of basic and backup power supply of the main 0.4 kV distribution lines will be retained in the newly designed solution.

Diesel generator for power supply of the main voltage distribution of 0.4 kV system of fire protection of the navgation lock. As part of the 0.4 kV voltage works, it is necessary to move the diesel generator from the mixing station, ie install a new diesel generator, 125 kVA, container type, with associated switching equipment, to supply the fire protection system of the navigation lock, on the plateau next to the portal crane on the river side of the upper head of the lock.

The uninterruptible power supply system will meet all the requirements of specific consumers for management and telecommunications that require continuous (uninterruptible) power supply.

The uninterruptible power supply system with a voltage of 231 V and 50 Hz will be formed in the main switchboard of auxiliary voltages, which will be located in the cabin of the control tower. In normal operation, the uninterruptible power supply system will be powered via an inverter. The inverter, single-phase, static, 220V DC / 231V, 50 Hz, power 10 kVA, will be powered from the first busbar section in the main voltage distribution 220 V jss. The backup power supply of the system will be reported from the 0.4 kV main distribution on the upper head via an insulating transformer 231 V / 231 V, 50 Hz. The power of that transformer is 10 kVA and is harmonized with the maximum simultaneous power of all consumers of the system.

DC power supply system. The project envisages complete replacement of DC voltage distribution equipment, as well as all cable connections. DC power will be provided at two voltage levels of 220 V DC and 24 V DC.

The project envisages testing the electrical resistance of existing installations, after which it is necessary to adapt the existing installations in order to ensure the characteristics in accordance with the applicable technical

regulations. In the premises and on the parts of the cable channels in which it is necessary to dismantle the existing installations for the needs of performing construction works, the scope of works will include the installation of new equipment for these installations. In addition to measuring the total transient resistance of the earthing switch, it is planned to record the contact voltage and steps and on the basis of the measured values to propose any necessary additional measures (potential ramps, insulating bases, etc.).

The adaptation of the **control system on the navigaton lock** envisages the introduction of a new, modern, distributed and hierarchically organized system with the following levels of management: level of local management (level of functional units), level of central management (control tower). From the point of view of managing the process of translating a vessel, ie in a functional sense, a navigation lock can be divided into functional units, so that each functional unit consists of individual subsystems, ie processes. The following functional units of the navigation lock are provided: upper head, lower head, auxiliary systems, supporting systems.

All planned new equipment with existing equipment that remains in operation, and which is of interest to the management system, should form a single, integrated and fully consistent system. The selected level of management must not suspend any of the protective functions implemented at any level of the management system. Malfunction or failure at a higher management level must not affect the defined operation of the lower management levels. Regardless of the level from which it is managed, all levels will have the possibility of supervision within their competencies at all times.

Auxiliary systems of the navigation lock, which are the subject of replacement within the project of adaptation, rehabilitation and reconstruction of the navigation lock at HPP "Djerdap 2", in addition to the system for powering consumers of the navigation lock with electricity include: traffic light signaling system; heating, ventilation and air conditioning system; outdoor and indoor lighting system; stable fire extinguishing system; cranes; discharge and drainage system (pumping stations); guide system and door sills; central lubrication system for working double doors.

The equipment of these systems will be replaced with new ones, which will enable the necessary functionality of the system equipment itself and the navigation lock as a whole. The equipment will be defined in accordance with the relevant standards.

Stable fire extinguishing system. The conceptual solution envisages a complete replacement of electrical equipment and installation of this system, which includes distribution cabinets, electric motor drives, measuring and signaling equipment, system management equipment, cables and cable accessories.

Guide rail and door sill heating system. The designed works will include complete replacement of equipment, which includes replacement of induction heating cables (heaters), cabinets with switches to protect heaters from overload and short circuit and contactors for switching on heaters, installation cables for connecting equipment and contact thermometers for automatic on/off of the heaters. Automatic system operation is provided, depending on the measured outdoor temperature.

Cranes. The project of adaptation of the navigation lock envisages a complete replacement of the gantry cranes on the upper and lower heads, as well as the device for raising the overhaul door on the lower head. As part of the crane replacement, electrical equipment and installations will be installed on the new cranes, which will ensure reliable and safe operation of all drives.

Outdoor and indoor lighting system. The project envisages complete replacement of equipment (distribution cabinets, lamps, switches, sockets, brackets, poles) and installation (cables and cable accessories) of indoor and outdoor lighting systems. The newly designed lamps will have LED modules. In accordance with the Internal Standard for lighting of electric power plants JSC "Elektromreža Srbije" IS-EMS 314: 2014, the following types of lighting are provided for lighting of the facility NL "Djerdap 2": Basic (functional) lighting; Security lighting (anti-panic lighting); Auxiliary lighting.

The project envisages a complete **replacement of the existing equipment for heating, ventilation and air conditioning** with a new one, with the application of modern solutions related to this equipment. The electrical part includes the equipment and installations required for power supply and control of the heating and air conditioning system of technological rooms and rooms in the control tower.

Supporting systems of the navigation lock, which are the subject of replacement within the project of adaptation, rehabilitation and reconstruction of the navigation lock at HPP "Djerdap 2" are: electro-hydraulic drive of the safety net, boat mooring system, grid clogging measurement system, water level measurement system , system for measuring meteorological parameters, fire alarm system, vessel detection system, sound system, radar system, video surveillance system, radioactive radiation measurement system, conversation recording system, radio communication system, telephone system.

The equipment of these systems will be replaced with new ones, which will enable the necessary functionality of the system equipment itself and the navigation lock as a whole. The equipment will be defined in accordance with the relevant standards.

Lightning protection system. The project does not envisage works on the replacement of the lightning protection installation.

4.2.2 Mechanical installations

The hydraulic drive of doors and shutters on the upstream head of the ship navigation lock is located in two separate drive facilities on the river and shore side and includes drives for: servomotors of working doors, servomotors of emergency repair doors and servomotors of working gallery shutters. The hydraulic drive installation of the door and shutter on the downstream head of the ship's lock is located in the drive facilities on the river and coastal side and includes drives for: servomotors of working double doors and servomotors of the main gallery shutters.

Rehabilitation and adaptation of electro-hydraulic door and shutter drives envisages replacement of complete existing equipment with a new modern technical concept using modern components and in accordance with the needs of hydromechanical equipment usage after reconstruction.

Execution of works and delivery of equipment for rehabilitation, adaptation and reconstruction of electrohydraulic door and shutter drives will include the following:

- Dismantling of existing equipment and its disposal at the landfill;
- Installation of new equipment for hydraulic drive doors and shutters on the upper and lower head;
- Installation of new hydraulic units equipment in the equipment rooms and control blocks on the upper and lower head;
- Installation of new piping equipment on the upper and lower head;
- Delivery of the required amount of hydraulic oil for filling and flushing the drive system on the upper and lower head, including a reserve quantity of 20% of the quantity required for filling.

Hydraulic drive installations of the safety net for braking ships are located in special rooms on the river and coastal wall of the lower head of the navigation lock and include drives with hydraulic servomotors. Hydraulic brake servomotors are housed in load-bearing steel structures in the river and coastal wall of the lower head of the navigation lock.

Rehabilitation and adaptation of electro-hydraulic drives of the safety net envisages the replacement of complete existing equipment with a new, modern technical concept with the use of modern components and in accordance with the needs of hydromechanical equipment usage after reconstruction.

Execution of works and delivery of equipment for rehabilitation, adaptation and reconstruction of electrohydraulic drives of the safety net will include:

- Dismantling of existing equipment and its disposal at the landfill;
- Installation of new equipment of hydraulic cylinders for the drive of network mechanisms and shock absorption;
- Installation of new equipment of hydraulic units in equipment rooms and control blocks;
- Installation of new piping equipment;
- Delivery of the required amount of hydraulic oil for filling and rinsing the drive system, including a reserve quantity of 20% of the quantity required for filling.

Main operating door on the upstream head

The main operating door is a flat sliding door, located on the chamber of the upstream head of the navigation lock, with a clear opening of 34 x 17 m. It is used to close or open the upstream chamber of the lock when the vessel enters the chamber from the upstream pre-port and vice versa. The door is driven by two hydraulic servomotors, which are connected to the side consoles on the door.

Repairation and adaptation of the hydromechanical equipment of the operating door on the upstream head envisages the replacement of the door construction and the examination of the condition with the repair of the determined damages on the concrete parts. Execution works and delivery of equipment for rehabilitation, adaptation and reconstruction of operating doors of the upstream head will include:

- Dismantling of existing equipment and its disposal at the landfill;
- Sandblasting, non-destructive testing and repair of concrete parts including necessary construction works and anti-corrosion protection;
- New operating doors with associated mechanical parts;
- New sealing set of working doors;
- New connections between the service door to the drive servomotor, including connecting elements.

Working double-leaf door downstream head

On the downstream head there is an operating double door (34 x 17 m), hydraulically operated and used to close and open the chamber and maintain the water level in the chamber. With the repair and adaptation of the hydromechanical equipment of the working double-leaf doors on the downstream head, it is planned to examine the condition and repair the determined damage to the door with the replacement of wearing parts.

The new operating door will be designed for an elevation of normal deceleration of 41.25 m above sea level. The door will be made of welded steel construction using modern materials in order to increase the quality of new equipment.

After works completion on testing and repairing, the renewal of anticorrosion protection will be performed, whereby the mentioned works will also include surface sandblasting. The concrete surfaces parts in contact with the door seals will be metallized with stainless steel or stainless steel strips will be welded. The scope of replacement of parts for working double-leaf doors will include bearings and complete sealing set, as well as timber on the downstream side of each leaf.

Safety net for braking ships

In front of the lower head, there is a system with a net for braking ships in case of an emergency situation when the ship move towards the double-leaf doors on the lower head, while entering into the chamber during the downstream navigation. It is composed of steel ropes with drive servomotors. The drive servomotors are housed in load-bearing steel structures in the river and coastal wall of the downstream head of the navigation lock.

With the repairation and adaptation of the hydromechanical equipment of the safety net, it is planned to examine the condition and to repair the determined damages. Rehabilitation and adaptation of hydromechanical equipment of the safety net will include the following:

- Dismantling of existing equipment and its disposal for the needs of reconstruction works;

- Sandblasting of steel structure of beams and concreted parts;
- Non-destructive testing of steel structure of beams, associated mechanical parts, mesh and concreted parts;
- Testing the network with a test load;
- Repair of damage determined by testing, including necessary construction works and corrosion protection;
- Replacement of mechanical parts on the steel structure of the beam, which will necessarily include all bearings..

Entrance griting

At the water entrance into the gallery of the upstream head, ie. at the water intake, gratings were placed, two pieces, on each water intake, dimensions 4.5 x 4.5 m. Rehabilitation and adaptation of hydromechanical equipment envisages replacement of existing entrance gratings. The gratings will be made of welded steel construction using modern materials in order to increase the quality of equipment and safety and security at work. The design of the new gratings will be adapted for installation in existing niches with concrete parts.

The installation of new gratings will be preceded by sandblasting, non-destructive testing and repair of concrete parts, including necessary construction works and corrosion protection.

Heating and ventilation system

Each of the technological rooms of the navigation lock on the upper and lower head is equipped with its own heating and ventilation system which provides the minimum allowed room temperature (10 °C), as well as the required amount of fresh air.

The rehabilitation and adaptation of the mechanical equipment of the air conditioning and ventilation system includes the complete replacement of the existing mechanical equipment for heating and ventilation of the operating rooms on the upper and lower head and the gallery rooms at elevations of + 37.50 and + 40.30 m. Existing equipment is being replaced with modern devices, with the same characteristics and appropriate safety measures.

The project solution for the adaptation of heating and ventilation of the control tower will include air conditioning of the control room, technical room, room with electrical cabinets and entrance to the gondola via a heat pump with heat recovery in the "split" version. The project solution will include forced ventilation of all rooms in the control tower via a duct recuperator as well as heating of toilets and stairs via a modern electric boiler of 70 kW, hot water radiators and pipes that will run inside the gondola.

Cranes

To service the equipment of the upstream head, a portal crane with a load capacity of 400 kN and a span of 7.5 m has been installed on the coastal side, which is used for manipulating equipment in the drive room, and

for manipulating equipment and installations necessary for gallery operation. To service the upstream head equipment, a portal crane with a load capacity of 400 kN and a span of 7.5 m has been installed on the river side, which is used for manipulating equipment in the drive room, as well as for manipulating equipment and installations necessary for gallery operation. To service the downstream head equipment, a portal crane with a load capacity of 400 kN and a span of 12 m has been installed on the river side, which is used for manipulating the equipment in the drive room, as well as for manipulating the equipment and installations necessary for gallery operation. The drive rooms on the river and coastal side of the upstream head are equipped with one bridge crane with a load capacity of 20 kN and a span of 5.7 m. The drive room on the costal side of the downstream head is equipped with a bridge crane with a load capacity of 20 kN and a span of 5 m. The drive room on the river side of the lower head is equipped with one bridge crane with a load capacity of 20 kN and a span of 7.5 m. The pumping station for emptying and drainage on the river side of the downstream head is equipped with one bridge crane with a load capacity of 80 kN and a range of 5.0 m.

With the rehabilitation and adaptation of the cranes on the navigation lock, the replacement of the existing equipment is planned. Existing crane tracks and bumpers for portal and bridge cranes will be inspected and any identified damage will be repaired. In addition, the renewal of anti-corrosion protection is planned.

Discharge and drainage system

One **pumping station for emptying and drainage** is planned on the river wall of the upstream head of the navigation lock and one on a coastal wall of the upstream head of the navigation lock. The function of each of the pumping stations is as follows: emptying the niche of emergency-overhaul and operating doors, emptying the space between the overhaul gallery shutters, drainage of the room at elevation 37.5 m and 34.3 m, drainage of the pipeline gallery on the coast, drainage of the cable gallery on the river side and drainage of the manhole of the shutter.

Rehabilitation and adaptation of the drainage and drainage system at the navigation lock means the replacement of the existing equipment in the pumping pools, pumping stations, shafts and shutters on the upstream and downstream head of the lock.

The existing equipment of the drainage and discharge system will be dismantled and replaced with a new one of the same basic technical characteristics with the application of modern design, components and materials in order to increase the quality of equipment and safety and security at work. Auxiliary equipment for access to the main equipment of the drainage and discharge system consisting of access platforms, climbers and fences, as well as concreted parts of the pipeline will be subject to inspection and repair or replacement in accordance with the condition determined by the inspection.

Automatic lubrication system for working double gates

For automatic lubrication of wing bearings and drive servomotors of working gate, a central lubrication system is installed on the river and coastal side of the downstream head of the lock. One device located in the room of the appropriate drive servomotor is provided for lubrication of the bearing of the coastal and river wing of the working door on the downstream head of the conductor. The distribution of the grease pipe from the lubrication device to the grease points on the door is performed through the gallery in the niche of each door leaf.

Rehabilitation and adaptation of the central lubrication system of double working gate envisages dismantling of existing equipment and replacement with a new of the same basic technical characteristics with the application of modern design, components and materials in order to increase the quality of equipment and safety and security at work. The new equipment of the lubrication system will be adjusted to the technical solution of the installation of new drive servomotors and reconstructed assemblies of working double gate envisaged in other parts of the machine design.

Stable fire extinguishing system

Stable fire protection system consists of: pumping station for water pumping from wells, pumped water tank, pipe water supply from the tank to the navigation lock, pipe water distribution along the walls of the lock chamber, storage and preparation system of foam extract, foam extract distribution along the walls of the lock, Venturi mixers in the places of monitors, the monitors along the walls of the chamber, the fire protection control system in the control tower.

Rehabilitation and adaptation of the mechanical equipment of the stable fire extinguishing system includes the replacement of the existing valve equipment in the shut-off of the pumped water tank and of the complete equipment on the lock. The equipment that is the subject of replacement will be dismantled and replaced with a new one of the same basic technical characteristics by applying modern design, components and materials in order to increase the quality of equipment and safety and security at work. In addition to the new equipment, the delivery of the required amount of foaming extract is also planned.

5 OVERVIEW OF MAIN ALTERNATIVES CONSIDERED BY THE PROJECT HOLDER

Within the project of adaptation of the navigation locks, no alternative solutions were considered. Given the type and scope of interventions (replacement of equipment) on the planned adaptation, it was not applicable to consider alternative solutions, but the timely replacement of worn-out and unreliable equipment that calls into question the continued functioning of the navigation locks.

For the the replacement of the existing equipment, new equipment of a modern technical concept, with the application of modern components, and in accordance with the needs of the navigation lock was chosen.

If we would talking about alternatives related to the need for adaptation, two alternatives could be conditionally considered:

- An alternative implying doing nothing,
- Proposed adaptation / revitalization considered in the project.

An alternative implying doing nothing would soon cause a complete cessation of river traffic through the navigation lock, because due to the wear and unreliability of certain parts of the equipment, sooner or later the lock would stop working. However, this is an unrealistic scenario considering the priority given to this project by the Government of the Republic of Serbia, i.e. the relevant Ministry of Construction, Transport and Infrastructure (Project holder). In this context, this conditional alternative cannot be seriously considered.

The only alternative to the proposed adaptation of the navigation lock is in combination with the implementation of measures to prevent and eliminate possible negative effects on the environment, and it is favorable for the environment itself, because ensuring continuous functioning of the facilities and installations creates preconditions for preventing possible negative effects on environment due to work of worn equipment and use of damaged parts of the navigation lock.

6 DESCRIPTION OF THE ENVIRONMENT CONDITIONS

Air quality

The territory of the municipality of Negotin is not covered by the national network of automatic stations for air quality monitoring. The examination of air quality in the summer and winter period is performed by the Institute for Public Health "Timok" from Zajecar. An apparatus for sampling sulfur dioxide, soot and sediment was installed in JNA Street No. 10 in Negotin (8 km by air from the navigation lock). According to the data on the results of air quality monitoring published on the website of the Municipality of Negotin, the measured values were within the limit values or slightly deviated from them.

Surface water quality

The Serbian Environmental Protection Agency (SEPA) is the official institution for providing data on the quality of surface and groundwater and river sediments in the Republic of Serbia, as well as on the quality of other environmental medium, starting in 2011.

Monitoring of the quality of the Danube River is performed at a total of nine stations, of which Brza Palanka and Radujevac are the closest to HPP "Djerdap 2". Brza Palanka is located about 21 kilometers upstream, and Radujevac 10 kilometers downstream from the navigation lock. At both measuring stations, monthly monitoring of general parameters, oxygen regime, nutrients, salinity, metals, microbiological parameters and priority and priority hazardous substances is performed.

By the Decree on the categorization of watercourses ("Official Gazette of the SRS" No. 5/1968), the Danube River, throughout its course through the Republic of Serbia, is classified in the II category. According to the Regulation on Water Classification ("Official Gazette of the SRS" No. 5/1968), class II includes waters that are suitable for bathing; recreation and water sports, for the cultivation of less noble species of fish (cyprinids), as well as waters that can be used with normal methods of processing (coagulation, filtration and disinfection) to supply the settlement with drinking water and in the food industry.

The results of analyzes of surface water samples (watercourses), ie the relevant values of parameters for the annual period, were compared with the limit values of quality classes prescribed by the Regulation on limit values of pollutants in surface and ground waters and sediments, and deadlines for achieving them ("Official Gazette of RS" No. 50/2012).

The values of priority and priority hazardous substances are compared with the values of environmental quality standards (EQS), ie annual average value (AA-EQS) and maximum allowable concentration (MAC-EQS), prescribed by the Regulation on limit values of priority and priority hazardous substances that pollute the surface waters and deadlines for their achievement ("Official Gazette of RS", No. 24/2014). To determine the quality class, the criteria prescribed by the Regulation ("Official Gazette of RS" No. 50/2012) were used.

According to the results of surface and groundwater quality testing for 2017, 2018 and 2019, the tested parameters at both measuring stations mostly corresponded to categories I and II. Deviations from the prescribed category of the Danube River, during the mentioned three years and at both measuring stations, were in terms of nutrient concentration (nitrogen and phosphorus compounds), total iron and microbiological parameters. Also, the presence of dissolved nickel and fluoranthene in concentrations corresponding to categories III/IV was determined.

The following table provides an overview of the parameters that deviated from the prescribed category of the Danube River.

Table 6.1 – Danube water quality in 2017, 2018 and 2019 - an overview of parameters that deviated from the prescribed category

Year	Measuring station	Deviations from category II
2017.	Brza Palanka	Total nitrogen (III) Iron, total (III)
	Radujevac	Total nitrogen (III) Nitrites (III) Total phosphorus (III) Iron, total (III) Number of aerobic heterotrophs (III) Nickel dissolved 1x (III/IV)
2018.	Brza Palanka	Dissolved oxygen (III) Total coliforms Number of aerobic heterotrophs (III) Fluoranthene 1x (III / IV)
	Radujevac	Dissolved oxygen (III) Total phosphorus (III) Orthophosphates (III) Fluoranthene 1x (III / IV)
2019.	Brza Palanka	Number of aerobic heterotrophs (III) Fluoranthene 1x (III/IV)
	Radujevac	Iron, total (III) Number of aerobic heterotrophs (III) Nickel dissolved 1x (III/IV)

Sediment

The publication "Quality of river sediment and accumulations of Serbia", issued by the Serbian Environmental Protection Agency in 2019, contains the results of testing the quality of river sediments and accumulations from the annual surface water monitoring programs for the period from 2012 to 2017. The sediment samples

were tested for heavy metals (zinc, copper, chromium, lead, cadmium, mercury, nickel, arsenic) and organic pollutants (polycyclic aromatic hydrocarbons (PAH), polychlorinated biphenyls (PCBs), organochlorine pesticides and triacin-based pesticides).

The results of the analysis of heavy metals show that at the sampling point in Brza Palanka, the limit values were not exceeded, while in the samples from the Radujevac measuring station, the values for copper and nickel were exceeded.

Of the tested organic pollutants, the content of p,p'-DDE on the profiles Brza Palanka (2.6 μg/kg) and Radujevac (1.7 μg/kg) indicate that the maximum allowed concentrations have been exceeded.

Soil quality

On the territory of the municipality of Negotin, systematic examinations of soil quality are not performed. The land is more or less degraded by various natural and anthropogenic processes. Anthropogenic soil pollution originates from the chemical industry from which powdery substances are emitted into the air, which are later deposited on the soil, as well as from the dispersal of pyrite burn from the landfill in Prahovo and the seepage of atmospheric water from the phosphogypsum landfill.

The assessment of the land quality in the area of Negotin was performed in 2005, within the project "Control of fertility and determination of the contents of dangerous and harmful substances in the soils of the Republic of Serbia". It was determined that the limit values of nickel were exceeded in most of the samples. Copper concentrations were increased in three samples and cadmium in one.

7 DESCRIPTION OF POSSIBLE SIGNIFICANT EFFECTS OF THE PROJECT ON THE ENVIRONMENT

The effects of revitalization of the navigation lock on the environment can be considered through two phases:

- project implementation phase, i.e. work on the revitalization of the navigation lock and
- exploitation phase after the completion of project works.

7.1 Impact due to the construction works

During the works on the rehabilitation, adaptation and reconstruction of the navigation lock, there will be environmental impacts that are mostly temporary and limited to the immediate environment. Impacts occur as a consequence of the presence of people, the use of machinery, the methodology of work and last as long as the work lasts. With the cessation of works, the influences also cease. During the execution of works, there will be impacts on air quality, surface waters, soil quality, river sediment quality, noise and vibration levels, population health and the ecosystem.

7.1.1 Impacts of the project during the execution of works on air quality

During the works on the execution of the project on the rehabilitation, adaptation and reconstruction of the navigation lock emissions of dust, exhaust gases from engaged construction machinery and vehicles, emissions of dust during embankment of stone and installation of gravel on the crown of the embankment in the downstream pre-port, emissions of vapors from volatile organic compounds contained in anti-corrosion protection agents will occur.

Short-term negative impacts of emissions of pollutants into the air can be expected only in the area of works and in the immediate vicinity, during the works. With the work cessation, these influences also disappear.

By engaging construction machinery, exhaust gases are emitted depending on fuel quality, operating mode and engine load. Exhaust emissions will depend on the type of machinery used, the condition of the equipment maintenance and the type of motor fuel.

7.1.2 Impact of the project during the execution of works on the quality of surface waters and water regime

During the implementation of the project, there may be a negative impact on the water quality in the Danube and the lock chamber due to: works on the rehabilitation of concrete surfaces when using special high-quality concrete, penetrating crystallization material and modern materials based on polyurethane, cleaning concrete surfaces and metal structures from rust, dust, oil and other impurities by brushing, sandblasting or applying compressed air, using coatings to protect metal surfaces from corrosion (primer and anti-corrosion protection)

and final paints, leakage of hydraulic oil from replaced elements of electro-hydraulic door and shutter drive equipment, works on the reconstruction and rehabilitation of the embankment in the downstream berthing area, leakage of waste hazardous materials (machine oil, fuel) from construction machinery and means of transport on the shore and from construction machinery.

During working on concrete structures, i.e. during cleaning concrete surfaces and possibly metal structures from rust, dust, oil and other impurities by brushing, sandblasting or using compressed air, during dismantling existing and installing new equipment, as well as during transportation of the construction materials, equipment and the generated waste dust will be emited that can enter the watercourse directly, by deposition from the air, or by rising from manipulative surfaces and roads. The quality of surface water can also be affected by accidental spillage of concrete, crystallization material or polyurethane-based material into surface water.

Dust emitted during works on rehabilitation and adaptation of the navigation lock, having in mind the size of work surfaces, simultaneous organization of a small number of workplaces and the flow of the Danube, will have a negligible impact on the water quality of the Danube, while accidental spills are prevented by applying clearly defined procedures for the execution of works. Also, trained construction workers will be engaged in the execution of works, which will prevent unwanted effects of works on water quality. This impact will be temporally and spatially limited to the period during the performance of works and to the water environment of the berthing area and directly downstream from it.

When using coatings for protection of metal surfaces from corrosion (primer and anti-corrosion protection) and final paints, due to carelessness, these substances can reach surface waters. Controlled use of coatings and application of other prevention measures such as the use of proper equipment, training of employees, etc. these impacts are prevented or minimized.

When replacing an element of mechanical equipment, leak of hydraulic oil used to drive the doors and shutters may occur. Disassembly of the equipment will be performed only after the oil has been drained. Complete replacement of hydraulic oil will be carried out according to the regulations in force within HPNS “Djerdap 2”. Any risk of possible oil leakage is covered by the existing technical solution, which is already used on the entire system of HPP “Djerdap 2”.

The use of floating barriers in the upstream and downstream berthing area during the replacement of equipment prevents the possibility of oil reaching the Danube River and the indirect negative impact on the living world in the water. The favorable circumstance is also that during the works on the project, the chamber of the navigation lock will be emptied, so if dust and accidental spills reach the chamber they will be collected and disposed as waste.

During the embankment and disposal of soil or stone material, certain amounts of soil can reach the surface waters, i.e. suspended material. The increase in the concentration of dry matter during the embankment of crushed stone in the downstream berthing area is of a local character, and related to the right bank of the embankment. By moving away from the embankment, the water clears up quickly.

The use of proper machinery and equipment and the application of procedures for the execution of works reduce the environmental impacts of the project to a minimum.

During the works, the navigation lock will be emptied and closed to traffic. The project does not envisage any other procedures for the regulation of the water regime in the catchment area, so that the planned works will not have an impact on the water and watercourse regime.

7.1.3 Impacts of the project during the execution of works on the quality of the land

Impacts during the execution of works on the land can occur due to: the formation of temporary landfills on the ground, the formation of temporary warehouses of construction materials during the adaptation, permanent disposal of waste, leakage of harmful substances, i.e. oils and fuels from construction machinery, which is in operation on the coast, by taking up space for the needs of the construction site.

7.1.4 Impacts of the project during the execution of works on the quality of river sediment

The change in the quality of river sediment can be caused by presence of building material residues (special concretes, epoxy resins, penetrating materials and polyurethane-based materials) and steel material (parts of metal structures and their waste during operation), used during revitalization of building structures, leakage of hazardous waste (machine oil, fuel) from navigable construction machinery.

Taking into account the type and scope of work, the greatest impact on the quality of the river sediment will have dust that will occur during the planned works on refurbishment of existing facilities, dismantling of existing and installation of a new equipment, as well as transport of construction materials, equipment and waste. The dust will contain particles of metal, paint, protective agents, insulation and other pollutants. Dust will reach the watercourse directly by deposition from the air or by rinsing from manipulative surfaces and roads. Taking into account the sizes of the surfaces which have to be rehabilitated and the magnitude of the Danibe flow the impact of dust generated during the revitalization works will have a negligible impact on the quality of the Danube sediment. This impact will be limited in time and space for the period during the execution of works and on the waters of the berthing area and immediately downstream from it.

By applying protection measures, negative impact on sediment is prevented and reduced to acceptable limits.

7.1.5 Impacts of the project during the execution of works on the level of noise and vibration

Noise emissions will occur during construction and ground equipment works. The noise will have the greatest negative effects on the construction site of the navigation lock and in its immediate vicinity, and it is of a temporary nature.

7.1.6 Impacts of the project during the execution of works on the health of the population

No direct impact of the revitalization works on the health of the surrounding population is expected.

7.1.7 Impacts of the project during the execution of works on the ecosystem

Before the beginning of revitalization, for the needs of opening the construction site, the existing vegetation and the reproductive layer of the soil are removed from the soil surface.

Having in mind that the Danube River is corridor of birds migratory species and that the works on the rehabilitation and adaptation of the navigation lock will be concentrated on the navigation lock itself, while the accompanying activities will be performed in the narrow area that is connected with HPP "Đerdap 2", it is not expected that bird fauna suffer any significant impact due to project work if the replacement of fluids in the system (such as mineral oils), or the replacement of equipment containing mineral oils, is performed in such a way that mineral oils or other fluids do not reach surface waters and land. Also, it is expected that the presence of people and the execution of works will have a repulsive effect, so the animals will move away from the location of the works, which will prevent the occurrence of accident situations.

Works on the rehabilitation of the embankment of the downstream berthing area can lead to an increase in the concentration of suspended sediment. The occurrence of water turbidity threatens, directly or indirectly, the aquatic ecosystem. The effect of increasing the concentration of suspended sediment is reflected through the reduction of light reaching the bottom and lowering the levels of dissolved oxygen. This impact will be concentrated to the immediate environment of works. By moving away from the embankment the water will be cleared up quickly due to large flow of Danube River. Also, by careful work of the mechanization and the choice of stone without soil impurities, this impact will be more reduced to a minimum. No significant impact of works on the rehabilitation of the embankment on the Danube fauna is expected.

It is not expected that the adaptation and rehabilitation of the navigation lock in any period of adaptation will affect fish spawning, because the adaptation itself will not significantly affect the water regime and water quality of the downstream berthing area, as well as reservoirs upstream from the dam, so it will not affect the natural conditions. during spawning.

The navigaton lock on the dam of HPP "Đerdap 2" did not show significant effects on the passage of fish and migratory species. The passage of fish and migratory species through the navigation lock is accidental and sporadic, so the works on rehabilitation and adaptation will not negatively affect the fish stock, and especially not the migratory species. Also, since navigation lock will be closed during the rehabilitation works, the entry and passage of other fish species through it, which is already stochastic and irrelevant for their characteristics of life and survival, will be disabled.

7.2 Influences during the operation of the navigation lock

The realization of the planned works will not lead to a change in the purpose and function, or the way the navigation lock works. The impacts will remain the same as before the project, with the new equipment leading

to greater safety at work and reducing the possibility of unwanted accidents that could have negative impacts on the environment.

The most significant impact on the environment that HPP “Đerdap 2” has is the prevention of migration of endangered fish species such as sturgeon species and herring. Adaptation and rehabilitation of the navigation lock on the dam of HPP “Djerdap 2” includes activities on the lock itself which is not directly related to the possibility to substantially contribute to eliminating the consequences of obstruction of migratory routs caused by the construction of the dam or to improve the current situation.

The navigation lock itself proved to be unsuitable to simultaneously efficiently perform the role of fish passageways. The passage of fish through them is primarily a random phenomenon because the fish are not attracted to enter them due to the very nature of their function, i.e. hydraulic properties that navigation locks have to perform their role. When the lock opens downstream to let the ship to enter it, it only slightly amplifies the current that enters it, and the fish need a more permanent stream of water of a certain strength to signal that it is a fish passage. In every section and step of transferring in the navigation lock, they need such a water current, and they only have it periodically. When the vessel enters from the upstream side, the situation is again unfavorable in terms of water flow, because the water current of adequate strength for sturgeon fish is missing.

Also, the lock is placed in calm, lateral, coastal parts of the rivers so that vessels can maneuver as easily and successfully as possible when entering and leaving them, and therefore the output current is a signal to fish to enter the lock from the downstream side to migrate upstream of the dam too weak to be adequate. Some authors estimate that less than 1.5% of migrating fish entered the lock at the Boneville Dam on the Columbia River in Oregon.

Although it is possible to make modifications to the operation of the lock that can mitigate the problem of low input signal from the downstream side and thus somewhat overcome it by leaving the gate open when filling the lock from the upstream side, it is unlikely that in the case of navigation lock operation it is possible to achieve this without consequences for the river transport for which the locks are intended. These modifications of the operation of the navigation lock do not include any technical changes, but only changes in the mode of operation which at the Beaucaire lock in Rhône, France, ensured that in 49 cycles of operation more than 10,000 migratory herrings, i.e. shads (order Clupeiformes, family Clupeidae upeidae, genus Alosa) passes into the upstream parts of the river. This can serve as a suggestion that helps preserve endemic migratory (anadromous) Black Sea (Pontic) shads - herrings which, in addition to sturgeons, are the most endangered by the interruption of migration routes along the Danube, but is contrary to the basic transport function of the lock. When it comes to the revitalization of the existing lock and its impact on migratory species, it is not expected that it will be different from the one that the lock had during its regular operation, nor there are any possibilities to change that impact during the reconstruction, neither in negative nor in a positive way, because the lock itself does not represent a means of influencing the interruption of migration routes, nor it is able to effectively provide mitigation of that interruption or its elimination.

Within the alternatives that were considered within the development of the proposed navigation lock adaptation project, the possibilities of realization of the fish path were considered. Relying in that context on the River Basin Management Plan (GD 80/2011) for the adoption of the National Management Plan for the Romanian part of the Danube Basin (Mielach et al. 2012), it was assessed that there are no conditions for the construction of the fish paths on dams exceeding 15 m. That height is considered the maximum in that study, technically feasible for solving the problem of building fish paths, so it was accepted in this case as well. The dams on the Danube and the construction of fish paths on them were separated from the mentioned plan and, according to Plan, should be solved under the auspices of the International Commission for the Protection of the Danube (ICPDR). Having in mind the above, this option was not the subject of the navigation lock adaptation Project, and therefore of the Environmental Impact Assessment Study.

8 ENVIRONMENTAL IMPACT ASSESSMENT IN CASES OF ACCIDENTS

The most significant possible accident situations are:

- Leakage of oil and/or derivatives from a damaged vessel;
- Fire on the vessel and in the lock chamber;
- Discharge of hazardous water-soluble substances from the damaged vessel.

In addition to the above-mentioned accident situations, smaller-scale accident situations may also occur on the project, such as:

- leakage of oil and oil derivatives from construction machinery engaged on concrete facilities of the navigation lock,
- oil leaks when replacing equipment or from replaced equipment,
- leakage of temporarily stored hazardous substances.

During the works on the rehabilitation, adaptation and reconstruction of the navigation lock, the navigation lock will be closed for crossing and the chamber will be emptied. If a accident situation occurs and oil and/or oil derivatives are spilled from the mechanization tank into the navigation lock chamber, it will not reach the surface water but will be collected by adsorption means.

Smaller accidents (oil leaks from the tanks of vehicles) are also possible on roads and manipulative surfaces around the navigation lock, and their impact is limited to the concrete surfaces of the ship from which leaked substances can be collected. Accidental leaks due to damage to the packaging are possible in the storage of chemicals (fuels, oils and lubricants, paints and other substances).

Pollution of surface waters and land from the state road, class IIa, no. 168, connection with the state road 35 - Dušanovac - state border with Romania (border crossing Kusjak), is also possible because all the waste generated during the reconstruction of the navigation lock will be transported via it, so any accident in this sector of the road will adversely affect on the soil around the navigation lock, which is sloping towards the Danube and possibly to groundwater.

Accident situations on engaged navigational machinery can lead to surface water pollution.

The accident situations that may occur during the operation of the project will remain the same as during the existing operation of the navigation lock, namely oil spills and oil derivatives, fire and explosions due to the presence of a large amount of hydrocarbons.

The occurrence of fires on vessels in the navigation lock can most often occur during the passage of tank ships transporting large quantities of oil and derivatives, when due to unfavorable conditions there is increased evaporation and formation of clouds of flammable and explosive vapors in the lock chambers. After the revitalization of the navigation lock, an identical concept of the existing fire protection will be used. The revitalization of the navigation lock includes the replacement of the existing fire extinguishing equipment with

new ones, as well as fire alarm signals, which enables a quick response. When a fire occurs on board, the revitalized fire protection system enables the fire to be alarmed in an appropriate manner and the successful extinguishing of the fire that may occur in the lock chamber.

The consequences of the accident depend on the place of origin, type and amount of spilled substance, its physical-chemical and toxicological characteristics, meteorological and hydrological conditions, preventive measures taken, as well as the speed and efficiency of intervention of the vessel's crew and competent HPP services.

Taking into account the quantities of substances transported through the navigation lock and the frequency of transport, it is most likely that oil and/or oil derivatives will spill. The spill in the lock chamber also increases the danger of fire, so the spill of hydrocarbons and fire are the two most significant possible accidents during the operation of the navigation lock.

The following hazardous substances will be present during the project:

- petroleum and petroleum products in construction machinery, vehicles and vessels,
- lubricants in the equipment of the navigation lock which is subject to replacement.

Oil is a thick and viscous liquid, poorly soluble in water. When oil reaches the surface of the water, it forms an oil slick, after which various processes appear, the intensity of which is influenced by the physico-chemical characteristics of the oil itself, ie. its derivatives, climatic conditions, hydrological conditions, etc. The main processes that contribute to the decomposition of oil in water or on water surfaces are: evaporation, dissolution, emulsification, dispersion, precipitation, oxidation and microbiological degradation.

Under the influence of external factors, lighter fractions evaporate (with a lower boiling point), the density of oil increases and it sinks to the bottom.

The dissolution of oil in water is very weak and is limited to lighter fractions. The emulsifying mechanism results in the formation of a stable emulsion known as "chocolate moss". Emulsification slows down the decomposition of oil due to less exposure of oil to water and air.

Dispersion mechanically or chemically contributes to the increase of surface pollution and its penetration into underground layers. It selectively affects the solubility of the oil by increasing the surface area of the oil spill and thus increasing the solubility of the low molecular weight components.

Oil deposition occurs as a consequence of oil aging, which results in an increase in the density of the spilled oil. When the density of the oil becomes higher than the density of the water, the oil will sink. The oil can also sink if it has previously been adsorbed on heavy particles of sand and silt.

Polycyclic aromatic hydrocarbons have the property of concentrating on suspended particles of organic matter. The sorption process is influenced by the mineral composition of the soil, temperature, pH and the

characteristics of the compound itself. Sorption is most intense on particles of sand, clay and organic matter, which is related to the size and structure of these particles.

Analysis of the probability of accident situations

According to the Rulebook on the content of the accident prevention policy and the content and methodology of drafting the Safety Report and the Accident Protection Plan ("Official Gazette of RS", No. 41/2010), the risk of a chemical accident is assessed on the basis of the probability of an accident and the extent of the possible consequences.

The probability of an accident is expressed numerically or descriptively as small, medium and large, and the consequences as small, significant, serious, large and catastrophic.

Depending on the probability of an accident and the consequences that would occur, the risk of a chemical accident is defined as: negligible, small, medium, large and very large risk, according to the criteria shown in the following table.

Table 8.1 - Risk criteria based on the probability of an accident and possible consequences

Probability of an accident	Consequences				
	small	significant	serious	large	catastrophic
Low	negligible risk	low risk	medium risk	high risk	very high risk*
Medium	low risk	medium risk	high risk	very high risk*	very high risk*
High	medium risk	high risk	very high risk*	very high risk*	very high risk*

* risk is not acceptable

Risk is acceptable if it is assessed as: negligible, low, medium and high risk. Acceptable risk can be managed under certain conditions, prescribed regulations and a defined course of action when performing hazardous activities.

At the shipyard of HPP "Djerdap 2", the two most unfavorable scenarios of possible accidents are large spills from a thin vessel and a fire on the vessel. According to domestic and world experiences, the probability of these accidents is very low.

The assessment of possible consequences was performed on the basis of an analysis of events according to the criteria of the Rulebook on the content of accident prevention policy and the content and methodology of the Safety Report and Accident Protection Plan ("Official Gazette of RS", No. 41/2010) and is shown in the following table.

Table 8.2 - Risk assessment for the navigation lock HPP "Djerdap 2"

Type of accident	Probability of occurrence	Consequences	Risk assessment
Large spills from a tank vessel	low	significant	low
Fire on the vessel	Low	significant	low

The possible level of accidents is determined based on the width of the vulnerable zone and vulnerability analysis. In the chamber, the level of accidents is assessed as the level I of accidents - the level of dangerous plants where the consequences of the accident are limited to part of the plant (installation) or the whole plant, at the same time there are no consequences for the whole complex, because the water area is completely closed.

In berthing areas, the level of accidents is assessed as II level of accidents - the level of the complex where the consequences of the accident are limited to part or whole complex, at the same time there are no consequences outside the boundaries of the complex. No major impact on the Danube river is expected, due to the existence of a floating dam and equipment for collecting spilled derivatives. The accident will have no effect on the Romanian side of the Danube.

9 TRANSBOUNDARY ENVIRONMENTAL IMPACT

As a signatory to the ESPOO Convention (Law on Ratification of the Convention on Environmental Impact Assessment in a Transboundary Context, "Official Gazette of RS - International Agreements", No. 102/2007) and the Kiev Protocol (Law on Ratification of the Kyoto Protocol to the United Nations Framework Convention on Change climate, "Official Gazette of RS", No. 88/2007 and 38/2009), as well as international agreements related to the conservation of migratory species (Law on Ratification of the Convention on the Conservation of Migratory Species of Wild Animals, "Official Gazette of RS - International Agreements" , No. 102/2007); and other international agreements; The Republic of Serbia has undertaken to inform other countries regarding projects that may have a transboundary impact.

In 2018, Serbia also adopted the Law on Ratification of the Multilateral agreement among the countries of south-eastern Europe for implementation of the Convention on Environmental Impact Assessment in a Transboundary Context ("Official Gazette. RS Gazette ", no. 12/18), made on 20th of May 2008 in Bucharest.

The Espoo Convention defines transboundary impact as: "any impact, not only of a global nature, within an area under the jurisdiction of a Party, which causes a proposed activity whose physical origin is wholly or partly wholly or partly within an area under the jurisdiction of the other Party".

The project implies the specificity of specific circumstances:

1. It is a project for the adaptation of a facility that has been in operation for decades at the same location, and for which an Environmental Impact Assessment Study was conducted in 2009, which passed the procedure in accordance with the relevant legislation;
2. As the works have not been performed until today, a new project has been prepared, which takes into account the current condition of the facilities and equipment of the navigation lock. At the request of the project proponent, the competent authority decided to update the existing impact assessment study
3. Adaptation of the navigation lock implies the replacement of worn parts and equipment, repair of concrete surfaces and reconstruction and rehabilitation of the embankment in the downstream part of the berthing area, without changing the purpose of the facility and its functions;
4. The works will be performed with the application of all preventive measures for environmental protection which will minimize the possible negative impacts of the project on the environment, which were assessed in the Study as: small, local, of minimal spatial dispersion and temporary.

The analysis of the project and its environmental impacts did not identify possible transboundary environmental impacts of the project. During the works, if there are accidental oil leaks from the vessels engaged in the reconstruction and rehabilitation of embankments or concrete structures in the berthing areas, the leaked contents will be collected by floating dams and other equipment for repairing the spill owned by HPP "Djerdap 2". HPP "Djerdap 2" has adopted procedures, a trained team and equipment for reacting in case of accidents, so if an accident occurred, the pollution would be contoured and remediated with a quick reaction.

Minor pollution with suspended matter that will occur due to the works on the embankment will be maintained first along the embankment right bank, and then it will be diluted very quickly due to the huge flow of Danbe river.

Dust emissions due to the repair of concrete structures and possibly due to the repair of reinforcement, if the need arises, can affect the air quality of the immediate environment. Due to climatic characteristics, i.e. in the presence of wind, dust can be dispersed, the concentration of which decreases significantly with distance from the source. Having in mind the surface on which the rehabilitation works will be carried out and flow of the Danube, it can be said that dust emissions will not significantly affect the water quality, as well as animal world in it. It is also advantageous that during the works on the rehabilitation of the chamber, the chamber will be emptied, so any generated dust in the chamber will be collected and disposed of as construction waste.

Except that during execution of works the navigation lock will be emptied and closed for traffic, the project does not envisage any procedures for regulation of the water regime in the area of the navigation lock, so the planned works will not have significant impact on the watercourse regime.

The planned works on the rehabilitation, adaptation and reconstruction of the navigation lock HPP "Djerdap 2" will not have any effect on the environment of Romania, i.e. on the quality of air, water, population, phytocenoses present in Romania, as well as on ichthyofauna and other environmental factors.

As HPNS "Djerdap 2" is located on the Danube River along which the border with the Republic of Romania goes, the Republic of Romania was notified on the subject project in accordance with the ESPOO Convention.

10 DESCRIPTION OF MEASURES PROVIDED TO PREVENT, REDUCE AND ELIMINATE SIGNIFICANT ADVERSE IMPACTS

Necessary measures to reduce or prevent adverse impacts can be systematized into the following categories:

- Protection measures provided by law and other regulations, norms and standards and deadlines for their achievement
- Protection measures provided by the technical documentation and conditions of the competent authorities and organizations
- Protection measures during project construction
- Protection measures during the regular operation of the project
- Protection measures in case of an accident
- Protection measures in case of cessation and decommissioning of the project.

10.1 Protection measures provided by law and other regulations, norms and standards and deadlines for their achievement

The measures provided by laws and other regulations include the application of norms and standards in the selection and acquiring of devices and equipment for the proposed technological process, as well as those technical measures according to which the collection of all waste materials will be performed.

Air protection measures will be in accordance with the Law on Air Protection ("Official Gazette of RS", No. 36/09 and 10/13) and accompanying bylaws.

Water protection measures will be in accordance with the Law on Waters ("Official Gazette of RS", No. 30/10, 93/2012, 101/2016, 95/2018 and 95/2018 - other law) and accompanying bylaws .

Soil protection measures will be in accordance with the Law on Soil Protection ("Official Gazette of RS", No. 112/15) and accompanying bylaws.

Noise protection measures will be in accordance with the Law on Environmental Noise Protection ("Official Gazette of RS", No. 36/09, 88/10) and accompanying bylaws.

The treatment of waste materials will be in accordance with the Law on Waste Management ("Official Gazette of the RS", No. 36/2009, 88/2010, 14/2016 and 95/2018 - other law) and the accompanying bylaws.

In addition to these legal acts, during operation, it is necessary to comply with regulations in the field of environmental protection, which relate to environmental protection, nature protection, protection against non-ionizing and ionizing radiation, fire protection, transport of hazardous cargo, planning and construction, as well as laws governing labour and occupational health and safety and others.

The contractor is obliged to comply with all applicable legal regulations in the field of occupational health and safety during the execution of works.

10.2 Protection measures during the execution of works

Air quality protection measures

Reducing the impact of emissions of harmful gases and dust on air quality will be reduced by applying the following measures:

- Limiting the number and area of locations where works are performed as well as the duration of works;
- Building enclosures such as vinyl tarps, heat-shrinkable plastic sheets, reusable fabric products or others around the work area, where the blasting is performed, to provide containment;
- Collection of waste generated by cleaning concrete and metal structures and its disposal as a waste;
- Daily cleaning of access roads near the site (removal of soil and sand) to prevent the formation of dust;
- Daily cleaning of manipulative and work surfaces from construction waste. After demolition and removal of unusable material (rubble, etc.), the construction site must be clean, orderly and ready for performing new works;
- Controling the scattering of loose materials from vehicles and at the location for storage of excavated material;
- Proper selection of construction machinery and vehicles for the procurement of modern devices with the lowest exhaust emissions;
- Monitoring and maintaining the condition of the engines and machinery, in order to eliminate excessive exhaust emissions,
- Shutting down the engine when machinery and vehicles are not in use.

Water quality protection measures

By applying air quality protection measures surface waters are indirectly protected. Other surface water protection measures are as follows:

- Controlled disposal of waste from vessels, which perform works on the revitalization of the ship's lock:
  - collection and treatment of sanitary, ballast and bilge wastewater from vessels;
  - prevention of uncontrolled disposal of solid waste from vessels and collection in local containers on vessels, and then disposal of their contents in containers of municipal waste on the shore;

- monitoring and maintaining the condition of vessels and their engines, in order to prevent oil and fuel leaks;

- Regular maintenance and control of the condition of construction machines and engines, in order to eliminate the possibility of oil, derivatives and machine oil getting into the water;
- Collection of sanitary wastewater from staff accommodation facilities (offices, workshops, warehouses) in an impermeable septic tank, with the necessary emptying of the tanks of the competent utility service, as well as cleaning and removal after completion of works;
- Controlled use of special materials for repair of concrete structures (high-quality concrete, epoxy resins, penetrating material and modern materials based on polyurethane) in all respects according to the requirements of the manufacturers of these materials and technical conditions for execution;
- Use of quality crushed stone without admixture of soil material, in order to reduce the concentration of suspended matter in the river environment and perform rip-rap protection of the upstream pre-port according to the technical conditions for execution;
- Controlled manipulation of construction machinery, in order to reduce petroleum products on concrete surfaces of the ship's lock structure and oiling of atmospheric water;
- Removal of waste generated during the cleaning of surfaces of metal structures and concreted parts from paint and corrosion residues, as well as during sandblasting of metal surfaces and transportation of waste to the appropriate landfill;
- Controlled use of the most environmentally friendly coatings and final paints for protection of metal surfaces from corrosion according to the requirements of the manufacturers of these materials and technical conditions for execution;
- Performing oil change in the complete revitalized system of electrohydraulic drive of doors and shutters in accordance with the existing rules for oil handling at HPP "Djerdap 2" with maximum protection measures against any leakage into the environment;
- Replacement of the hydraulic equipment of the navigation lock on the lower and upper head after installation of floating barriers in the upstream or downstream berthing area.

Soil quality protection measures

- Equip the construction site with appropriate housing containers for workers, sanitary facilities for personal hygiene and chemical mobile toilets, in accordance with the number of employees;
- Classify materials during demolition or dismantling according to the type and dimensions, clean and store them in a temporary storage within the construction site until they are handed over to the authorized operator for its disposal;
- Collect solid municipal and construction waste in special containers;
- Recyclable waste (metal, wood, glass, plastic) must be collected separately and properly disposed of until handed over to a person authorized or licensed to manage these types of waste;

- Provide a sufficient number of marked dedicated containers, tanks and barrels for various types of solid and liquid hazardous waste, generated during the reconstruction of the lock;
- Perform regular maintenance and control of the condition of the engines of construction machines and means of transport, in order to prevent the ingress of oil, petroleum products and machine oil into the soil and groundwater;
- It is forbidden to pour oil from construction machines and trucks or their repair at the location in question during the previous works and the execution of works on the reconstruction of the ship's lock facilities;
- Define the characteristics of the sorbent that will be used when spilling small quantities of oil and petroleum products, motor oil, hydraulic oil, paints, etc. as well as the method of application, collection and procedure with the collected sorbent;
- Provide on-site sorbent containers and containers for disposal of used sorbent;
- In case of spillage of hazardous substances, remove the layer of contaminated soil, replacing the soil brought from another location, analysis of soil samples and disposal in accordance with the results of the analysis;
- In case of major discharges of oil and petroleum products and other hazardous substances into the soil, perform soil testing, delineation of contaminated soil and, if the tests determine the need, remediation of contaminated soil according to the project approved by the competent Ministry;
- Store petroleum products in tanks with a double mantle or with a secondary containment, and/or in barrels with a secondary containment. The secondary containment is selected so that it can contain the entire volume of liquid from the tank in the event of a leak;
- Transshipment of petroleum products: fuels, oils and lubricants, as well as servicing of construction machinery and vehicles should be performed exclusively on concrete watertight surfaces, which have a controlled drainage system for evacuation of waste and wastewater with an oil separator;
- Transport of petroleum products and hydraulic oil to be performed by certified means of transport with the provision of constant supervision during the transport and use of these materials;
- Provision of a sufficient number of special, mobile containers, according to the number of permanent and temporary workers for the collection of solid municipal waste from the location of revitalization and delivery to the municipal landfill in agreement with the competent municipal service of the city.
- Concreting the surface of the base of the landfill of waste steel material in order to prevent the leakage of oil from discarded mechanical and electrical equipment into the underground environment;
- Leaked, used and waste oils, oiled items, waste steel materials and other waste materials generated during the revitalization of the ship's lock, which have the character of hazardous waste or may be hazardous waste, will be temporarily stored on covered concrete substrates with built drainage system for evacuation of waste and wastewater with oil separator;

- Temporarily dispose of electrical and electronic waste on concrete surfaces and in metal containers intended for their storage;
- For permanent waste disposal, sign contracts with operators who have permits for permanent care/disposal of a given type of waste;
- Upon completion of the reconstruction, carry out landscaping and horticultural arranging of the construction site in the ship's locks complex with a combination of indigenous deciduous trees, conifers and ornamental shrubs in accordance with a Special project.

River sediment quality protection measures

- Controlled use of special materials for the repair of concrete structures, in compliance with the technical conditions for construction;
- Limiting the number and area of locations where works are performed as well as the duration of works;
- Building enclosures such as vinyl tarps, heat-shrinkable plastic sheets, reusable fabric products or others around the work area, where the blasting is performed, to provide containment;
- Controlled cleaning of metal and concrete surfaces and transportation of generated waste to the appropriate landfill;
- Use of the most environmentally friendly anti-corrosion agents.

Noise and vibration protection measures

- Proper selection of construction machines and vehicles in order to acquire modern devices with the lowest noise emission and the least vibration during operation;
- Regular maintenance of machinery in good condition, in order to minimize noise and vibration;
- Shutting down the engine of the machine when it is not in use.

Ecosystem protection measures

- Air quality and water quality protection measures are indirect measures for the protection of the ecosystem;
- Use, if possible, the existing temporary warehouses at the location of HPP “Đerdpap 2” as a temporary warehouses for the construction materials, new and replaced equipment and generated waste;
- There will be no unnecessary removal of vegetation and felling of trees on the construction site and in the surroundings and which will be formed on the bank of the Danube;
- In order to preserve the present vegetation as much as possible, the areas used for the execution of works should be as small as possible;
- In order to minimize dust emissions and its impact on the ecosystem during the transport of sand and other loose materials, it is necessary to use trucks with tarps over the cargo area, or to cover loose materials, clean the access roads daily and wet them during dry periods;

- After the completion of the works, the location of the ship's lock and temporary construction site will be rehabilitated by removing temporary structures, objects and materials from the surfaces used for the works, transporting them to the selected landfill, mechanical and biological soil reclamation, planting grass, shrubs and long-term afforestation.

Other protection measures

- Development of the Main design of the construction organization which should be in accordance with the safety and other rules of HPP "Djerdap 2".
- The contractor is obliged to comply with the relevant provisions of applicable national rulebooks and regulations when performing the works;
- Execution of preparatory works, securing the location of the lock and the coastal area of the construction site and performing other works that secure the immediate environment, life and health of people and safe traffic before the start of revitalization of the lock;
- Fencing and proper marking of the location of execution of works;
- Disposal of removed humus for later use for horticultural landscaping;
- Prevention of significant change in the morphology of the surrounding terrain during the revitalization works;
- Provide an adequate place for storage (landfill) of materials used during the works on the complex;
- Store all construction and other materials that may contaminate the environment (various insulation materials, bitumens, etc.) on the construction site, in closed facilities, with a watertight floor that can be cleaned;
- Comply with all regulations on safety and security at work and prevent any adverse impacts on the environment and the immediate environment of the site;
- Construction rubble, where there is dusty crushed material, cover with foil in order to reduce the possibility of raising dust due to wind;
- In case of high speed wind and "critical" directions, temporarily stop the works.
- Carry out regular wetting of dusty surfaces and prevent scattering of construction materials during transport, by covering the materials and regulating the speed of vehicles;
- It is necessary to provide sand, zeolite or other sorbent on the construction site in case of spillage of harmful substances (petroleum products, oils, chemicals, etc.);
- It is not allowed to perform mechanical service of machines on the construction site;
- In case of liquid and other materials (oil derivatives, oils, chemicals, etc.) leaking onto the free surface, first take all measures to prevent further leakage, and then sprinkle the place with sand, zeolite or other sorbent. Dispose of the contaminated sorbent in special containers and ensure its collection through an authorized operator;
- Train and educate employees working on the construction site for efficient implementation of all environmental protection measures. This especially refers to the use and maintenance of construction machinery, waste management, etc.

- Ensure safe disposal of the excavation from the embankment and its removal to precisely defined places on the site or to the city landfill;
- Collect all packaging made of hazardous material and dispose of it in containers for storage of hazardous waste and hand it over to authorized operators for disposal;
- Separate waste by type and store it separately;
- Provision of appropriate personal protective equipment for employees on revitalization, prescribed by the Law on Occupational Health and Safety ("Official Gazette of the Republic of Serbia" No. 101/05, 91/151 and 113/17 - other law).

Protection measures during the regular operation of the project

Independently of the works on the revitalization of the ship's lock, HPP "Djerap 2" regularly implements basic environmental protection measures during the operation of the ship's lock:

- ensuring the permanent functionality of the facility,
- regular maintenance of the facility to prevent possible damage,
- implementation of control of condition of all installations of installed equipment,
- monitoring of all environmental parameters that may be disturbed due to the existence and functioning of the facility.

The project of revitalization of building structures, mechanical and electrical equipment and installation of equipment and installations plans the reconstruction of damaged parts of the lock, as well as the revitalization of complete electrical-mechanical equipment so that it can work reliably and unobstructed in the next project period of 30 years. It is also planned to introduce modern lock management.

The applied technical solutions have maximally improved the functioning of the existing ship’s lock facility, so that the exploitation of the revitalized facility does not cause an increase in negative environmental impacts compared to the existing facility. On the contrary, the installation of modern mechanical and electrical equipment largely eliminates the negative impact on the environment. The situation is identical with accidental impacts on the environment.

Protection measures in case of an accident

Organizational protection measures

In accordance with the Law on Disaster Risk Reduction and Emergency Management ("Official Gazette of RS", No. 87/18), the Regulation on the content, manner of preparation and obligations of entities related to the preparation of disaster risk assessment and protection and rescue plans ("Official Gazette of RS", No. 102/20) and the Instruction on the Methodology of preparation and content of disaster risk assessment and protection and rescue plan ("Official Gazette of RS", No. 80/19), HPP "Djerdap 2", as a subject of special importance for the economy of the Republic of Serbia in the field of energy and transport, it has the obligation to prepare a Disaster Risk Assessment and a Protection and Rescue Plan.

Disaster risk assessment identifies the type, character and origin of individual disaster risks, the degree of endangerment, factors that cause or increase the degree of possible danger, consequences that may occur on human life and health, the environment, material and cultural goods, as well as other assumptions relevant to the conduct of normal life, economic and social activities. Disaster risk assessment includes:

b. identification of disaster hazards (natural disasters and technical-technological accidents);
c. disaster scenarios;
d. the level of risk, which includes the assessment of the probability of the event, the protected value and the assessment of the consequences for the protected value.

The Protection and Rescue Plan plans measures and activities for prevention and mitigation of the consequences of disasters, strengths and resources of the subjects of disaster risk reduction and emergency management, their organized and coordinated engagement and action in emergencies to protect and rescue people, material and cultural goods and providing basic living conditions. The plan for protection and rescue of entities of special importance, which includes HPP "Djerdap 2", contains the following elements in particular:

a. early warning and preparedness;
b. execution of tasks determined by the National Plan (Protection and Rescue Plan of the Republic of Serbia):
    a. review of obtained tasks,
    b. review of measures and activities on the implementation of the obtained tasks,
    c. list of employees who are engaged in the execution of the obtained tasks,
    d. review of material and technical means that are engaged in the implementation of the obtained tasks,
    e. activation plan,
    f. excerpt from the review of companies and other legal entities with which it cooperates in the execution of the obtained tasks;

3) civil protection measures - protection and rescue of employees and users of services of entities of special importance for protection and rescue, as follows:
    a. alerting,
    b. evacuation,
    c. removing,
    d. care for the endangered and injured,
    e. first aid,
    f. review of means for personal and mutual and collective protection.

The National Protection and Rescue Plan contains all the necessary elements for protection and rescue in emergency situations, in particular::

1) early warning and preparedness (readiness);
2) mobilization and activation;
3) protection and rescue by types of identified hazards from the Assessment;

4) civil protection measures:
    g. evacuation,
    h. care for the endangered and injured,
    i. first and medical aid,
    j. sanitation,
    k. use of forces and subjects of protection and rescue.

Soil protection measures

These measures provide protection of the soil both in minor accidents and in accident situations.

1. Generated solid potentially hazardous waste (oiled equipment, contaminated soil, used sorbent for oil substances, sand and paint after sandblasting, packaging of paint and protective agents, sludge from separators, etc.) classify and collect it in appropriate containers and perform waste characterization;
2. Dispose of liquid hazardous waste (oily water, hydraulic fluid, used motor and hydraulic oils, as well as lubricants, etc.) in tanks and certified, marked metal barrels with lids and perform characterization;
3. It is forbidden to mix different types of waste and joint storage of incompatible types of waste;
4. Manipulation and temporary storage of collected potentially hazardous and liquid waste should be performed on a covered, impermeable substrate, resistant to stored waste, and equipped with a secondary containment (parapet around the substrate or tank) that can collect liquid matter in case of packaging damage, or on an impermeable substrate with built technological sewerage connected to the oil and grease separator;
5. To harmonize the further procedure with solid and liquid hazardous waste with the results of waste characterization, and to entrust the collection and final disposal to a legal entity (authorized operator) that has a permit for the management of the specified types of waste;
6. Visit the temporary waste storage site on a daily basis in order to timely identify packaging damage and leaks if they occur;
7. Transshipment of petroleum products: fuels, oils and lubricants, as well as servicing of construction machines and vehicles should be performed exclusively on concrete watertight surfaces, which have a controlled drainage system for evacuation of waste and wastewater with an oil separator;
8. Use construction machines and means of transport that have passed technical inspections on the construction site;
9. Perform regular maintenance and control of the condition of construction machinery and means of transport;
10. Determine the type of sorbent that will be used for spilling small quantities of oil and petroleum products, motor oil, hydraulic oil, paints, etc. as well as the method of application, collection and procedure with the collected sorbent;

11. Provide on the construction site containers with sorbent and containers for temporary disposal of used sorbent;
12. In case of soil pollution, perform soil testing, delineating of the contaminated land and, if necessary, remediation of the soil according to the reclamation and remediation project to which the consent of the competent Ministry has been obtained.

Surface and groundwater and sediment protection measures

Protection of the aquatic environment from pollution in accident situations is extremely important for the living world of the Danube, due to the possible volume of pollution and negative consequences, and it is one of the obligations assumed by international conventions and agreements.

Water can be polluted directly by discharging pollutants into it or indirectly through soil pollution.

Direct pollution of surface waters and sediments occurs during minor or major accidents on vessels or machines engaged in the reconstruction of the lock, which result in direct spillage of oil and / or petroleum products into the aquatic environment. The protection measures in this case are, as in any similar accident:

- The ship's lock must have a floating barrier, a suitable vessel, chemical means and equipment for collecting, temporarily storing and neutralizing any leaked oil and/or petroleum products in the chambers and pre-ports;
- If it is determined at the pre-ports that oil, petroleum and/or derivatives are leaking from one of the vessels and water pollution occurs, a floating dam must be installed immediately;
- It is necessary to urgently eliminate the malfunction or damage to the vessel that led to the accident, in order to stop further pollution of the aquatic environment;
- The vessel from which the petroleum, petroleum products or oil leaked must not leave the area enclosed by the floating dam, until the pollution is picked up by appropriate equipment and means;
- Collect spilled petroleum products from the surface of the water mirror with the help of special traps and pump oily water and petroleum products into special tanks/containers;
- To dispose of this type of waste, hire a legal entity authorized to handle this type of hazardous waste.

Indirect protection of surface and groundwater and sediment is performed by applying soil protection measures. The application of soil protection measures reduces or eliminates soil pollution, but also potential water and sediment pollution that occurs through the transport of pollution from soil to groundwater, and due to the connection of groundwater and surface water, transport of pollution into surface water, and/or leaching of contaminated soil into watercourse.

Fire protection measures

- Ship’s lock HPP "Djerdap 2" is equipped with an automatic fire alarm system consisting of a fire alarm control panel, manual fire detectors, automatic fire detectors, alarm sirens, parallel display boards and other accessories and equipment;

- The ship's lock chamber is completely covered by a stable fire extinguishing system: a system of nozzles to protect the lock door and monitors along the walls of the chamber, while the fire on the vessel is extinguished by the equipment of each ship separately;
- During the reconstruction of the lock, the complete mechanical and electrical equipment and installations of the fire protection system will be completely replaced, which provides additional safety and ensures maximum reliability of the revitalized fire protection system;
- The fire control unit is located in the control tower and is connected to the SCADA system of the lock, ie a single system for monitoring and control;
- Continuous operation of the SCADA system for monitoring and remote control of the FP system from the command tower;
- Constant human presence next to the SCADA system;
- Alarms are performed via conventional alarm sirens distributed throughout the building, and are activated selectively by fire alarm sectors;
- Extinguishing fires in the lock chambers is done with monitors evenly distributed along the wall of the ship's chamber, with water or a mixture of water and foam extract;
- It is necessary to constantly maintain the pumping station "Kusjak", water tank, venturi mixer, tank for storage of extract and monitors in functional condition;
- It is necessary to have a permanent water reserve in the tank of the "Kusjak" system;
- It is necessary to provide a sufficient amount of foam extract in the foam extact storage tanks;
- Hand-held fire extinguishers are also envisaged as fire-fighting measures in the event of a fire in the lock’s facilities (command tower, technological rooms);
- In case of fire, the following should be done: start extinguishing the fire, stop the endangered device and turn off the electricity, report the fire to the security/fire brigade, take all measures to prevent the spread of fire to neighboring facilities - devices, initiate evacuation of people from the endangered area.

Envisaged measures in case of an accident

- It is obligatory to provide a certain amount of sorbents on the construction site in case of leakage of fuel and lubricants from construction machines and means of transport;
- In case of spillage, leakage of petroleum, petroleum products, oil, as an accident that can occur in all phases of realization and regular operation of the lock, it is necessary to immediately start remediation of the terrain at the location, and the waste generated by remediation should be packed in impermeable barrels with lids;
- Carry out the characterization of waste generated by the collection of spilled petroleum, oil, lubricants, or other hazardous substances and hand it over to an authorized operator who has a permit to manage a given type of waste for further disposal, with mandatory records on waste collection;

- Use correct, regularly maintained mechanization and means of transport that have passed technical inspections on the construction site;
- Use proper sailing machinery for water works;
- In case of chemical leaks, accident response includes: notifying the responsible person, putting on protective equipment, taking care of the injured (if any), preventing further leaks and spilling of chemicals, collecting chemicals and packaging as hazardous waste, remediation of contaminated sites;
- In the event of a petroleum and petroleum products leak in the ship's lock chamber or in the pre-ports, install a floating dam and collect the leaked contents;
- All places where the accident occurred must be repaired and completely repaired as soon as possible;
- When reacting in case of a hazard, it is mandatory to use adequate protective equipment (protective suit, shoes, goggles, gloves, masks);
- Rescue and first aid actions include: rescue (general), rescue from the hazard of suffocation by inhalation of gases, intoxication caused by inhalation of gas;
- After the accident, the project holder is obliged to immediately, and no later than within 24 hours, inform the competent body of the competent ministry about the emergency event; The notification contains information on the circumstances of the emergency, location, time, imminent danger to human health and a description of the measures taken.

11 ENVIRONMENTAL IMPACT MONITORING PROGRAM

Monitoring of the impact on the environment is done in order to timely detect the negative impact of activities on the environment. Impact assessment enables timely response and application of additional measures in order to prevent or reduce negative impacts to a minimum.

Based on the defined possible impacts of the project on the environment, the parameters for monitoring the impact of the project on the environment are defined.

Monitoring of environmental impact is performed by an authorized organization, accredited according to the standard for sampling, measurement, analysis of the observed parameter. Selected organizations should have accreditations for the parameters covered by the monitoring and the authorization of the competent ministry.

11.1 Overview of the state of the environment before the start of the operation of the project at locations where the impact on the environment is expected

Chapter 5 analyzes the current state of the environment, i.e. the situation before the start of the project.

11.2 Parameters on the basis of which harmful effects on the environment can be determined

Surface water quality monitoring parameters

Surface water quality monitoring parameters were selected to include possible impacts on water quality during the works on the revitalization of the HPP "Djerdap 2", as well as possible impacts during the operation of the navigation lock.

Monitoring parameters would be: temperature, electrical conductivity, pH, suspended solids, sedimentary substances, dissolved oxygen concentration,% oxygen saturation, BOD_5, chemical oxygen demand ($KMnO_4$), chemical oxygen demand ($K_2Cr_2O_7$), petroleum hydrocarbons, arsenic, zinc, chromium, iron, lead, nickel, cadmium, mercury.

Surface water quality monitoring parameters and their limit values by classes are defined by the Decree on limit values of pollutants in surface and ground waters and sediment and deadlines for their achievement ("Official Gazette of RS", No. 50/2012), Decree on limit values of priority and priority hazardous substances that pollute surface waters and deadlines for their achievement ("Official Gazette of RS", No. 24/2014), Regulation on hazardous substances in waters ("Official Gazette of SRS", No. 31/82).

According to the Decree on the categorization of watercourses ("Official Gazette of RS", No. 5/68), the Danube from the Hungarian border to the Bulgarian border belongs to the II category, i.e. the II water class.

The following table shows the parameters of the water quality of the Danube River that need to be monitored in order to determine the impact of the execution of works on the project and the operation of the navigation lock on the environment.

Table 11.1 - Danube water quality monitoring parameters

Parameter	Unit	Limit values Class II	Average annual concentration
Temperature	^{o}C	/	/
Electrical conductivity	mS/cm	1000*	/
pH	/	6.5-8.5*	/
Suspended matter	mg/l	25*	/
Dissolved oxygen	mgO_2/l	7.0*	/
Oxygen saturation	%		/
- epilimnion (stratified water)		70-90*	/
- hypolimnion (stratified water)		50-70*	/
- unstratified water		50-70*	/
BOD_5	mgO_2/l	5.0*	/
COD ($K_2Cr_2O_7$)	mgO_2/l	15*	/
COD ($KMnO_4$)	mgO_2/l	10*	/
Petroleum hydrocarbons		(1) *	/
Arsenic	µg/l	10*	/
Boron	µg/l	1000*	/
Copper	µg/l	5 (T=10)* 22 (T=50)* 40 (T=100)* 112 (T=300)*	/
Zinc	µg/l	300 (T=10)* 700 (T=50)* 1000 (T=100)* 2000 (T=500)*	/
Chromium hexavalent	µg/l	100***	/
Chromium trivalent	µg/l	100***	/
Iron (total)	µg/l	300***	/
Lead	µg/l	14**	1.2 **
Nickel	µg/l	34**	4 *
Cadmium	µg/l	0.45**	0.08 **
Mercury	µg/l	0.07**	/

* the Decree on limit values of pollutants in surface and ground waters and sediment and deadlines for their achievement ("Official Gazette of RS", No. 50/2012)
** Decree on limit values of priority and priority hazardous substances that pollute surface waters and deadlines for their achievement ("Official Gazette of RS", No. 24/2014)
*** Regulation on hazardous substances in waters ("Official Gazette of SRS", No. 31/82)
T – Water hardness (mg/l $CaCO_3$)

(1) Petroleum products must not be present in water in such quantities that:
- form a visible film on the surface of water or coatings on the banks of watercourses and lakes,
- give a distinctive "hydrocarbon" taste to fish,
- cause harmful effects in fish

Sediment quality monitoring parameters

The parameters of sediment quality monitoring, their limit values and sediment classification are defined by the Decree on limit values of pollutants in surface and groundwater and sediment and deadlines for their achievement ("Official Gazette of RS", No. 50/2012).

The following table shows the parameters that need to be monitored in the sediment to assess the status and trend of sediment quality.

Table 11.2 - Limit values for assessment of sediment status and trend

Parameter	Unit	Target value	Maximum allowable concentration	Remediation value
Arsenic (As)	mg/kg	29	42	55
Cadmium (Cd)	mg/kg	0.8	6.4	12
Chrome (Cr)	mg/kg	100	240	380
Copper (Cu)	mg/kg	36	110	190
Mercury (Hg)	mg/kg	0.3	1.6	10
Lead (Pb)	mg/kg	85	310	530
Nickel (Ni)	mg/kg	35	44	210
Zinc (Zn)	mg/kg	140	430	720
Mineral oils	mg/kg	50	3000	5000
Polycyclic Aromatic Hydrocarbons (PAH) (1)	mg/kg	1	10	40
Anthracene	mg/kg	0.001	0.1	/
Naphthalene	mg/kg	0.001	0.1	/
Phenanthrene	mg/kg	0.005	0.5	/
Fluoranthenes	mg/kg	0.03	3	/
Benzo (a) anthracene	mg/kg	0.003	0.4	/
Kryzene	mg/kg	0.1	11	/
Benzo (k) fluoranthene	mg/kg	0.02	2	/
Benzo (a) pyrene	mg/kg	0.003	3	/
Benzo (g. h. i) perylene	mg/kg	0.08	8	/
Indeno (1.2.3-cd) pyrene	mg/kg	0.06	6	/

(I) the parameter refers to the sum of the following compounds: naphthalene, anthracene, phenanthrene, fluoranthene, benzo (a) anthracene, kryzene, benzo (k) fluoranthene, benzo (a) pyrene, benzo (g, h, i) perylene, indeno (1, 2,3-cd) pyrene

The limit values for metals and organic matter refer to standard sediment containing 10% organic matter and 25% clay.

In case of changes in existing or adoption of new regulations governing the area of sediment quality the monitoring of sediment quality will be adjusted to the applicable regulations.

Soil and groundwater monitoring parameters

Monitoring of soil and groundwater is performed according to the Decree on limit values of polluting, harmful and dangerous substances in the soil ("Official Gazette of RS", No. 30/18 and 64/19). Parameters for monitoring the quality of soil and groundwater would be: groundwater level, electrical conductivity, pH, dissolved oxygen concentration,% oxygen saturation, BOD_5, chemical oxygen demand ($KMnO_4$), chemical oxygen demand (K_2Cr2O_7), benzene, ethylbenzene, toluene , xylenes, phenol, cresols (total), PAH (total), total petroleum hydrocarbons (fractions C_6 – C_{40}), arsenic, copper, zinc, chromium, iron, manganese, lead, nickel, cadmium, mercury.

The limit values and remediation values for metals and arsenic, with the exception of antimony, molybdenum, selenium, tellurium, thallium and silver, depend on the content of clay and organic matter in the soil.

The following table shows the parameters that need to be monitored in the soil and groundwater to assess the impact of the execution of works on project and the operation of the navigation lock on the environment.

Table 11.3 - Soil and groundwater quality parameters

Parameter	Soil (mg/kg of absolutely dry matter)		Aquifer (µg/l in solution)
	Limit maximum value	Remediation value	Remediation value
Arsenic (As)	42	55	60
Cadmium (Cd)	29	55	6
Chrome (Cr)	100	380	30
Copper (Cu)	36	190	75
Mercury (Hg)	0.3	10	0.3
Lead (Pb)	85	530	75
Nickel (Ni)	35	210	75
Zinc (Zn)	140	720	800
Total petroleum hydrocarbons C_6-C_{40}	50	5000	600
Polycyclic Aromatic Hydrocarbons (PAH) - Total (1)	1	40	/
Anthracene	/	/	5
Naphthalene	/	/	70

Parameter	Soil (mg/kg of absolutely dry matter)		Aquifer (µg/l in solution)
	Limit maximum value	Remediation value	Remediation value
Phenanthrene	/	/	5
Fluoranthenes	/	/	1
Benzo (a) anthracene	/	/	0.5
Kryzen	/	/	0.2
Benzo (k) fluoranthene	/	/	0.05
Benzo (a) pyrene	/	/	0.05
Benzo (g. h. i) perylene	/	/	0.05
Indeno (1.2.3-cd) pyrene	/	/	0.05

(I) the parameter refers to the sum of the following compounds: naphthalene, anthracene, phenanthrene, fluoranthene, benzo (a) anthracene, kryzene, benzo (k) fluoranthene, benzo (a) pyrene, benzo (g, h, i) perylene, indeno (1, 2,3-cd) pyrene

Location, manner and frequency of determined parameters monitoring

Surface waters

During the execution of works on the project, conduct monitoring once a month at the following three locations:

a. at the entrance to the upstream berthing area of HPP "Djerdap 2",
b. downstream berthing area
c. lock chamber.

Analysis of water in the lock chamber should be performed when the chamber is filled with water.

During the navigation lock operation, the surface water quality monitoring should be performed quarterly at two measuring points:

1. at the entrance of the upstream berthing area of HP Djerdap 2,
2. downstream berthing area.

Sediment quality monitoring

Sediment quality monitoring should be performed after the completion of all planned works on the project. Quality monitoring should be performed at three locations in the downstream berthing area. Two sampling locations should be on the ships route through the berthing area; one at the entrance to the berthing area and the other in the middle of the road through the downstream berthing area. The third location should be perpendicular to the second location, but closer to the shore.

These locations should be maintained during further monitoring of the navigation lock operation because it will enable sediment quality control both on the route by which ships move through the ports, where due to the passage of ships less sediment deposition, and in the area near the coast where the impact of ship passage is less pronounced. so the sediment deposition is higher.

After the completion of works on the adaptation of the lock and the planned monitoring of the impact of the project on the quality of sediment, further control of the impact of navigation lock on the quality of sediment should be performed once a year during low waters. Another point that would be located in the upper berthing area, approximately in the middle of ship route through the upstream berthing area, should be included in the monitoring.

Monitoring the project impact on soil and groundwater quality

Monitoring the project impact on soil and groundwater quality should be done through groundwater monitoring. For monitoring purposes, it is necessary to install a piezometric well between the construction site and the Danube bank.

Groundwater levels monitoring should be carried out once a week, while testing of other required parameters should be performed before the start of preparatory work and then once every three months.

The piezometer should be installed before the work starts, because it is necessary to perform soil and groundwater sampling in order to determine the baseline.

Table 11.1 - Monitoring program during construction and operation work of the navigation lock at HPP "Djerdap 2"

Environmental factor	Parameter	During construction work		During operation work	
		Sampling location	Sampling frequency	Sampling location	Sampling frequency
Danube river	See Table 11.1	at the entrance to the upstream berthing area	Once a month	at the entrance to the upstream berthing area	4 times a year
		downstream berthing area		downstream berthing area	
		lock chamber		/	
Danube river sediment	See Table 11.2	at the entrance to the downstream berthing area	After the completion of works	at the entrance to the downstream berthing area	once a year during small waters
		in the middle of the route through the downstream berthing area		in the middle of the route through the downstream berthing area	
		in the middle of the route through the downstream berthing area, closer to the shore		in the middle of the route through the downstream berthing area, closer to the shore	
Soil	See Table 11.3.	At the piezometer drilling site - between the	Before the works start and in case of soil pollution	/	/

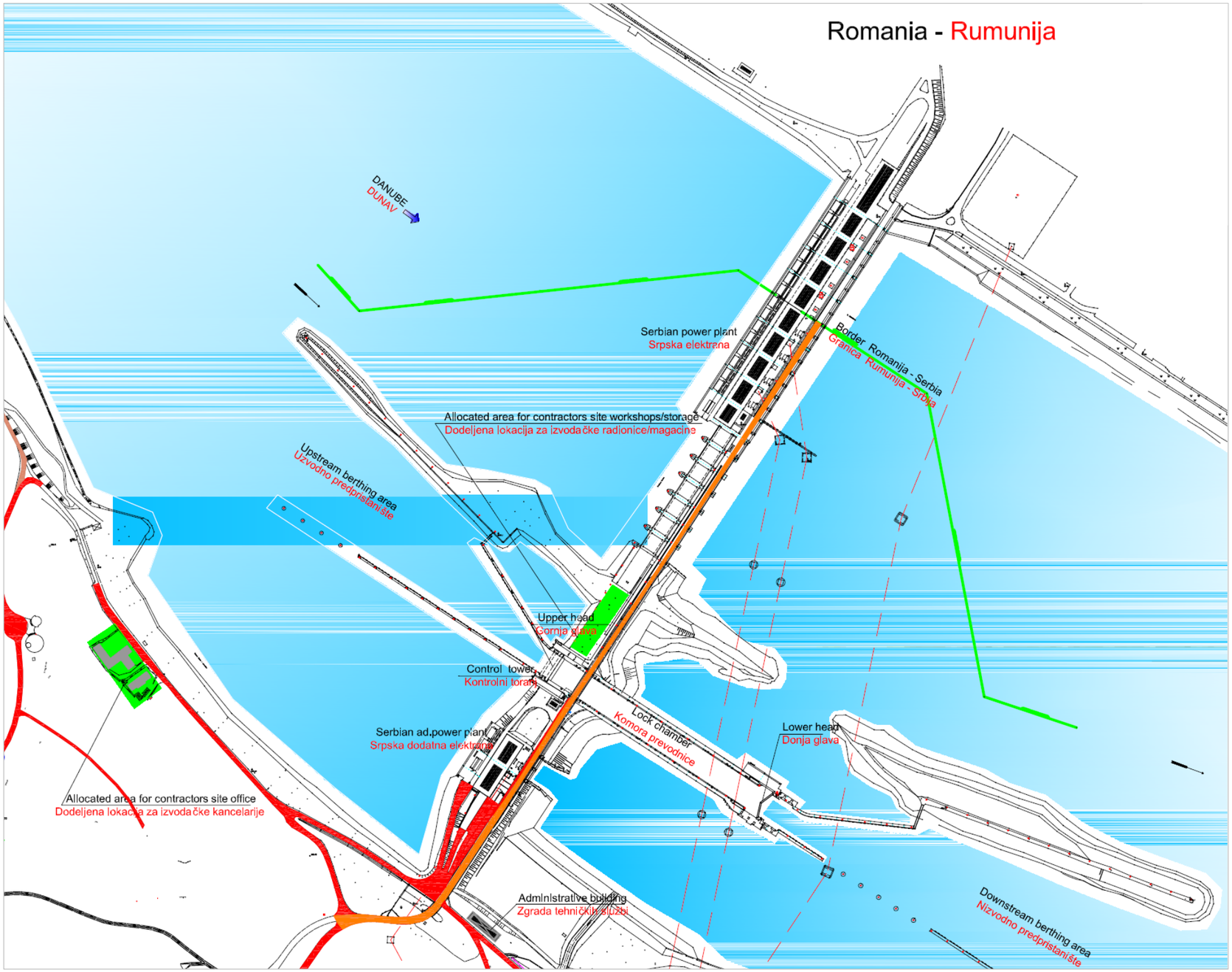
Environmental factor	Parameter	During construction work		During operation work	
		Sampling location	Sampling frequency	Sampling location	Sampling frequency
		construction site and the Danube River			
Groundwater	See Table 11.3	On the piezometer between the construction site and the Danube River	Before the start of works, and then once in three months	On the piezometer between the construction site and the Danube river	once a year during dry season

12 DATA ON TECHNICAL DEFICIENCIES

During the preparation of the Environmental Impact Assessment Study of the navigation lock adaptation project within HPNS "Djerdap 2", the multidisciplinary team that participated in the preparation did not encounter any special difficulties or shortcomings that are important for the quality of the Study.

A N N E X E S

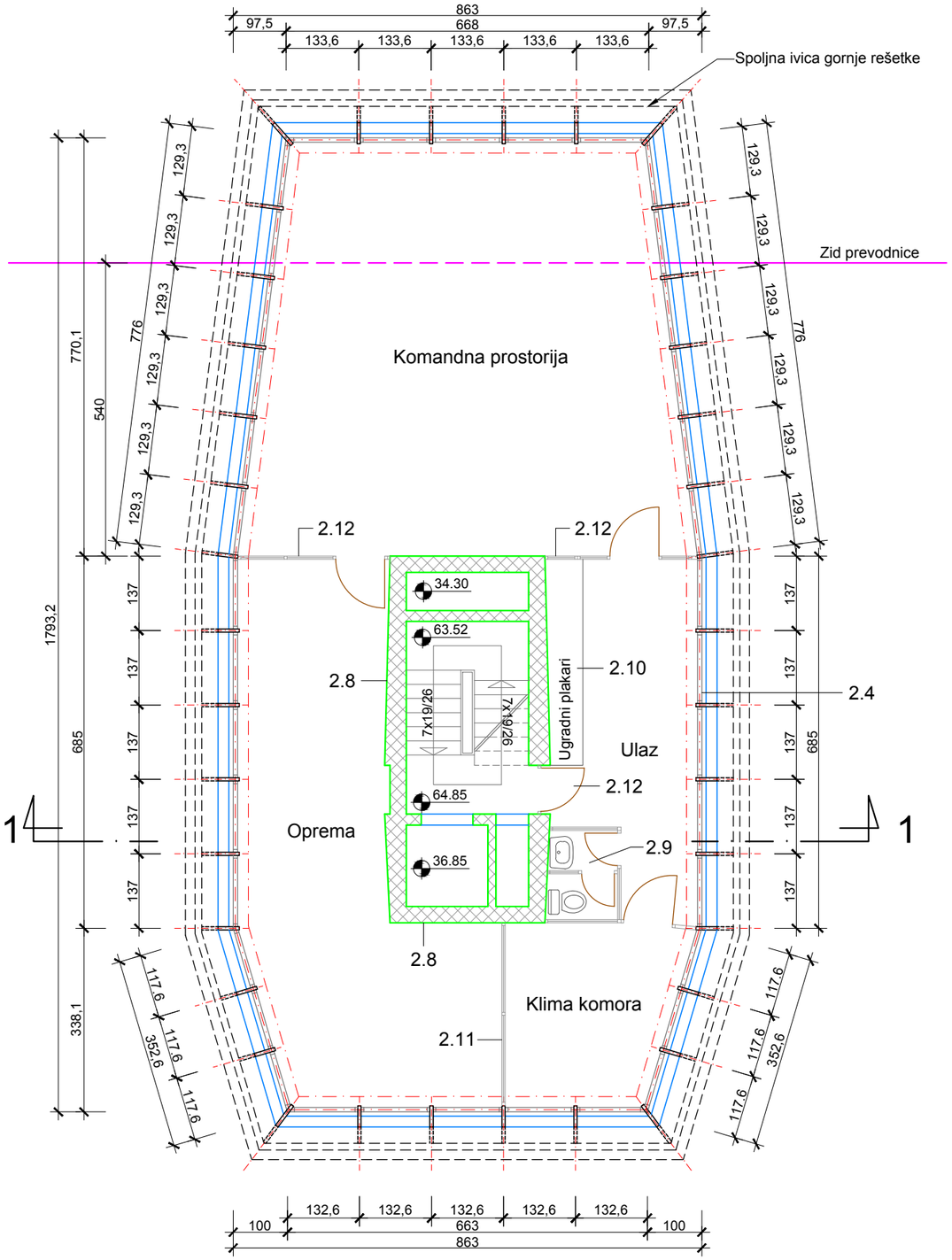
Annex 1. Layout of navigation lock of HPP “Djerdap 2”



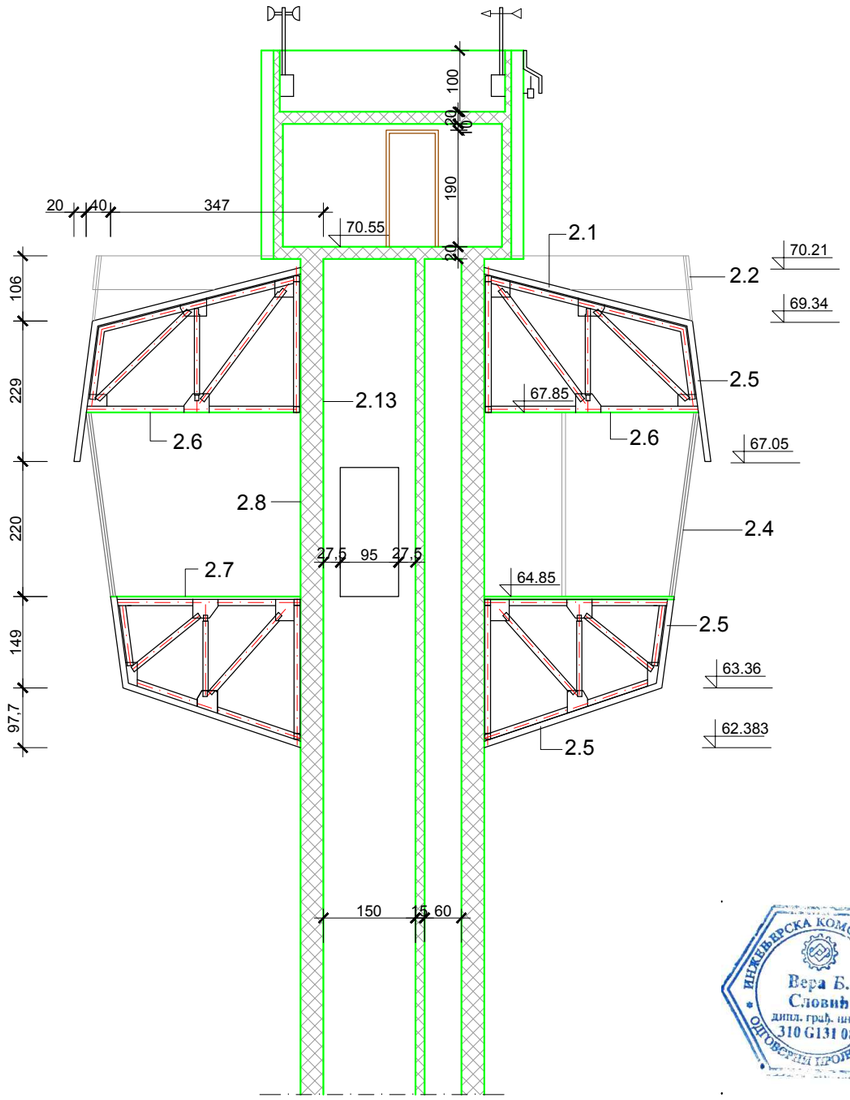
Annex 2. Layout plans

Pogled na komandni toranj - Djerdap 2

Osnova na koti 64.85



Presek 1-1



Scale 1:100

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R.BR.	DATUM	OPIS IZMENE	POTPIS

ENERGOPROJEKT-HIDROINŽENJERING A.D.
BULEVAR MIHAILA PUPINA 12, BEOGRAD, SRBIJA

INVESTITOR	REPUBLIKA SRBIJA - MGSI / JP "ELEKTROPRIVREDA SRBIJE "
OBJEKAT	BRODSKA PREVODNICA HE "ĐERDAP 2"
PROJEKAT	IDEJNI PROJEKAT I STUDIJA OPRAVDANOSTI SANACIJA, ADAPTACIJA I REKONSTRUKCIJA BRODSKE PREVODNICE HE "ĐERDAP 2"
CRTEŽ	DJERDAP 2 KOMANDNI TORANJ - OSNOVA I PRESEK

BROJ UGOVORA	DATUM	FAZA
18072-204	10.2019.	IDP

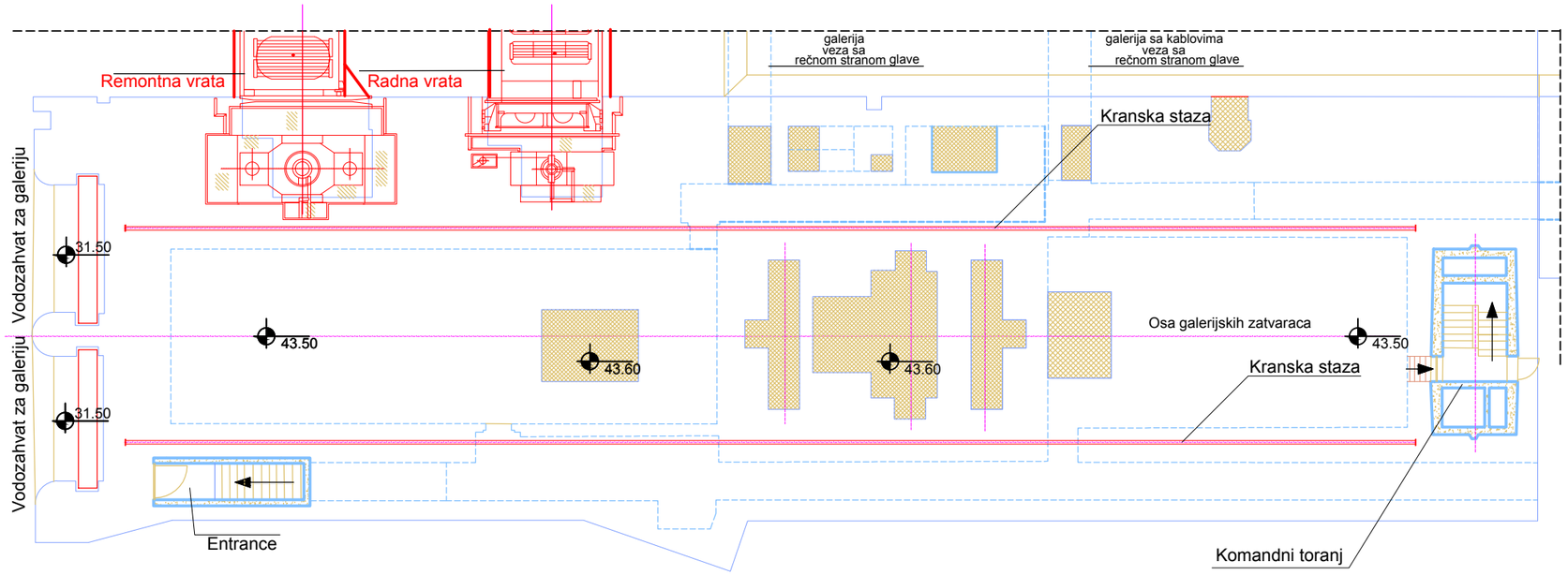
ODG. PROJEKTANT	Vera Slović, dipl.inž.građ.
UN. KONTROLA	Tamara Šumar, dipl.inž.građ.
GL. PROJEKTANT	Todora Lazić, dipl.inž.el.

RJ	RAZMERA	LISTOVA
110-202	1:50	1
		LIST 1

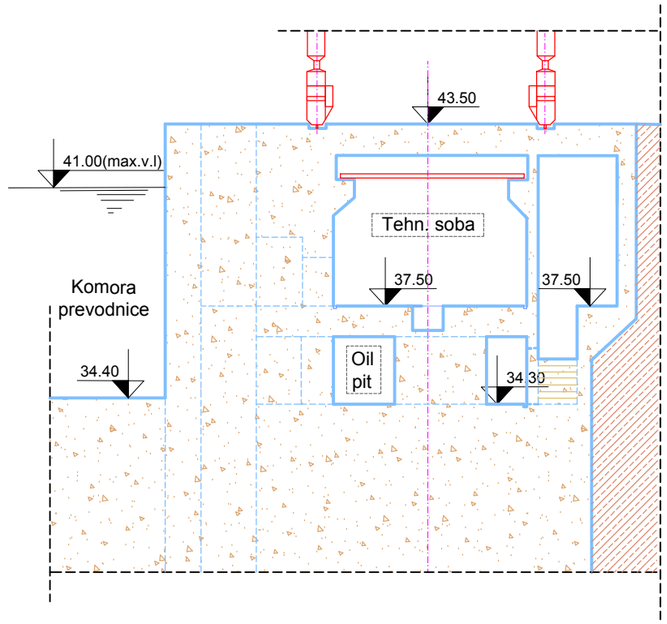
DEO PROJEKTA	ŠIFRA CRTEŽA	BR.CRTEŽA/IZMENA
2/1	18072-IDP-II-01.1-202-01	01

INŽENJERSKA KOMORA SRBIJE
Vera B. Slović
dipl. građ. inž.
310 G131 08
OVLAŠĆENI PROJEKTANT

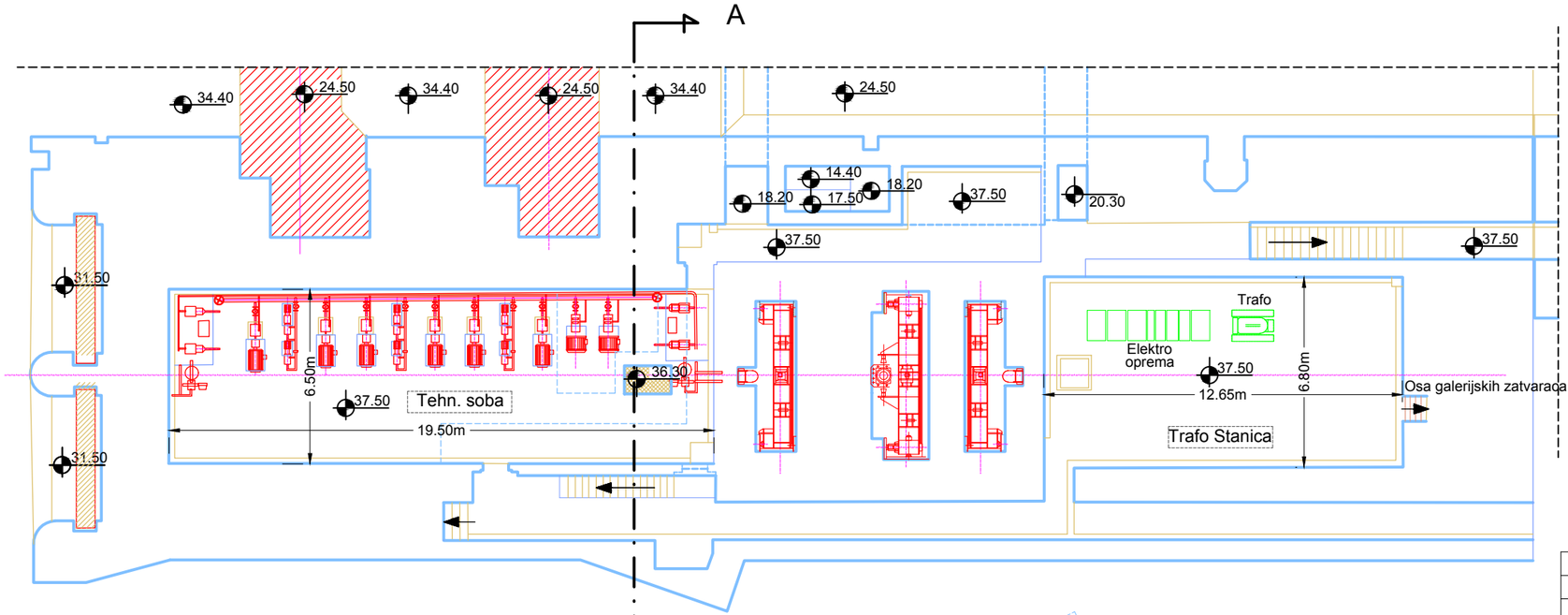
Situacija gornje glave O.S nivo. 43.50 (1:200)

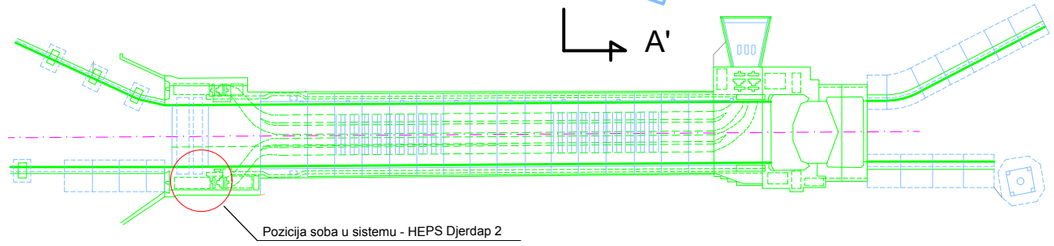


Poprecni presek A - A' (1:200)

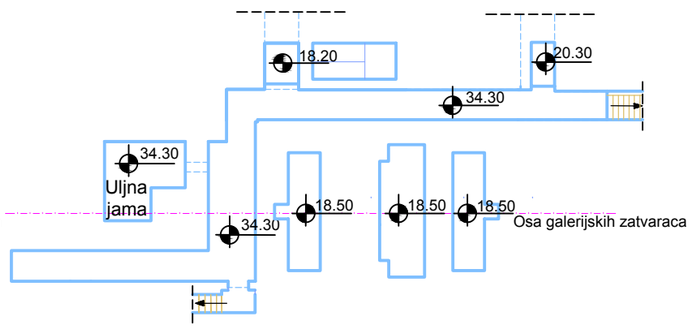


Izgled teh. prostorije i trafo prostorije nivo. 37.50 (1:200)





Izgled na koti 34.30



R.BR.	DATUM	OPIS IZMENE	POTPIS

ENERGOPROJEKT-HIDROINŽENJERING A.D.
BULEVAR MIHAILA PUPINA 12, BEOGRAD, SRBIJA

INVESTITOR: REPUBLIKA SRBIJA - MGSI / JP "ELEKTROPRIVREDA SRBIJE "	PROJEKAT: IDEJNI PROJEKAT I STUDIJA OPRAVDANOSTI SANACIJA, ADAPTACIJA I REKONSTRUKCIJA BRODSKE PREVODNICE HE "ĐERDAP 2"
OBJEKAT: BRODSKA PREVODNICA HE "ĐERDAP 2"	CRTEŽ: DJERDAP 2 GORNJA GLAVA - OBALNA STRANA TEHN. PROSTORIJA - SITUACIJA POSTOJEĆE STANJE

BROJ UGOVORA	DATUM	FAZA
18072-204	10.2019.	IDP

ODG. PROJEKTANT	Vera Slović, dipl.inž.građ.
UN. KONTROLA	Tamara Šumar, dipl.inž.građ.
GL. PROJEKTANT	Todora Lazić, dipl.inž.el.

RJ	RAZMERA	LISTOVA
110-202	1:50	1
		LIST 1

DEO PROJEKTA	ŠIFRA CRTEŽA	BR.CRTEŽA/IZMENA
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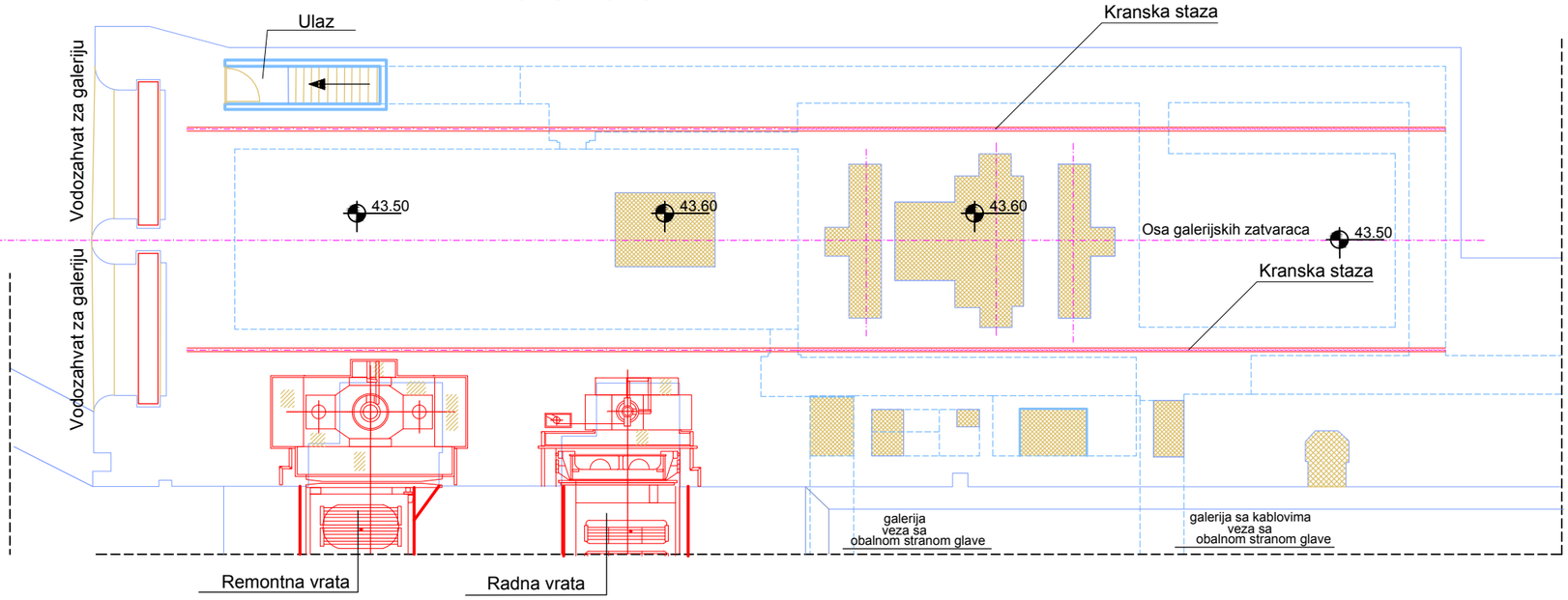
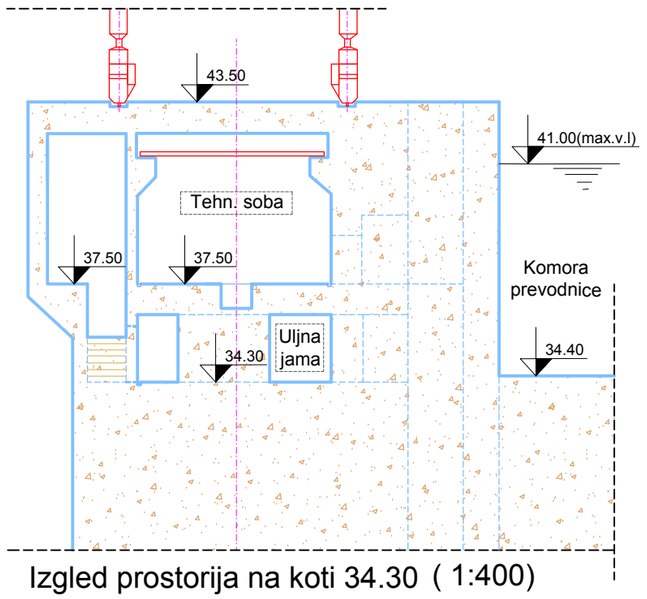
Situacija gornje glave O.S nivo. 43.50 (1:200)



Poprecni presek A - A' (1:200)



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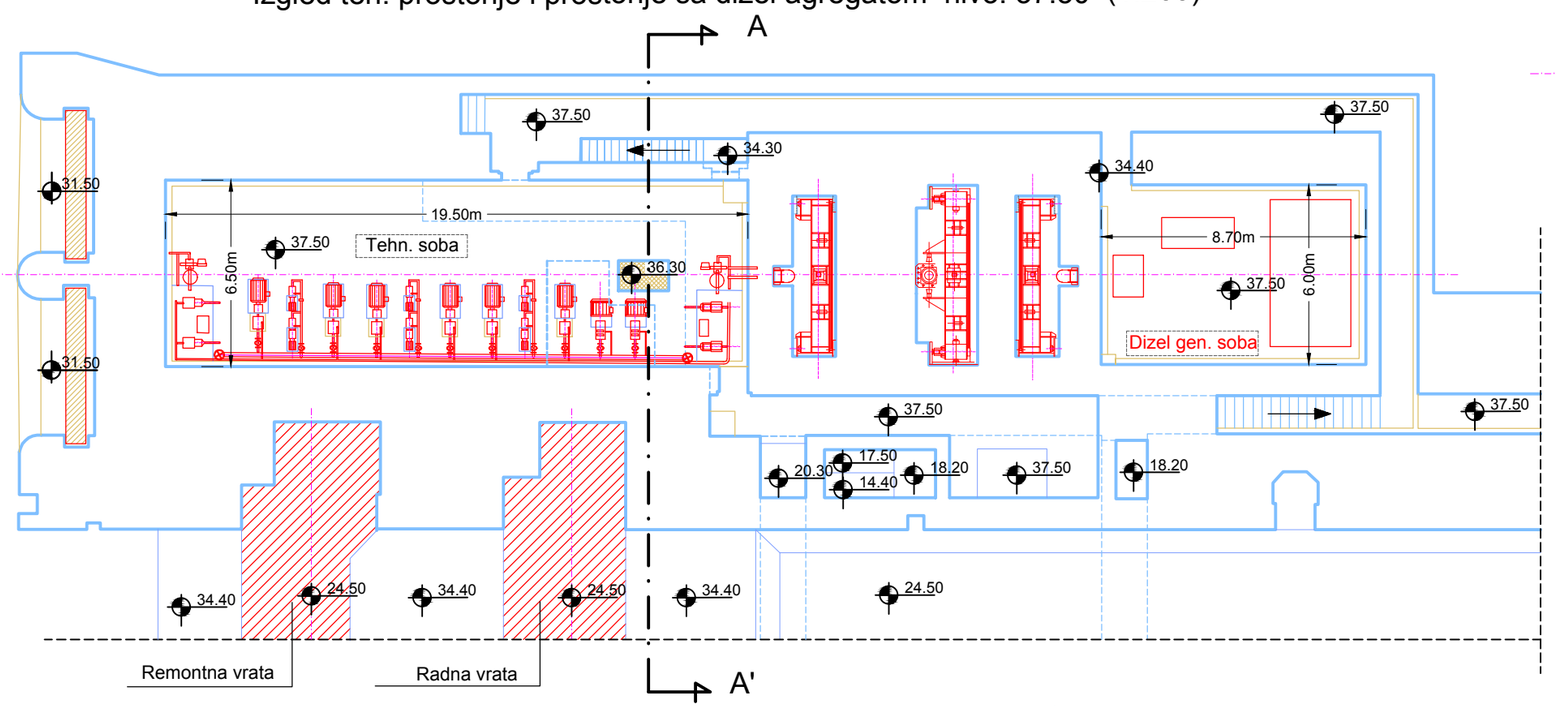
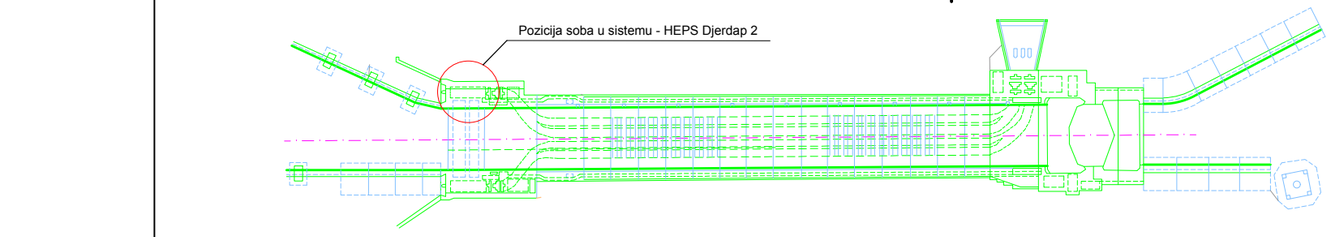
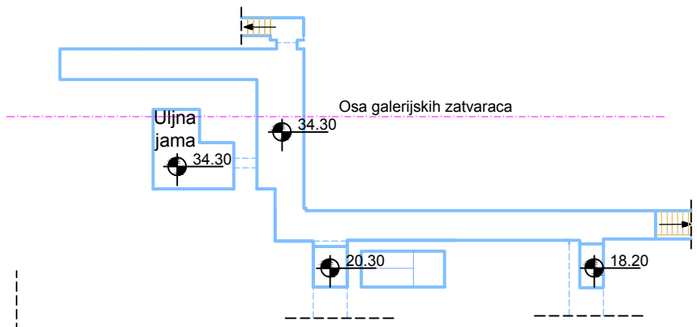




Izgled prostorija na koti 34.30 (1:400)



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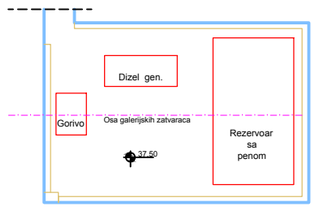


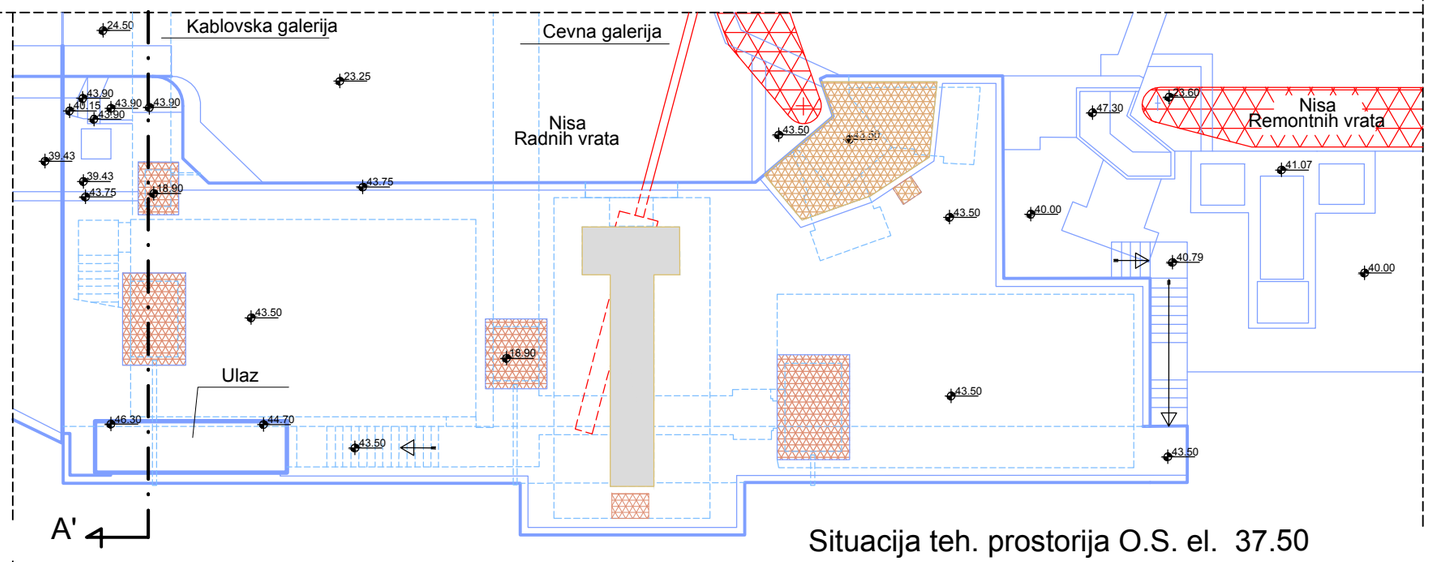
R.BR.	DATUM	OPIS IZMENE	POTPIS

ENERGOPROJEKT-HIDROINŽENJERING A.D.
BULEVAR MIHAILA PUPINA 12, BEOGRAD, SRBIJA

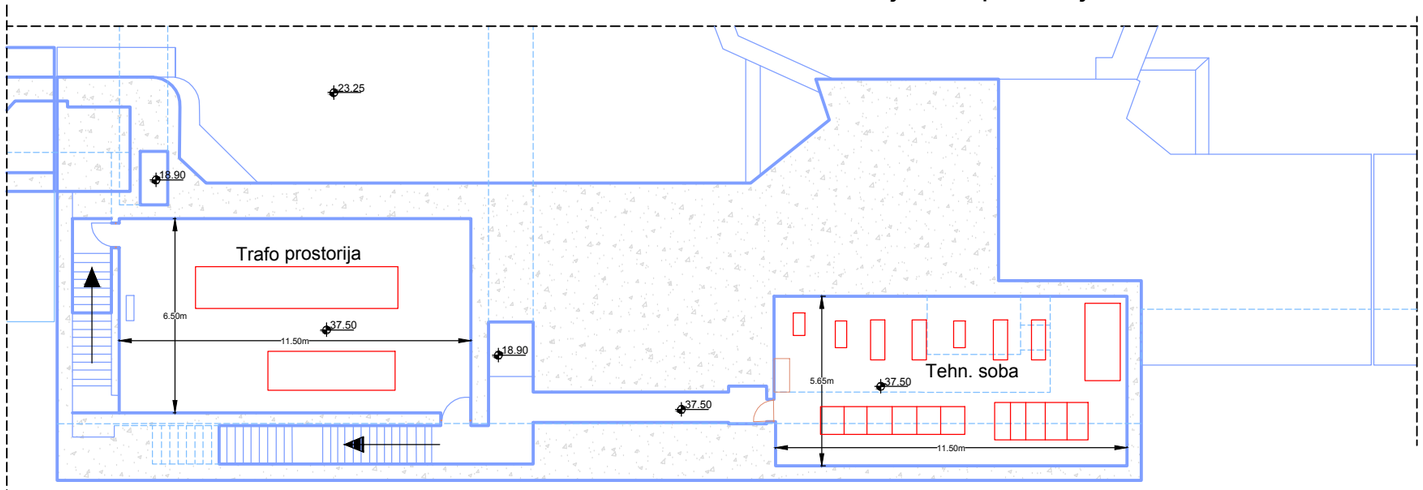
INVESTITOR: REPUBLIKA SRBIJA - MGSI / JP "ELEKTROPRIVREDA SRBIJE "	PROJEKAT: IDEJNI PROJEKAT I STUDIJA OPRAVDANOSTI SANACIJA, ADAPTACIJA I REKONSTRUKCIJA BRODSKE PREVODNICE HE "ĐERDAP 2"
OBJEKAT: BRODSKA PREVODNICA HE "ĐERDAP 2"	CRTEŽ: DJERDAP 2 GORNJA GLAVA - REČNA STRANA TEHN. PROSTORIJA - SITUACIJA
BROJ UGOVORA: 18072-204 / DATUM: 10.2019. / FAZA: IDP	
ODG. PROJEKTANT: Vera Slović, dipl.inž.građ.	RJ: 110-202 / RAZMERA: 1:50 / LISTOVA: 1 / LIST: 1
UN. KONTROLA: Tamara Šumar, dipl.inž.građ.	DEO PROJEKTA: 2/2 / ŠIFRA CRTEŽA: 18072-IDP-II-01.2-202-02 / BR.CRTEŽA/IZMENA: 02
GL. PROJEKTANT: Todora Lazić, dipl.inž.el.	

Inženjerska komora Srbije — Vera B. Slović, dipl. građ. inž. 310 G131 08 — Odgovorni projektant

Situacija donje glave O.S. el. 43.50



Situacija teh. prostorija O.S. el. 37.50



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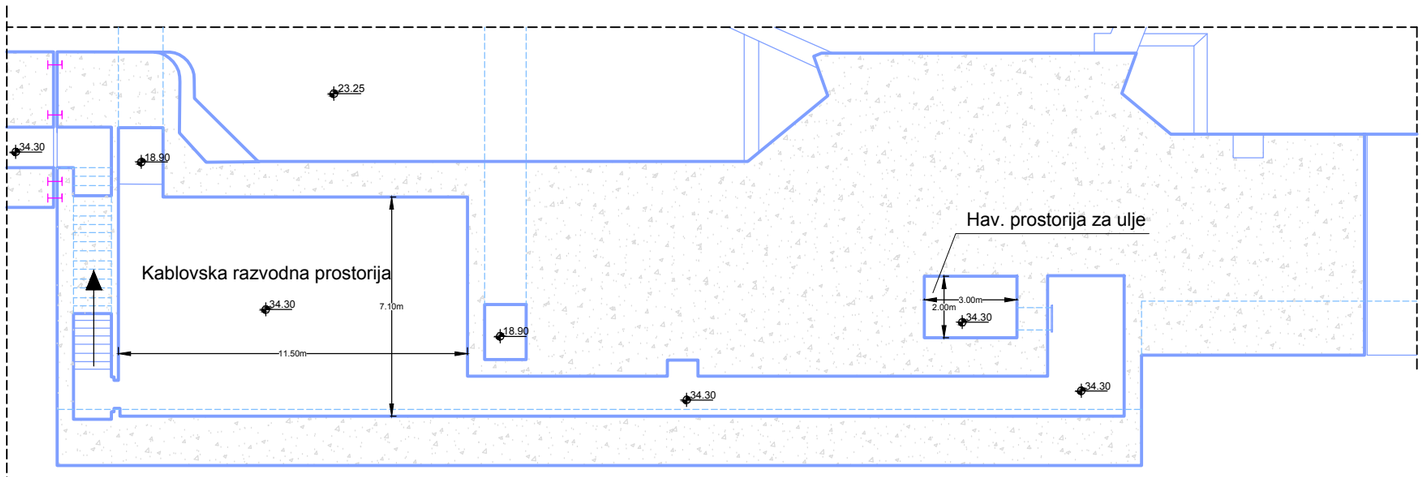
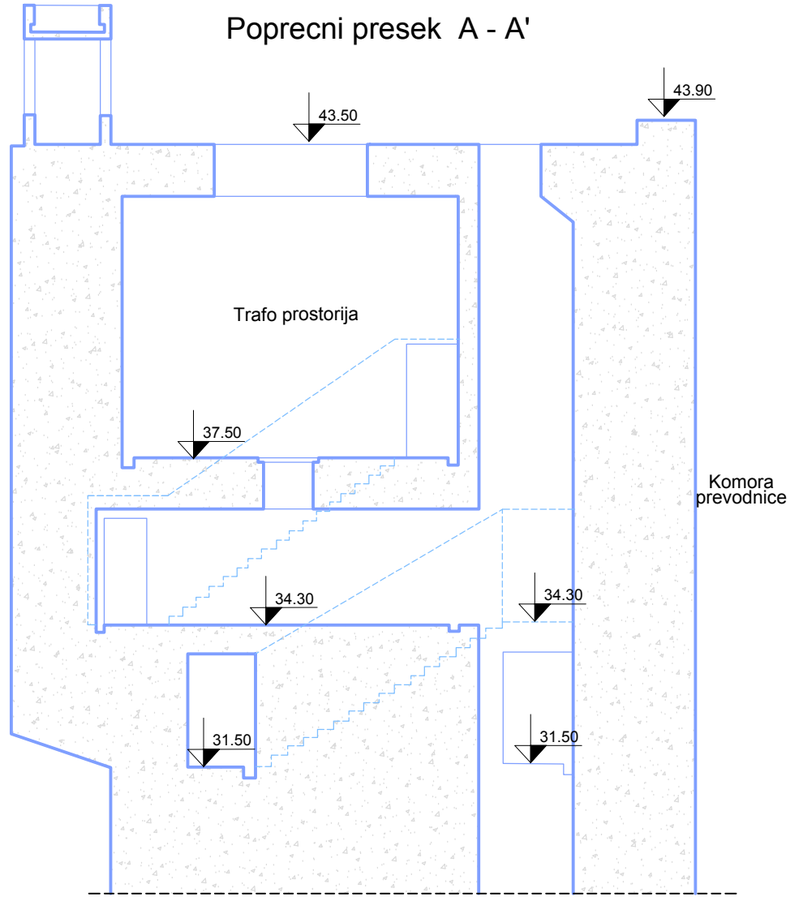
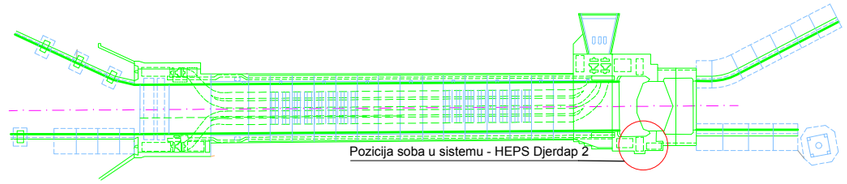


Poprecni presek A - A'





R.BR.	DATUM	OPIS IZMENE	POTPIS

ENERGOPROJEKT-HIDROINŽENJERING A.D.
BULEVAR MIHAILA PUPINA 12, BEOGRAD, SRBIJA

INVESTITOR: REPUBLIKA SRBIJA - MGSI / JP "ELEKTROPRIVREDA SRBIJE "	PROJEKAT: IDEJNI PROJEKAT I STUDIJA OPRAVDANOSTI SANACIJA, ADAPTACIJA I REKONSTRUKCIJA BRODSKE PREVODNICE HE "ĐERDAP 2"
OBJEKAT: BRODSKA PREVODNICA HE "ĐERDAP 2"	CRTEŽ: DJERDAP 2 DONJA GLAVA - OBALNA STRANA TEHN. PROSTORIJA - SITUACIJA POSTOJEĆE STANJE - ZAVRŠNI RADOVI

BROJ UGOVORA	DATUM	FAZA
18072-204	10.2019.	IDP

ODG. PROJEKTANT	Vera Slović, dipl.inž.građ.
UN. KONTROLA	Tamara Šumar, dipl.inž.građ.
GL. PROJEKTANT	Todora Lazić, dipl.inž.el.

RJ	RAZMERA	LISTOVA
110-202	1:50	1
		LIST 1

DEO PROJEKTA	ŠIFRA CRTEŽA	BR.CRTEŽA/IZMENA
2/2	18072-IDP-II-01.2-202-03	03

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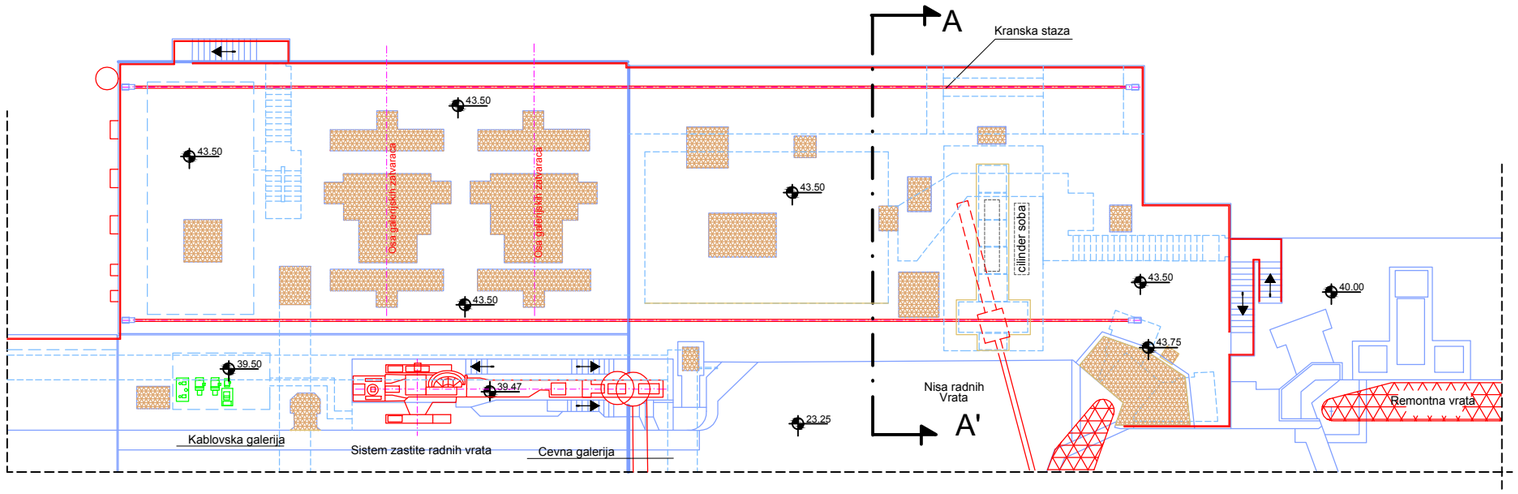

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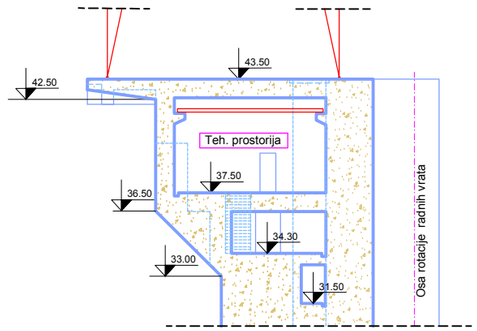

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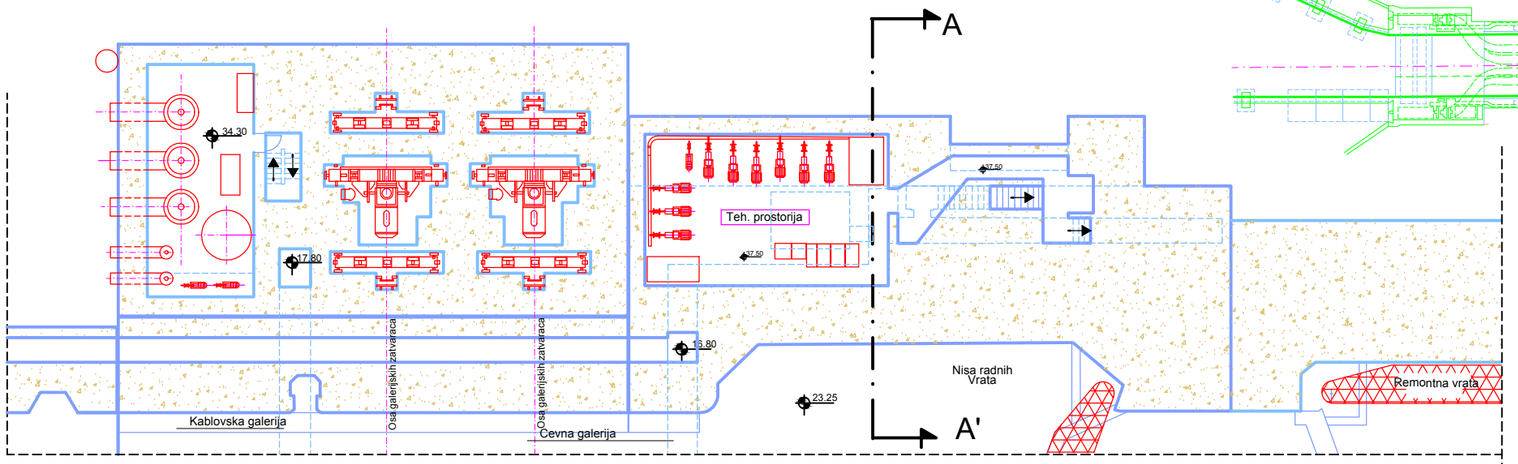
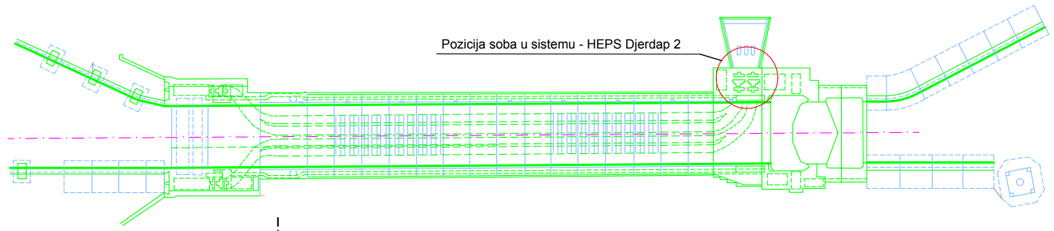
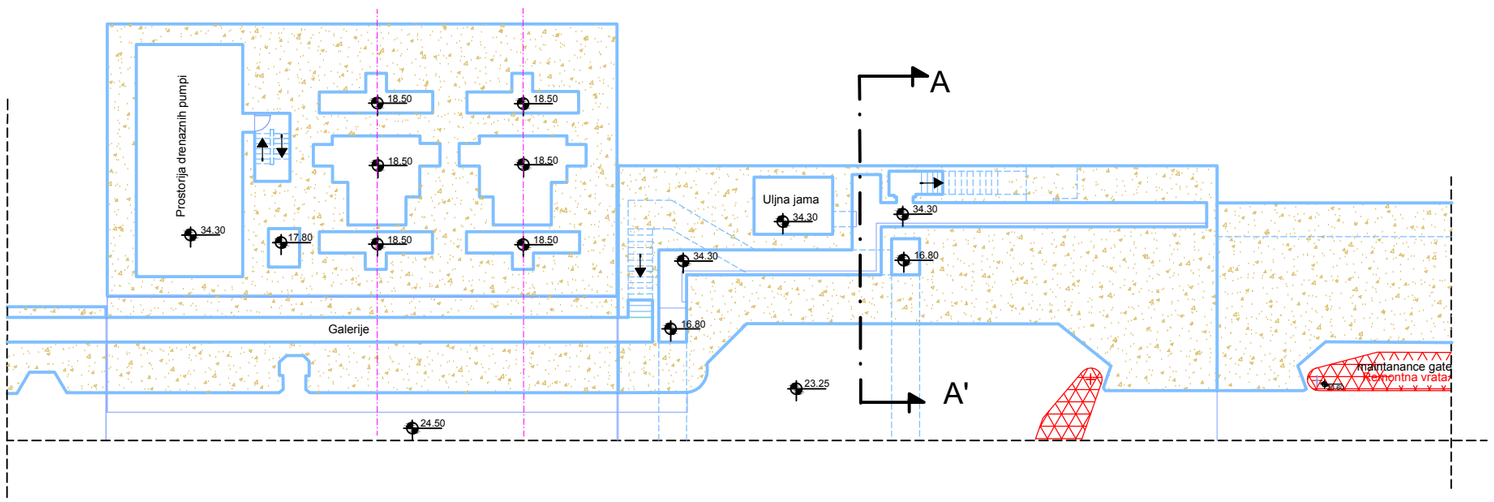




Osnova na koti .34.30



R.BR.	DATUM	OPIS IZMENE	POTPIS

ENERGOPROJEKT-HIDROINŽENJERING A.D.
BULEVAR MIHAILA PUPINA 12, BEOGRAD, SRBIJA

INVESTITOR: REPUBLIKA SRBIJA - MGSI / JP "ELEKTROPRIVREDA SRBIJE "	PROJEKAT: IDEJNI PROJEKAT I STUDIJA OPRAVDANOSTI SANACIJA, ADAPTACIJA I REKONSTRUKCIJA BRODSKE PREVODNICE HE "ĐERDAP 2"
OBJEKAT: BRODSKA PREVODNICA HE "ĐERDAP 2"	CRTEŽ: ĐERDAP 2 DONJA GLAVA - REČNA STRANA TEHN. PROSTORIJA - SITUACIJA POSTOJEĆE STANJE - ZAVRŠNI RADOVI

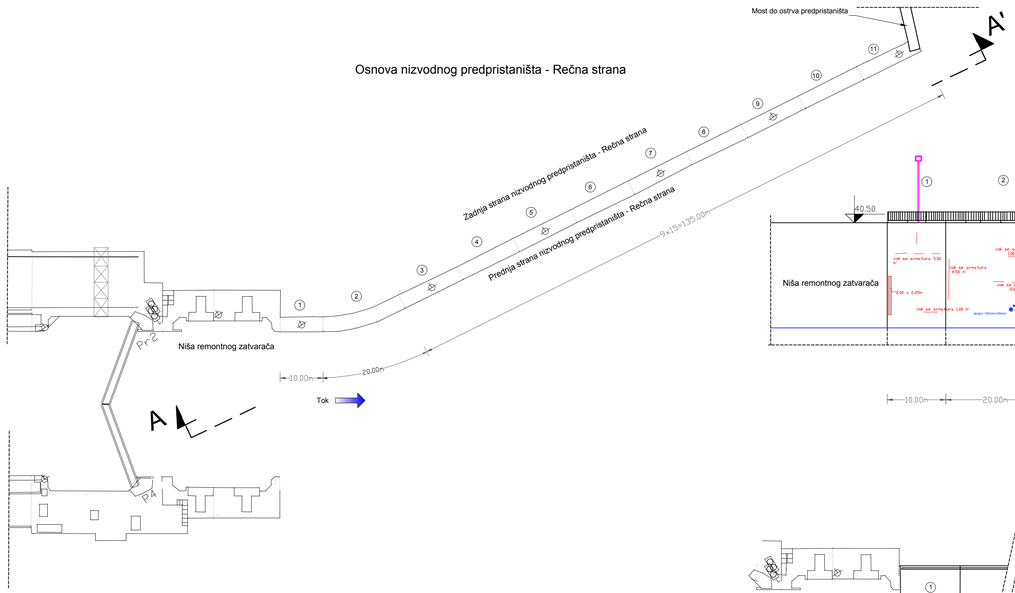
BROJ UGOVORA	DATUM	FAZA
18072-204	10.2019.	IDP

ODG. PROJEKTANT	Vera Slović, dipl.inž.građ.
UN. KONTROLA	Tamara Šumar, dipl.inž.građ.
GL. PROJEKTANT	Todora Lazić, dipl.inž.el.

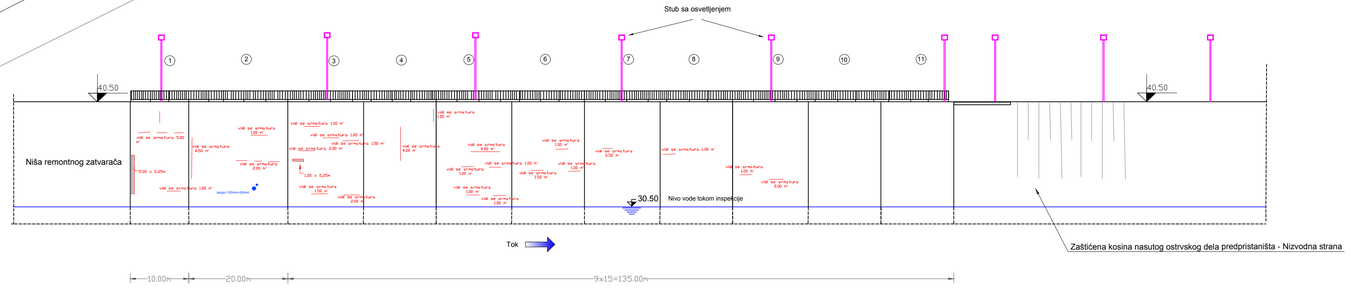
RJ	RAZMERA	LISTOVA
110-202	1:50	1
		LIST 1

DEO PROJEKTA	ŠIFRA CRTEŽA	BR.CRTEŽA/IZMENA
2/2	18072-IDP-II-01.2-202-04	04

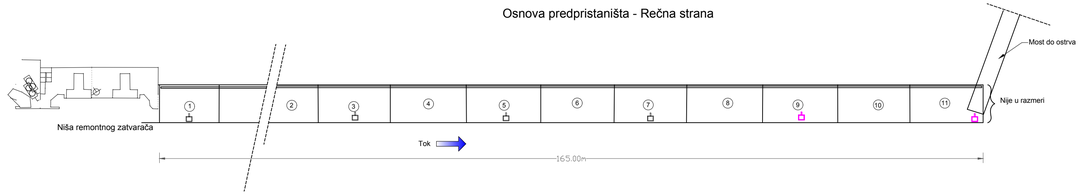
Osnova nizvodnog predpristaništa - Rečna strana



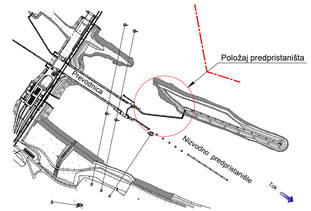
Podužni presek A-A'



Osnova predpristaništa - Rečna strana



Situacija prevodnice na HE Djerdap 2



Legenda

Metoda A - Rucna sanacija

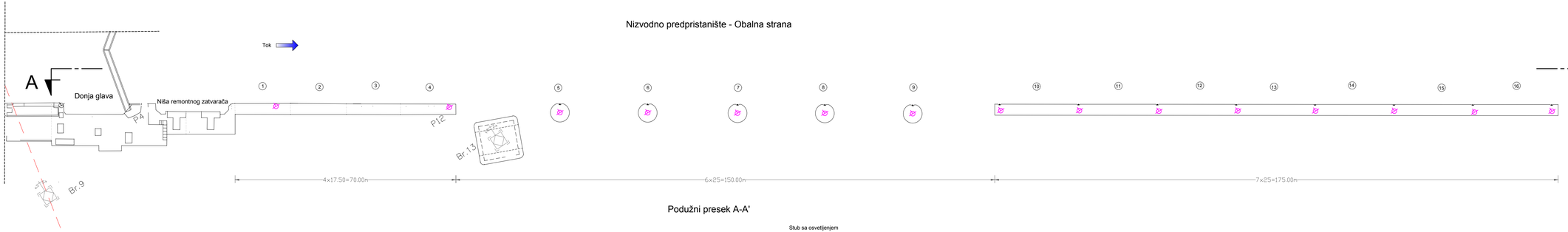
Farbanje ograde

R.BR.	DATUM	OPIS IZMENE	POTPIS

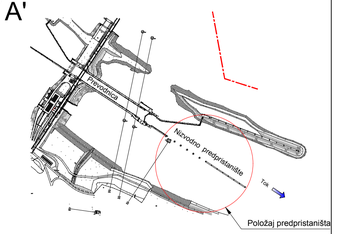
ENERGOPROJEKT-HIDROINŽENJERING A.D.
BULEVAR MIHAILA PUPINA 12, BEOGRAD, SRBIJA

INVESTITOR: REPUBLIKA SRBIJA - MGSI / JP "ELEKTROPRIVREDA SRBIJE "	PROJEKAT: IDEJNI PROJEKAT I STUDIJA OPRAVDANOSTI SANACIJA, ADAPTACIJA I REKONSTRUKCIJA BRODSKE PREVODNICE HE "ĐERDAP 2"
OBJEKAT: BRODSKA PREVODNICA HE "ĐERDAP 2"	CRTEŽ: ĐERDAP 2 NIZVODNO PREDPRISTANIŠTE - REČNA STRANA SITUACIJA - PREGLED POVRŠINA KOJE TREBA TRETIRATI
BROJ UGOVORA: 18072-204 / DATUM: 10.2019. / FAZA: IDP	
ODG. PROJEKTANT: Vera Slović, dipl.inž.grad.	RAZMERA: RU 110-202
UN. KONTROLA: Tamara Šarić, dipl.inž.grad.	LISTOVA: 1 / LIST: 1
GL. PROJEKTANT: Todora Lazić, dipl.inž.el.	DEO PROJEKTA: 2/3 / ŠIFRA CRTEŽA: 18072-IDP-II-013-202-05 / BR.CRTEŽA/IZMENA: 05

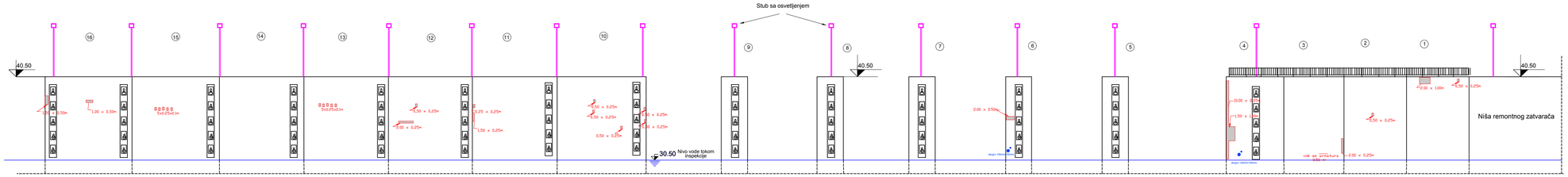
Nizvodno predpristanište - Obalna strana



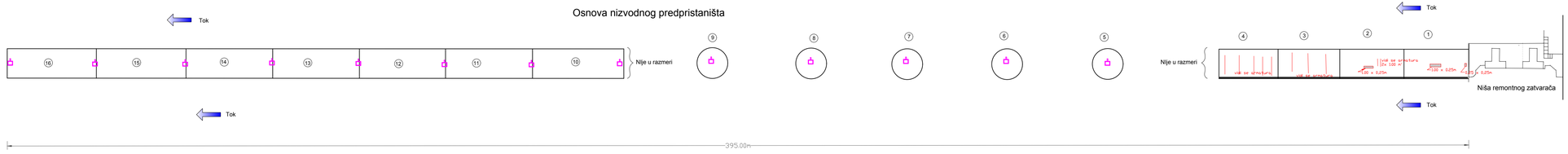
Situacija prevodnice na HE Djerdap 2



Podužni presek A-A'



Osnova nizvodnog predpristaništa



Napomena: Kuke i bitve nisu u razmeri

Legenda

1.00 × 0.25m — Metoda A - Rucna sanacija

Farbanje ograde

R.BR.	DATUM	OPIS IZMENE	POTPIS

ENERGOPROJEKT-HIDROINŽENJERING A.D.
BULEVAR MIHAILA PUPINA 12, BEOGRAD, SRBIJA

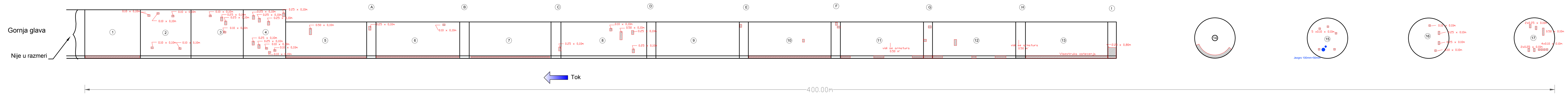
INVESTITOR: REPUBLIKA SRBIJA - MGSI / JP "ELEKTROPRIVREDA SRBIJE "	PROJEKAT: IDEJNI PROJEKAT I STUDIJA OPRAVDANOSTI SANACIJA, ADAPTACIJA I REKONSTRUKCIJA BRODSKE PREVODNICE HE "DERDAP 2"
OBJEKAT: BRODSKA PREVODNICA HE "ĐERDAP 2"	CRTEŽ: DJERDAP 2 NIZVODNO PREDPRISTANIŠTE - OBALNA STRANA SITUACIJA - PREGLED POVRŠINA KOJE TREBA TRETIRATI
BROJ UGOVORA: 18072-204 / DATUM: 10.2019. / FAZA: IDP	
ODG. PROJEKTANT: Vera Slović, dipl.inž.grad.	RU: 110-202 / RAZMERA: / LISTOVA: 1
UN. KONTROLA: Tamara Šumar, dipl.inž.grad.	DEO PROJEKTA: 2/3 / ŠIFRA CRTEŽA: 18072-IDP-R-013-202-06 / LIST: 1 / BR.CRTEŽA/IZMENA: 06
GL. PROJEKTANT: Todora Lazić, dipl.inž.el.	

Uzvodno predpristanište - Obalna strana

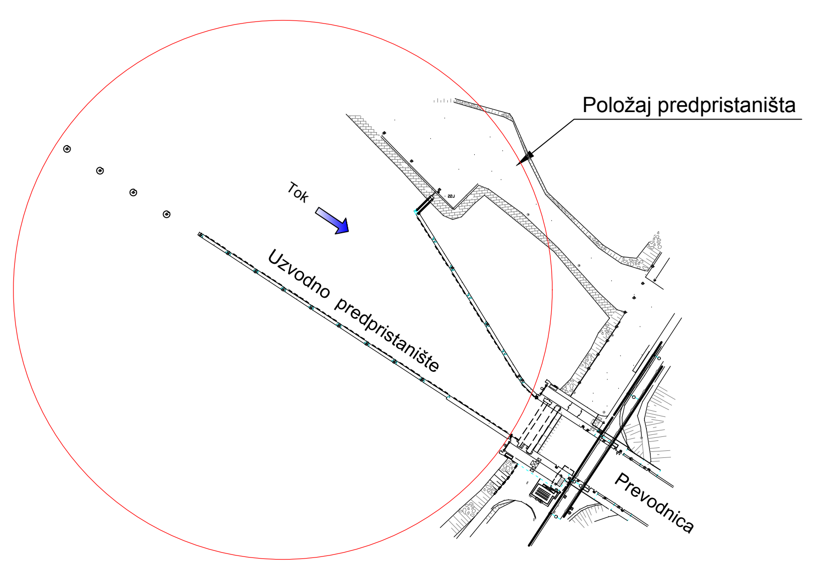
Podužni presek A-A'

Podužni presek A-A'

Osnova uzvodnog predpristaništa



Situacija prevodnice na HE Djerdap 2



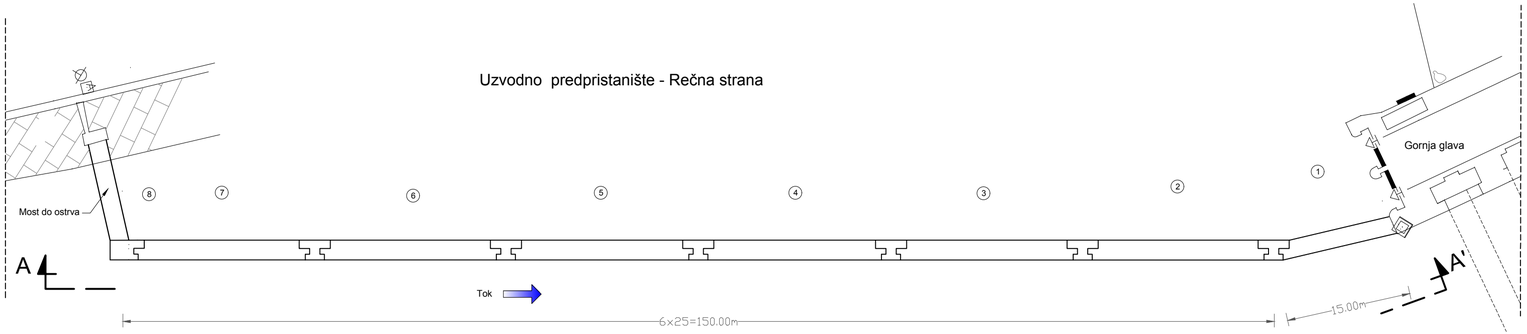
Legenda

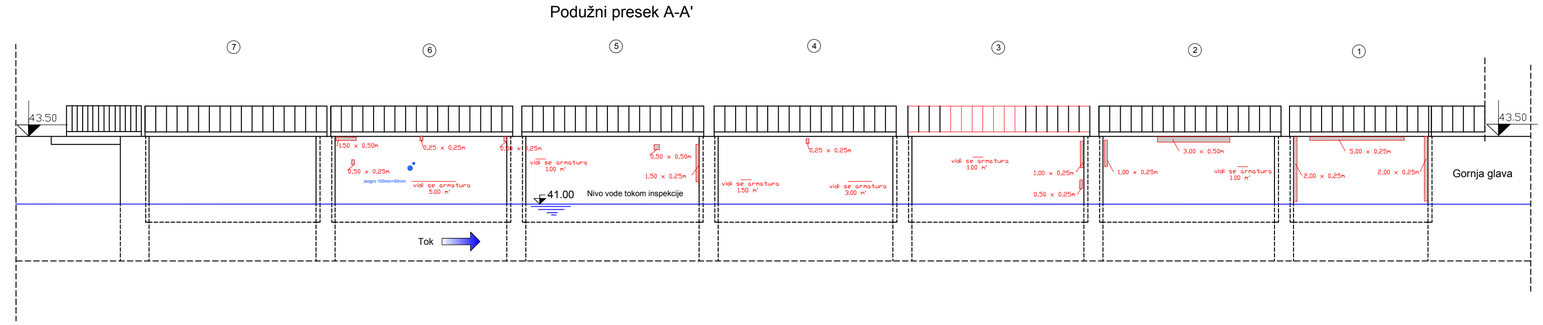
- Metoda A - Rucna sanacija
- Farbanje ograde

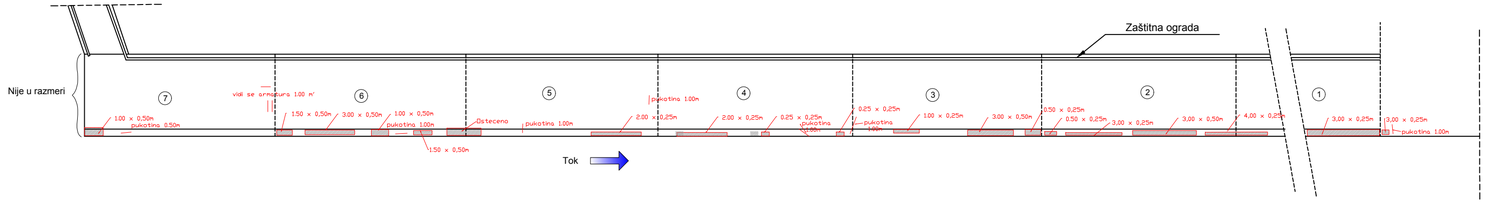
R.BR.	DATUM	OPIS IZMENE	POTPIS

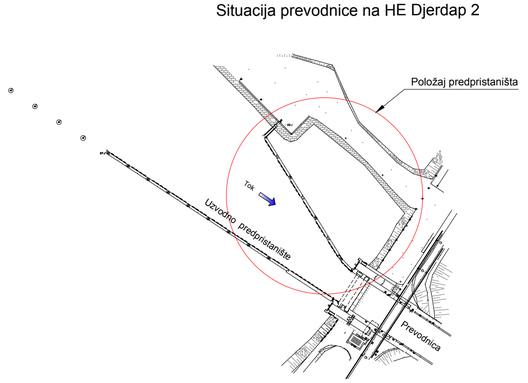
ENERGOPROJEKT-HIDROINŽENJERING A.D.
BULEVAR MIHAILA PUPINA 12, BEOGRAD, SRBIJA

INVESTITOR REPUBLIKA SRBIJA - MGSI / JP "ELEKTROPRIVREDA SRBIJE "	PROJEKAT IDEJNI PROJEKAT I STUDIJA OPRAVDANOSTI SANACIJA, ADAPTACIJA I REKONSTRUKCIJA BRODSKE PREVODNICE HE "ĐERDAP 2"
OBJEKAT BRODSKA PREVODNICA HE "ĐERDAP 2"	CRTEŽ DJERDAP 2 UZVODNO PREDPRISTANIŠTE - OBALNA STRANA SITUACIJA - PREGLED POVRŠINA KOJE TREBA TRETIRATI
BROJ UGOVORA 18072-204 · DATUM 10.2019. · FAZA IDP	RJ 110-202 · RAZMERA · LISTOVA 1 · LIST 1
ODG. PROJEKTANT: Vera Slović, dipl.inž.građ. UN. KONTROLA: Tamara Šumar, dipl.inž.građ. GL. PROJEKTANT: Todora Lazić, dipl.inž.el.	DEO PROJEKTA 2/3 · ŠIFRA CRTEŽA 18072-IDP-II-01.3-202-01 · BR.CRTEŽA/IZMENA 01









Legenda

- Metoda A - Rucna sanacija
- Metoda B - Injektiranje pukotina
- Farbanje ograde

Вера Б. Словић
дипл. грађ. инж.
310 G131 08
ИНЖЕЊЕРСКА КОМОРА СРБИЈЕ

R.BR.	DATUM	OPIS IZMENE	POTPIS

ENERGOPROJEKT-HIDROINŽENJERING A.D.
BULEVAR MIHAILA PUPINA 12, BEOGRAD, SRBIJA

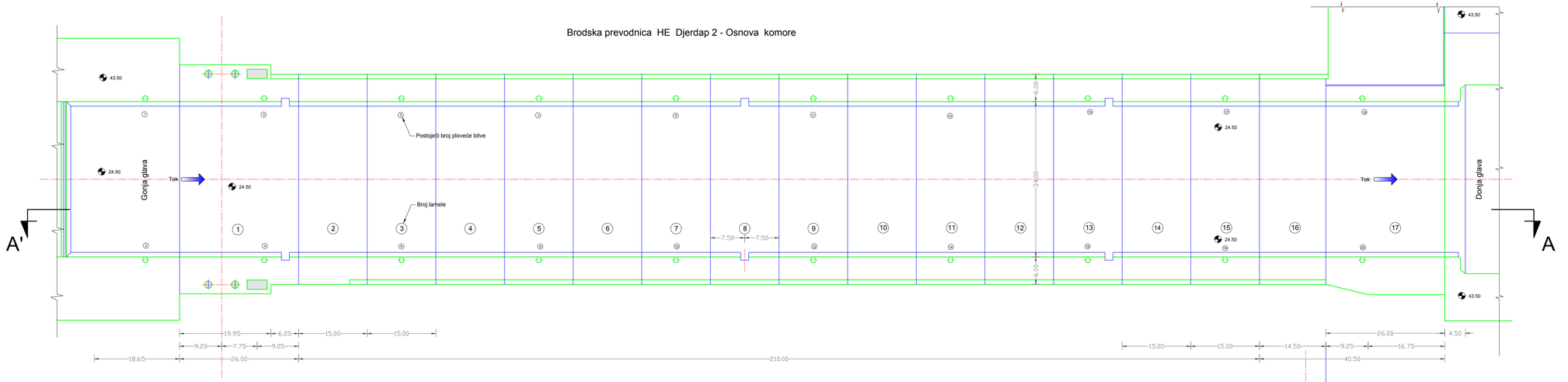
INVESTITOR	REPUBLIKA SRBIJA - MGSI / JP "ELEKTROPRIVREDA SRBIJE "
OBJEKAT	BRODSKA PREVODNICA HE "DERDAP 2"
PROJEKAT	IDEJNI PROJEKAT I STUDIJA OPRAVDANOSTI SANACIJA, ADAPTACIJA I REKONSTRUKCIJA BRODSKE PREVODNICE HE "DERDAP 2"
CRTEŽ	DJERDAP 2 UZVODNO PREDPRISTANIŠTE - REČNA STRANA SITUACIJA - PREGLED POVRŠINA KOJE TREBA TRETIRATI

BROJ UGOVORA	DATUM	FAZA
18072-204	10.2019.	IDP

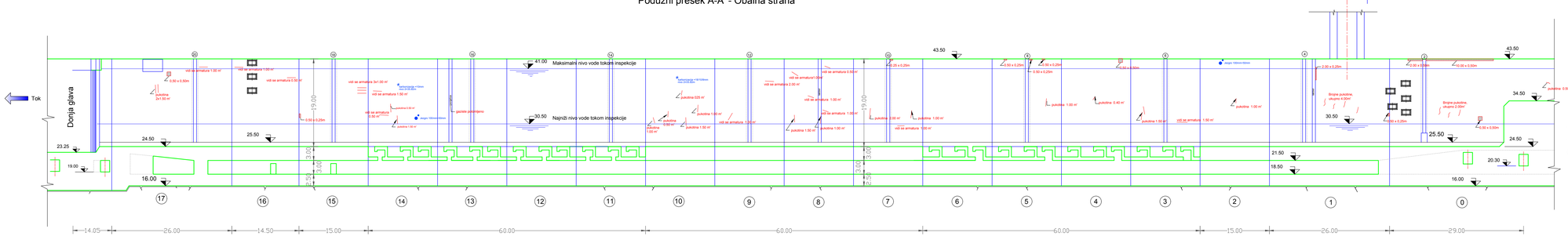
ODG. PROJEKTANT	Vera Slović, dipl.inž.grad.		
UN. KONTROLA	Tamara Šumar, dipl.inž.grad.		
GL. PROJEKTANT	Todora Lazić, dipl.inž.el.		

RJ	RAZMERA	LISTOVA
110-202		1
DEO PROJEKTA	ŠIFRA CRTEŽA	LIST / BR.CRTEŽA/IZMENA
2/3	18072-IDP-II-01.3-202-02	1 / 02

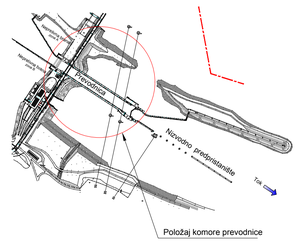
Brodska prevodnica HE Djerdap 2 - Osnova komore



Podužni presek A-A' - Obalna strana



Situacija prevodnice na HE Djerdap 2



Legenda

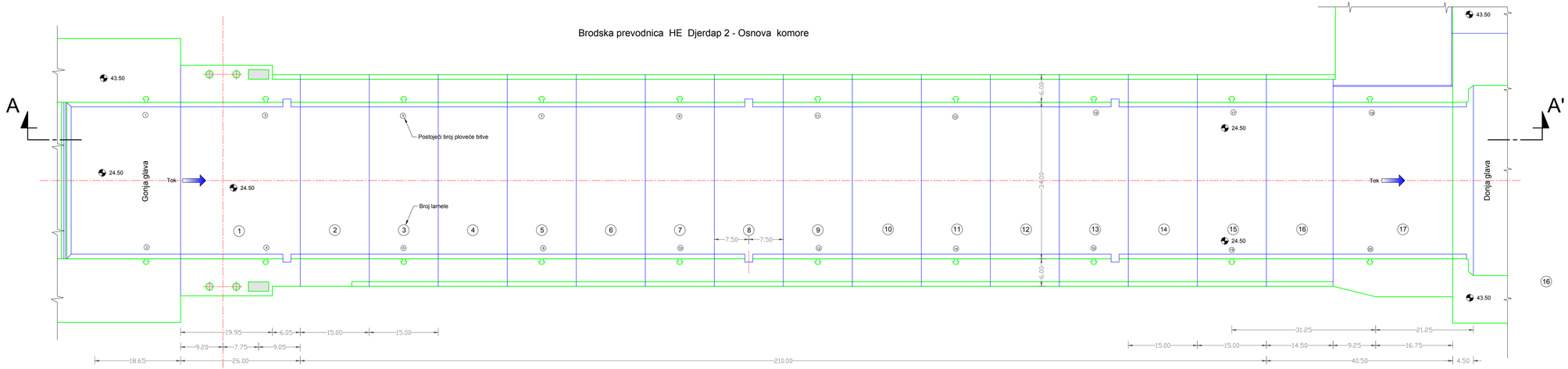
- Metoda A - Rucna sanacija
- Metoda B - Injektiranje pukotina
- Farbanje ograde

R.BR.	DATUM	OPIS IZMENE	POTPIS

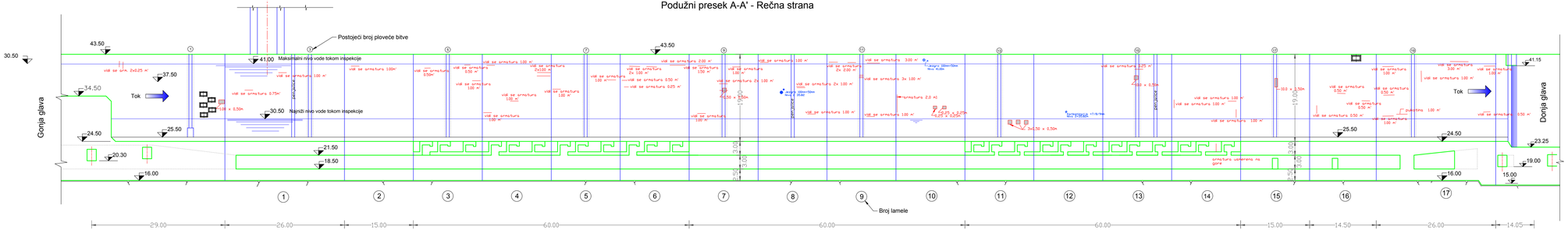
ENERGOPROJEKT-HIDROINŽENJERING A.D.
BULEVAR MIHAILA PUPINA 12, BEOGRAD, SRBIJA

INVESTITOR: REPUBLIKA SRBIJA - MGSI / JP "ELEKTROPRIVREDA SRBIJE "	PROJEKAT: IDEJNI PROJEKAT I STUDIJA OPRAVDANOSTI SANACIJA, ADAPTACIJA I REKONSTRUKCIJA BRODSKE PREVODNICE HE "DERDAP 2"
OBJEKAT: BRODSKA PREVODNICA HE "DERDAP 2"	CRTEŽ: DJERDAP 2 KOMORA PREVODNICE - OBALNA STRANA SITUACIJA - PREGLED POVRŠINA KOJE TREBA TRETIRATI
BROJ UGOVORA: 18072-204 / DATUM: 10.2019. / FAZA: IDP	
ODG. PROJEKTANT: Vera Slovic, dipl.inž.grad.	RAZMERA: RJ 110-202 / LISTOVA: 1
UN. KONTROLA: Tamara Šumar, dipl.inž.grad.	LIST: 1
GL. PROJEKTANT: Todora Lazić, dipl.inž.el.	DEO PROJEKTA: 2/3 / ŠIFRA CRTEŽA: 18072-IDP-R-013-202-03 / BR.CRTEŽA/IZMENA: 03

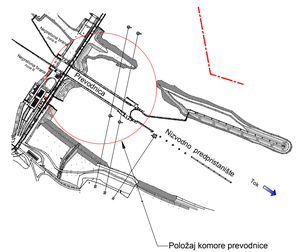
Brodska prevodnica HE Djerdap 2 - Osnova komore



Podužni presek A-A' - Rečna strana



Situacija prevodnice na HE Djerdap 2



Legenda

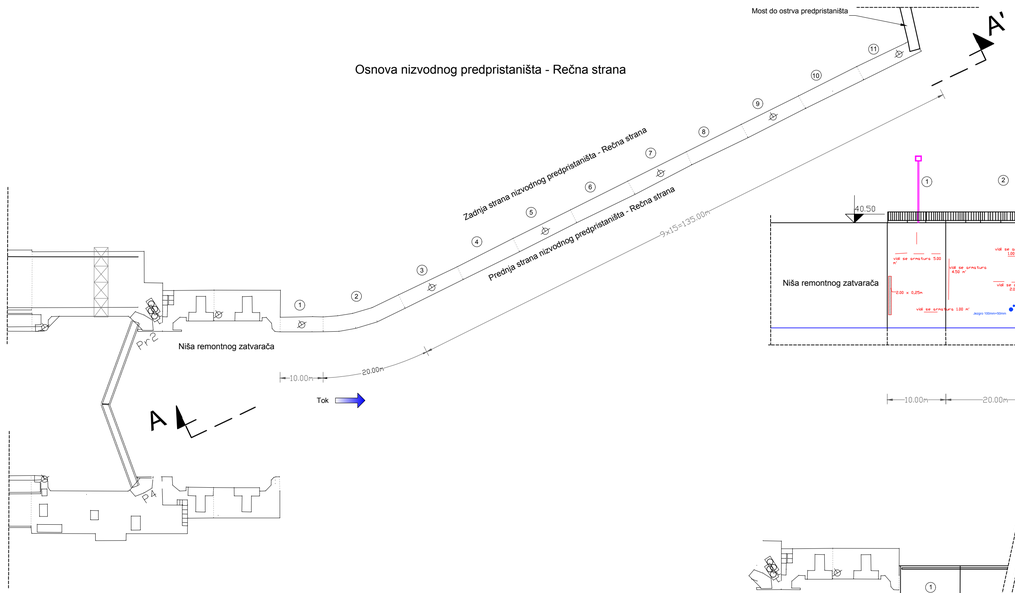
- Metoda A - Rucna sanacija
- Metoda B - Injektiranje pukotina
- Farbanje ograde

R.BR.	DATUM	OPIS IZMENE	POTPIS

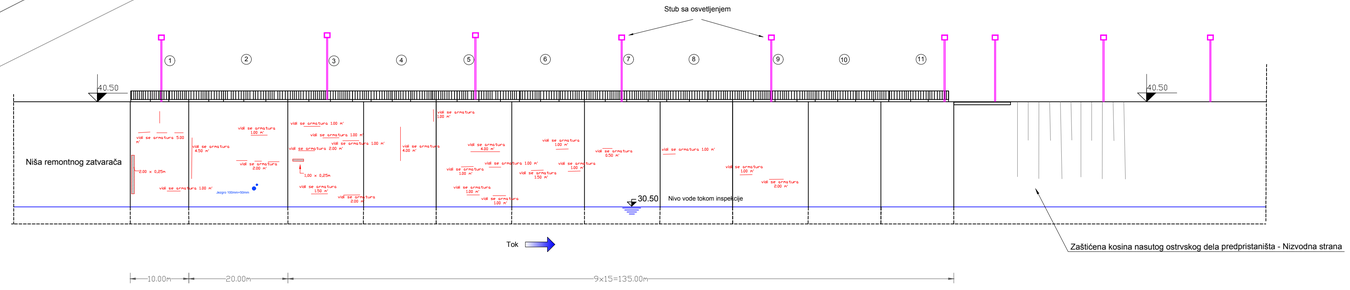
ENERGOPROJEKT-HIDROINŽENJERING A.D.
BULEVAR MIHAILA PUPINA 12, BEOGRAD, SRBIJA

INVESTITOR: REPUBLIKA SRBIJA - MGSI / JP "ELEKTROPRIVREDA SRBIJE "	PROJEKAT: IDEJNI PROJEKAT I STUDIJA OPRAVDANOSTI SANACIJA, ADAPTACIJA I REKONSTRUKCIJA BRODSKE PREVODNICE HE "DERDAP 2"
OBJEKAT: BRODSKA PREVODNICA HE "DERDAP 2"	CRTEŽ: DJERDAP 2 KOMORA PREVODNICE - REČNA STRANA SITUACIJA - PREGLED POVRŠINA KOJE TREBA TRETIRATI
BROJ UGOVORA: 18072-204 / DATUM: 10.2019. / FAZA: IDP	
ODG. PROJEKTANT: Vera Slovic, dipl.inž.grad.	RJ: 110-202 / RAZMERA: / LISTOVA: 1
UN. KONTROLA: Tamara Šumar, dipl.inž.grad.	LIST: 1
GL. PROJEKTANT: Todora Lazić, dipl.inž.el.	DEO PROJEKTA: 2/3 / ŠIFRA CRTEŽA: 18072-IDP-R-013-202-04 / BR.CRTEŽA/IZMENA: 04

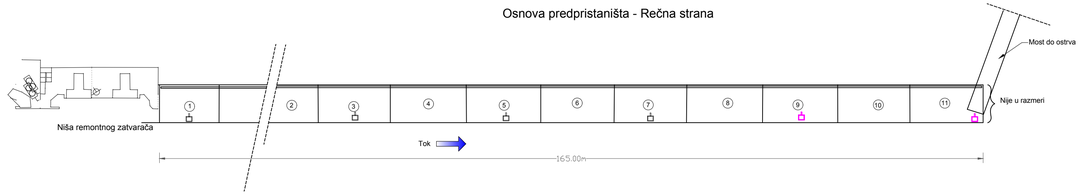
Osnova nizvodnog predpristaništa - Rečna strana



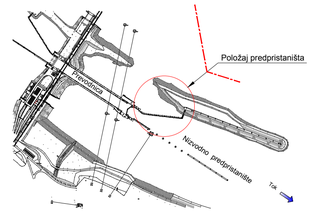
Podužni presek A-A'



Osnova predpristaništa - Rečna strana



Situacija prevodnice na HE Djerdap 2



Legenda

Metoda A - Rucna sanacija

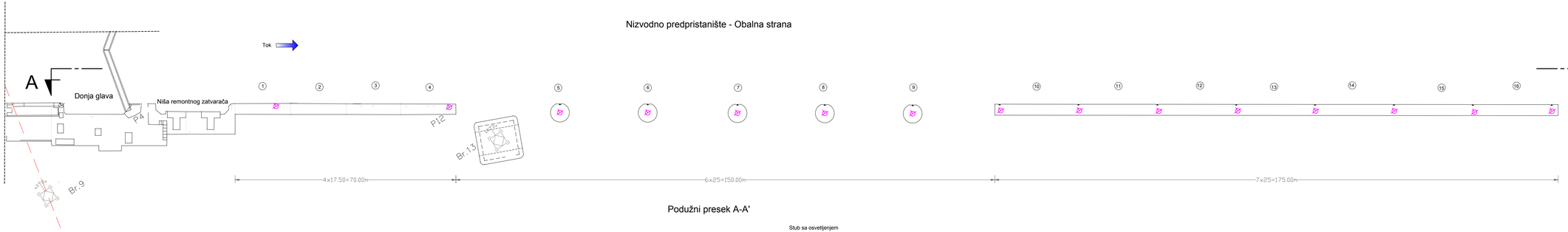
Farbanje ograde

R.BR.	DATUM	OPIS IZMENE	POTPIS

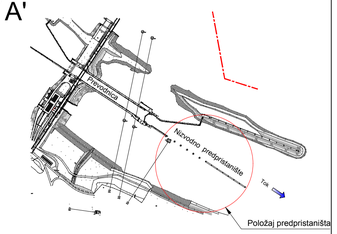
ENERGOPROJEKT-HIDROINŽENJERING A.D.
BULEVAR MIHAILA PUPINA 12, BEOGRAD, SRBIJA

INVESTITOR: REPUBLIKA SRBIJA - MGSI / JP "ELEKTROPRIVREDA SRBIJE "	PROJEKAT: IDEJNI PROJEKAT I STUDIJA OPRAVDANOSTI SANACIJA, ADAPTACIJA I REKONSTRUKCIJA BRODSKE PREVODNICE HE "ĐERDAP 2"
OBJEKAT: BRODSKA PREVODNICA HE "ĐERDAP 2"	CRTEŽ: ĐERDAP 2 NIZVODNO PREDPRISTANIŠTE - REČNA STRANA SITUACIJA - PREGLED POVRŠINA KOJE TREBA TRETIRATI
BROJ UGOVORA: 18072-204 / DATUM: 10.2019. / FAZA: IDP	
ODG. PROJEKTANT: Vera Slović, dipl.inž.grad.	RAZMERA: RU 110-202
UN. KONTROLA: Tamara Šarić, dipl.inž.grad.	LISTOVA: 1 / LIST: 1
GL. PROJEKTANT: Todora Lazić, dipl.inž.el.	DEO PROJEKTA: 2/3 / ŠIFRA CRTEŽA: 18072-IDP-II-013-202-05 / BR.CRTEŽA/IZMENA: 05

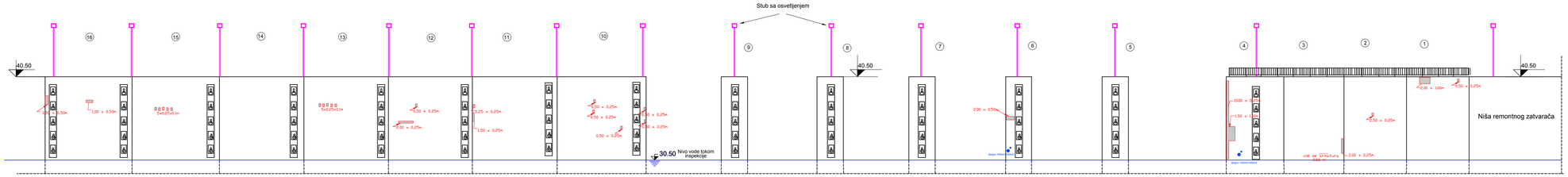
Nizvodno predpristanište - Obalna strana



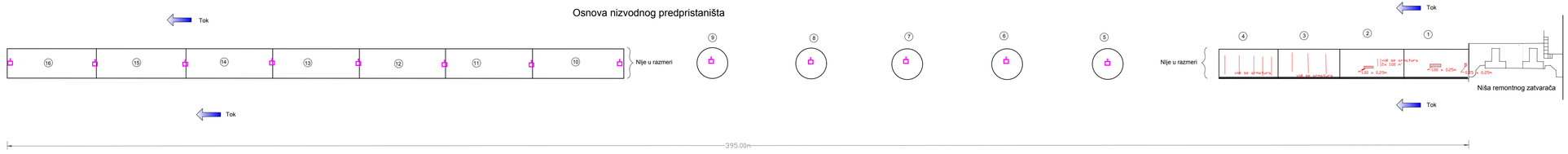
Situacija prevodnice na HE Djerdap 2



Podužni presek A-A'



Osnova nizvodnog predpristaništa



Napomena: Kuke i bitve nisu u razmeri

Legenda

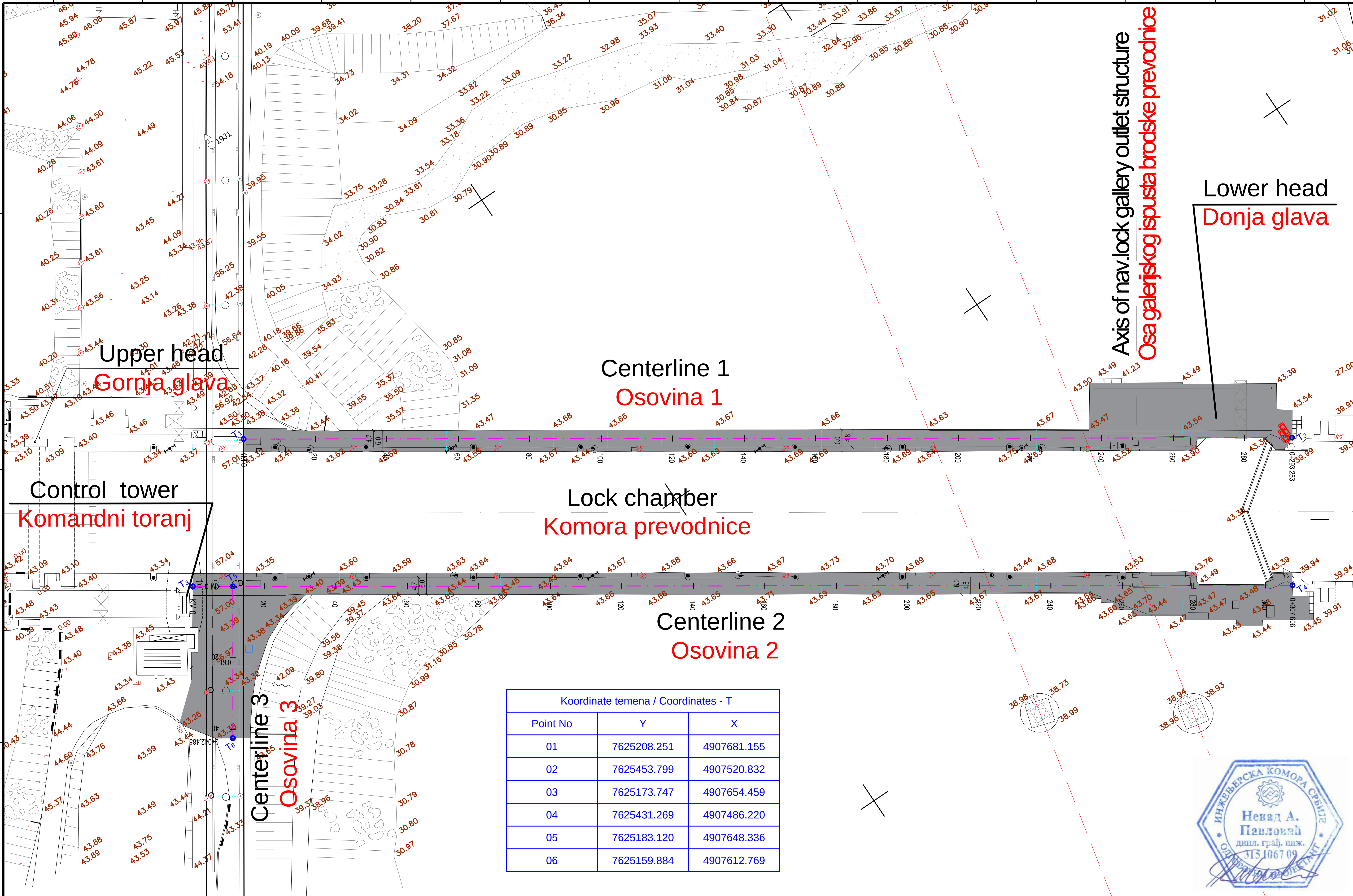
1.00 × 0.25m — Metoda A - Rucna sanacija

Farbanje ograde

R.BR.	DATUM	OPIS IZMENE	POTPIS

ENERGOPROJEKT-HIDROINŽENJERING A.D.
BULEVAR MIHAILA PUPINA 12, BEOGRAD, SRBIJA

INVESTITOR: REPUBLIKA SRBIJA - MGSI / JP "ELEKTROPRIVREDA SRBIJE "	PROJEKAT: IDEJNI PROJEKAT I STUDIJA OPRAVDANOSTI SANACIJA, ADAPTACIJA I REKONSTRUKCIJA BRODSKE PREVODNICE HE "DERDAP 2"
OBJEKAT: BRODSKA PREVODNICA HE "ĐERDAP 2"	CRTEŽ: DJERDAP 2 NIZVODNO PREDPRISTANIŠTE - OBALNA STRANA SITUACIJA - PREGLED POVRŠINA KOJE TREBA TRETIRATI
BROJ UGOVORA: 18072-204 / DATUM: 10.2019. / FAZA: IDP	
ODG. PROJEKTANT: Vera Slović, dipl.inž.grad.	RU: 110-202 / RAZMERA: / LISTOVA: 1
UN. KONTROLA: Tamara Šumar, dipl.inž.grad.	DEO PROJEKTA: 2/3 / ŠIFRA CRTEŽA: 18072-IDP-R-013-202-06 / LIST: 1 / BR.CRTEŽA/IZMENA: 06
GL. PROJEKTANT: Todora Lazić, dipl.inž.el.	



Koordinate temena / Coordinates - T

Point No	Y	X
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02	7625453.799	4907520.832
03	7625173.747	4907654.459
04	7625431.269	4907486.220
05	7625183.120	4907648.336
06	7625159.884	4907612.769

ENERGOPROJEKT-HIDROINŽENJERING A.D.
BULEVAR MIHAILA PUPINA 12, BEOGRAD, SRBIJA

ODG. PROJEKTANT	N. Pavlović, dipl.građ.inž. br.licence: 315 I067 09
UN. KONTROLA	Ž. Mrkić,dipl.građ.inž.
GLAV. PROJEKTANT	T. Lazić,dipl.inž.el.

INVESTITOR / KORISNIK: REPUBLIKA SRBIJA - MGSI / JP "ELEKTROPRIVREDA SRBIJE"

PROJEKAT: IDEJNI PROJEKAT I STUDIJA OPRAVDANOSTI SANACIJE, ADAPTACIJE I REKONSTRUKCIJE BRODSKE PREVODNICE HE "ĐERDAP 2"

OBJEKAT: BRODSKA PREVODNICA HE "ĐERDAP 2"

CRTEŽ: SITUACIJA PREDMETNIH SAOBRAĆAJNIH POVRŠINA

LISTOVA 1
LIST 1

DATUM	RAZMERA	FAZA	DEO PROJ.	ŠIFRA CRTEŽA	BR. UGOV.	RJ	BR. CRT./IZMENA
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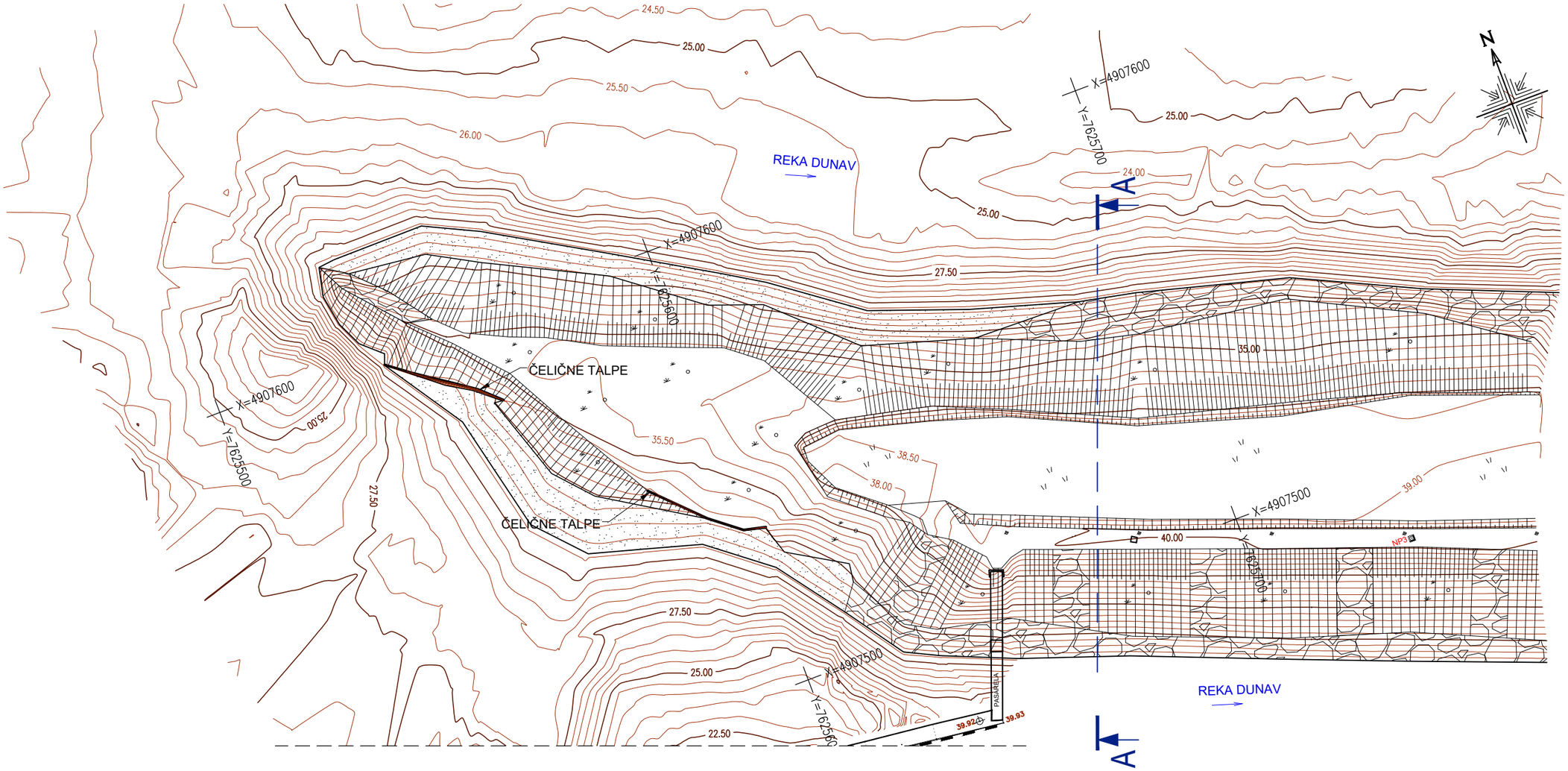
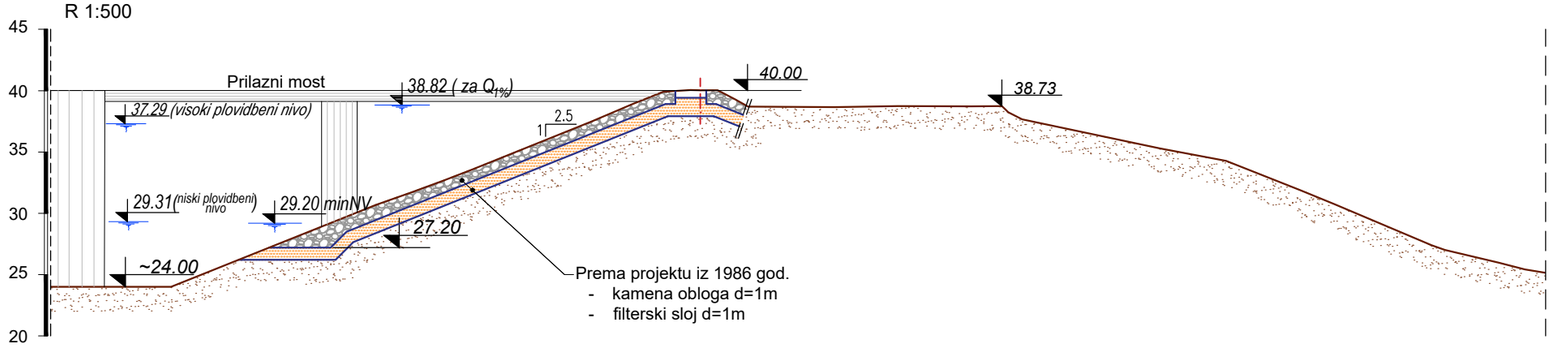
OSNOVA
R 1:1000



PRESEK A-A
R 1:500

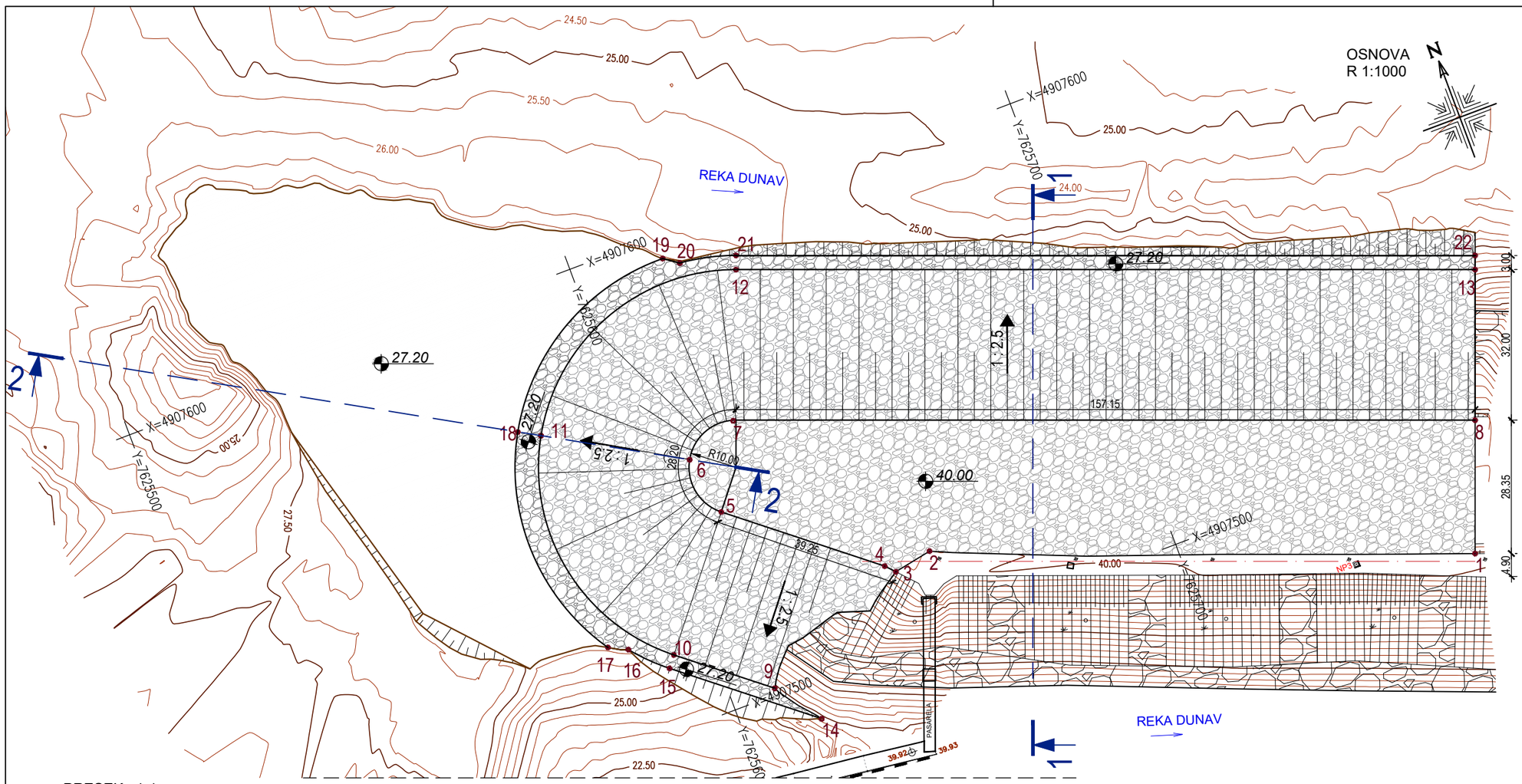


R.BR.	DATUM	OPIS IZMENE	POTPIS

ENERGOPROJEKT-HIDROINŽENJERING A.D.
BULEVAR MIHAILA PUPINA 12, BEOGRAD, SRBIJA

INVESTITOR: JP "ELEKTROPRIVREDA SRBIJE" OGRANAK HE "ĐERDAP" - KLADOVO		PROJEKAT: IDEJNI PROJEKAT ADAPTACIJE BRODSKE PREVODNICE HE "ĐERDAP 2"	
OBJEKAT: BRODSKA PREVODNICA HE "ĐERDAP 2"		CRTEŽ: SITUACIJA I POPREČNI PRESEK NASIPA U NIZVODNOM PREDPRISTANIŠTU - POSTOJEĆE STANJE -	
BROJ UGOVORA: 18072-204	DATUM: APRIL 2020.	FAZA: IDP	
ODG.PROJEKT.	Ivana Dmitrović, dipl.inž.gradj. br.licence: 314 F 401 07	RJ: 110-201	RAZMERA: 1:1000; 1:500; 1:100
UN. KONTROLA	Radmilo Glišić,dipl.inž.gradj.	DEO PROJEKTA: HG	LISTOVA: 1 / LIST: 1
ŠEF PROJEKTA	Todora Lazić,dipl.inž.el.	ŠIFRA CRTEŽA: 18072-IDP-III-01-201-03	BR.CRT./IZMENA: 03

OSNOVA
R 1:1000



KOORDINATE TAČAKA
NOVOPROJEKTOVANOG OBJEKTA

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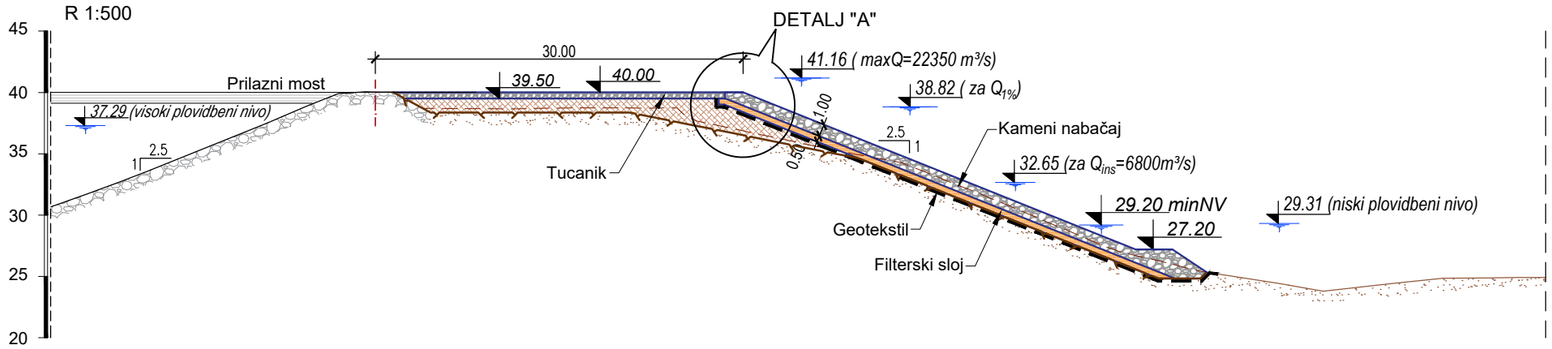
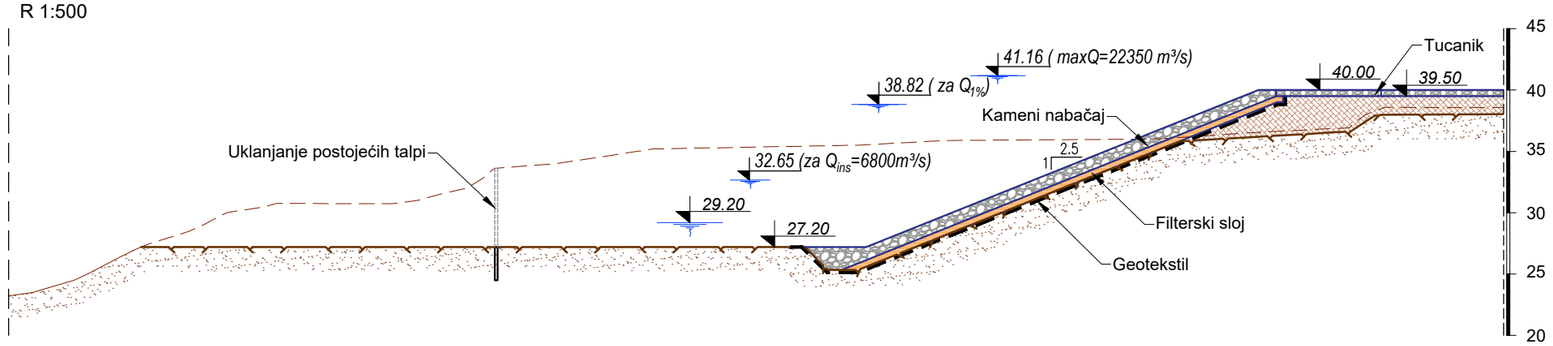
3	7625642.28	4907515.46
4	7625640.48	4907517.42
5	7625612.00	4907540.42
6	7625609.60	4907553.16
7	7625621.80	4907557.56
8	7625768.89	4907502.31
9	7625609.46	4907501.34
10	7625591.89	4907515.51
11	7625581.82	4907569.04
12	7625633.05	4907587.52
13	7625780.14	4907532.26
14	7625616.55	4907491.76
15	7625590.01	4907513.19
16	7625583.23	4907519.98
17	7625579.31	4907521.92
18	7625577.47	4907571.51
19	7625619.29	4907595.19
20	7625622.37	4907593.01
21	7625634.10	4907590.33
22	7625781.19	4907535.07

Ivana Dmitrović

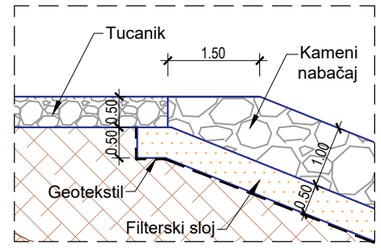
PRESEK 1-1
R 1:500



PRESEK 2-2
R 1:500



DETALJ "A"
R 1:100



R.BR.	DATUM	OPIS IZMENE	POTPIS

ENERGOPROJEKT-HIDROINŽENJERING A.D.
BULEVAR MIHAILA PUPINA 12, BEOGRAD, SRBIJA

INVESTITOR: JP "ELEKTROPRIVREDA SRBIJE" OGRANAK HE "ĐERDAP" - KLADOVO		PROJEKAT: IDEJNO REŠENJE ADAPTACIJE BRODSKE PREVODNICE HE "ĐERDAP 2"	
OBJEKAT: BRODSKA PREVODNICA HE "ĐERDAP 2"		CRTEŽ: SITUACIJA I POPREČNI PRESECI NASIPA U NIZVODNOM PREDPRISTANIŠTU - NOVOPROJEKTOVANO STANJE -	
BROJ UGOVORA: 18072-204	DATUM: APRIL 2020.	FAZA: IDR	
ODG.PROJEKT.	Ivana Dmitrović, dipl.inž.gradj. br.licence: 314 F 401 07	RJ: 110-201	RAZMERA: 1:1000; 1:500; 1:100
UN. KONTROLA	Radmilo Glišić,dipl.inž.gradj.		LISTOVA: 1
ŠEF PROJEKTA	Todora Lazić,dipl.inž.el.		LIST: 1
		DEO PROJEKTA: HG	ŠIFRA CRTEŽA: 18072-IDR-III-03-201-04
			BR.CRT./IZMENA: 04