MONTENEGRO

PODGORICA CAPITAL CITY

VODOVOD I KANALIZACIJA PODGORICA D.O.O.

Co-financed by:

KFW

Western Balkans Investment Framework WBIF

Podgorica Capital City

BMZ Project ID 2020 84 366
KfW Procurement No. 505 731

CONTRACT AGREEMENT FOR

Components 1, 2 and 3: Works for Construction of a Wastewater Treatment Plant, Sewage Sludge Treatment Plant and Sewage Sludge Incineration Plant for the City of Podgorica

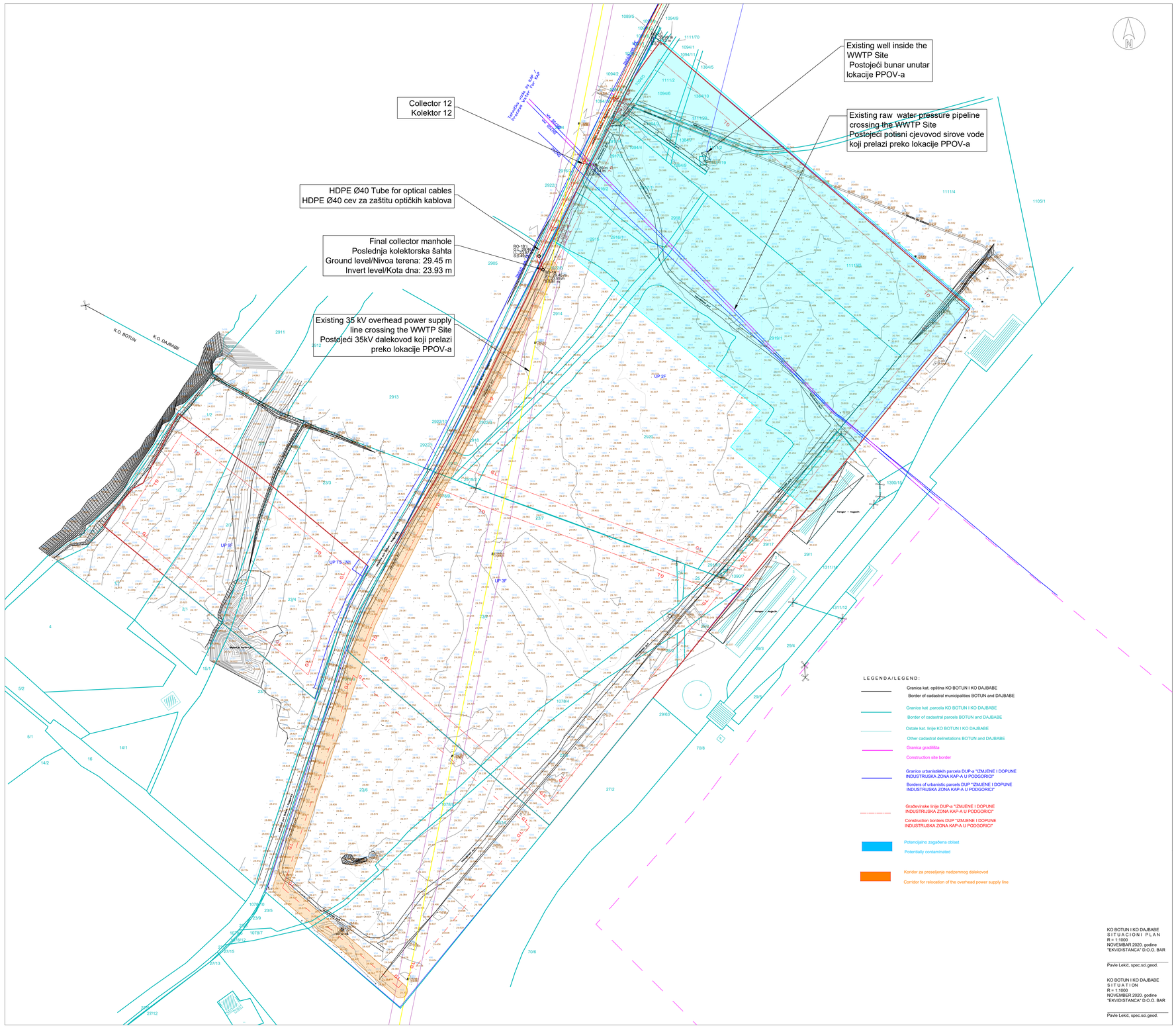
May 2022

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- **Urban-Technical Conditions (Urbanisticko-Tehnicki Uslovi)**
- **Environmental and Social Impact Assessment (ESIA)**
- **Environmental and Social Management Plan (ESMP)**
- **Geotechnical Survey Report**
- **Reports on Soil Contamination**
- **KAP Well Water Analyses Data**



KO BOTUN I KO DAJBABE
SITUACIONI PLAN
R = 1:1000
NOVEMBAR 2020. godine
"EKVIDISTANCA" D.O.O. BAR

Pavle Lekić, spec.sci.geod.

KO BOTUN I KO DAJBABE
SITUATION
R = 1:1000
NOVEMBER 2020. godine
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Pavle Lekić, spec.sci.geod.

Coordinate Reference System: MGI-1901
Referentni koordinatni sistem: Balkans zone 6

Vertical Reference System:
Vertikalni koordinatni sistem:

Index Broj	Description of amendment Opis izmjene	Date Datum	Name Ime

Client:
Kljijent:

MONTENEGRO
CRNA GORA

VODOVOD I KANALIZACIJA DOO PODGORICA

Funding Agency:
Investitor:

KFW
Western Balkans Investment Framework
WBIF

Consultant:
Konsultant:

FICHTNER
WATER & TRANSPORTATION
In association with
u saradnji sa
WA CONSULT d.o.o.
Design , Consulting and Engineering
wandschneider + gutjahr ingenieurgesellschaft mbh

Project:
Projekat:

DESIGN, CONSTRUCTION AND APPROVAL OF DESIGN PARAMETERS, TECHNOLOGY AND CAPACITIES OF WASTEWATER TREATMENT PLANT, SLUDGE TREATMENT AND INCINERATION PLANT AND SEWER EXTENSIONS
PROJEKTOVANJE, IZGRADNJA I ODOBRENJE PROJEKTNIH PARAMETARA, TEHNOLOGIJE I KAPACITETA POSTROJENJA ZA PREČIŠĆAVANJE OTPADNIH VODA, POSTROJENJE ZA OBRADU I SPALJIVANJE MULJA I PROŠIRENJE KANALIZACIJE

Consulting Services for the Preparation of Final Design, Elaboration of Tender Documents and Construction Supervision
Konsultantske usluge za pripremu Glavnog projekta, izradu tenderske dokumentacije i Građevinski nadzor

Measure:
Mjera:

SSIP
PSKM

Drawing Title:
Naziv crteža:

Construction site - Topographic survey
Gradilištu - Topografska izmjera

Drawn by: / Projektovao:	Pavle Lekić	
Checked by: / Kontrolisao:	Jürnjakob Dugge	
Approved by: / Odobrio:	Stéphane Meistermann	
Scale: / Razmjera:	1 : 1000	Drawing no.: / Crtež br.: A-0-00-LP-01
Date: / Datum:	Februar 2021	

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(viii) Other Documents

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- Reports on Soil Contamination
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Note: The following is an unofficial translation of the Urban-Technical Conditions (urbanisticko-tehnickih uslova) number 08-332 / 20-902 dated 21.08.2020 issued by the Secretariat for Spatial Planning and Sustainable Development of the Capital City Podgorica for the construction of the new wastewater treatment plant for the city of Podgorica.

The translation includes only the main part of the urban-technical conditions without annexes. It is provided for informational purposes only.

In case of any discrepancy between the original Montenegrin version and following unofficial English translation, the original Montenegrin language version shall prevail and only the original Montenegrin language is binding.

At your request no 08-332 / 20-902 from 21.08.2020, we are sending you a copy of the urban-technical conditions number 08-332 / 20-902 dated 21.08.2020, for urban plots number. 2F, 3F, 9F in the scope of the DUP "industrial zone of KAP", with the cadastre of installations and technical conditions of the city water supply and sewerage connections number 113UPI-041 / 20-5133 from 09.09.2020, issued by d.o.o "Vodovod j kanalizacjja" from Podgorica.

By checking the Register of Planning Documentation of the Ministry of Sustainable Development and Tourism, it was determined that the DUP "Industrial Zone of KAP", ("Official Gazette MNE - Municipal Regulations" No. 69/19), is recorded in the said Register.

URBAN - TECHNICAL CONDITIONS

Secretariat for Spatial Planning and sustainable development 08-352 / 20-902 August 9, 2020

Capital City, Podgorica

Secretariat for Spatial Planning and sustainable development:, based on the Article 74 of the Law on Spatial Planning and Construction of Facilities ("Official Gazette of MNE" No. 64/17, 44/18, 63/18 and 11/19), the Decree on entrusting part of the work of the Ministry of Sustainable Development and Tourism to local self-government units ("Official Gazette of MNE ", no. 075/19), DUP "KAP industrial zone -a" ("Official Gazette of MNE – municipal regulations", Ьг.69 / 19) and the submitted request of the Capital Podgorica from Podgorica (no. 08-332/20 902 from 21.08. 2020), issues:

URBAN-TECHNICAL CONDITIONS for the preparation of technical documentation for the construction of facilities on the urban plot UP 2 F, Z F i9 F in the scope of the DUP "industrial zone KAP" ("Official Gazette of Montenegro - municipal regulations", no. 69/19).

Precise data on the share of all cadastral parcels in the area of all urban parcels will be defined by the Study of parceling in the planning document, prepared by the company authorized for geodetic works, after which the study must be certified by the Real Estate Administration - Podgorica Regional Unit.

APPLICANT: Capital City Podgorica

CURRENT SITUATION 1 BASIC DATA FROM THE PLANNING DOCUMENT

In accordance with the data from **real estate sheet** no. 157, 154, 445, 456, 56, 3900, 3897- excerpt and copies of the plan, issued by the Real Estate Administration - Podgorica Regional Unit, cadastral parcels listed in the real estate records are as without construction

The real estate sheets listed in the applicant's request and a copy of the plan are an integral part of these UTUs. The conditions, according to the investor's request, refer to the space represented by UP 2 F, Z F and 9 F within the scope of the DUP "industrial zone of KAP"

PLANNED CONDITION

Purpose of space in urban plots

•: UTU CONDITIONS FOR THE CONSTRUCTION OF MUNICIPAL INFRASTRUCTURE - WASTEWATER TREATMENT PLANT

Facilities of Wastewater treatment plant are planned on the plots within Block F. The wastewater treatment plant is planned on the plots UP2F, UPZF and UP 4F. On UP 9F, is planned new discharge of treated wastewater from the both plants. Buildings and facilities within urban plots should be placed in an area bordered by construction lines, in accordance with the technological needs of this purpose. Heights and dimensions of planned facilities are to be harmonized with the requirement of the technological process with taking in to the account :

General urban conditions (conditions for facilities that need to be taken into account when it comes to air traffic safety and these are part of the General conditions.

The conditions about the quality of treated effluents that municipal wastewater treatment plants emit into the environment are regulated by the Montenegrin "Law on Municipal Wastewater Management" (Official Gazette of Montenegro, No. 002/17 of 10 January 2017)where European directives on urban wastewater (UWWD 91/271 / ES) have been transposed into Montenegrin legislation.

According to the conditions of this plan, the plots can be combined in compliance with the guidelines and parameters from the plan. The recommendation of the plan is that Conceptual Design approved by the relevant entities represents an integral part of the UTU for this type of facilities.

Note: While preparing technical documentation, use the Rulebook on the method of construction and volume of the building ("Official Gazette of Montenegro ", No. 60/18), i.e. to provide the calculation of gross and net area in accordance with the standard MEST EN 15221-6.

Conditions for connecting the facility

As a rule, the building is connected to the nearest road. The conditions for connection to the traffic infrastructure will be provided by the organization and companies authorized to do so by Law.

OTHER CONDITIONS

- The implementation in phases is allowed, conditioned by the requirements of future customers, technology and construction realization. Phased construction will be implemented in accordance with dynamics proposed by the Investor within the scope of Conceptual design.
- Newly planned building with length more than 30 m must have a dilatation coupling.
- number of the facility and distribution on the plot depends on the types of products for storage and technological requirements
- Unhindered access and free movement of persons with reduced mobility in accordance with the Law.
- All future facilities to be constructed in the area of the corridor 11O kv transmission line must be designed in accordance with the "Rulebook on technical standards for the construction of overhead power lines of nominal voltage from 1 kV to 400 kV" ("Official Gazette of Montenegro, No " 1 no. 65/88 and 18/92) with the obligation to prepare the Study on the possibility of building facilities in 11O KV transmission line zone within the project documentation and to obtain the approval on this from CEDIS(Electric Transmission System).
- Traffic areas imply primarily a regulated traffic network which is the basis for further planning development in terms of infrastructural equipping . It also encompasses the areas planned for the railway and its future reconstruction, providing thus a corridor in which route may be shifted.1 Then also, it encompasses pedestrian road parking, and other traffic elements

MEASURES and PROTECTION GUIDELINES

ENVIRONMENTAL PROTECTION MEASURES BUILT ENVIRONMENT

Measures to mitigate influence of the water the impact

The following measures should be implemented during the construction phase of the facilities:

- Adopting good construction practices to avoid the negative impact of groundwater.
- The plan for the execution of construction works, and the detailed elaboration of technological procedures should fully anticipate the measures for the safe and secure collection of all necessary materials (waste), their transport and its disposal to the nearest landfill.
- In any type of construction technology implementation, maintain a stable / natural hydrological regime of groundwater, primarily by preventing water leakage.
- Preserve the top plant coverage as much as possible, leave the buffer zone created of plant cover in place. between the planned access roads and water level.

- Establish continuous monitoring during the execution of works in the presence of a specialist in environmental protection.
- All areas of construction sites and other zones of temporary impact need to be reinstated after the completion of construction works in accordance with the Rehabilitation Plan, ie, depending on the future space usage, to reinstate it in original condition.

Measures to mitigate influence impact to the air

During the construction phase, ensure that discharge pipes of all machines and vehicles with diesel engines, have filters to separate the soot. Make regular (planned periodic) and extraordinary technical inspections of machines and vehicles to ensure maximum regularity and functionality of the fuel combustion system, use (and regularly control) fuel - with a standard quality standard. During the execution of works, ensure that watering of the soil is carried out on locations where there may be a larger amount of dust.

Measures to mitigate influence and pedological characteristics

It is necessary to prepare a project of preparatory works which is in accordance with the conditions issued by relevant body, as in the case of the using building materials from surrounding localities, which conditions should be determined in the main designs of the planned facilities.

In the construction phase, any waste generated, without spillage, should be loaded on the transporting vehicle and transported immediately to a landfill or a designated place with its adequate disposal. It is not allowed to deposit material in the riverbed or the banks of watercourses.

Adhere to good working/construction practice and planning

For the execution of works, choose the mechanization and transport of the means that will minimally affect the degradation of the land. Maintain the construction mechanization on a regular basis, and recognize the potential places of leaking and immediately carry out their sanitation. Prohibit the replacement of oil and the adding the fuel on the site, then carry it out on the closest pumping station. It is recommended to use environmentally friendly lubricants (EPL), instead of steppe lubricants (oils and lubricants) produced from mineral oils. Any part of the soil contaminated with spilled oil or fuel contractor works should be sprinkled with sawdust, remove and disposed it and then to the approved landfill.
In case of an accident (spillage or leakage of fuel or oil), promptly intervene in accordance with the prepared Plan of measures and activities in such cases.

Measures to mitigate influence on flora & fauna

In the construction phase, remove all waste material from removed vegetation and seedlings, and provide monitoring during the works. For the implementation of these works, it is necessary to choose mechanization and transport of the means that will require less expansion of the existing roads. Regular administrative measures are also necessary (participation of ecological inspection).

Measures to mitigate influence then landscape

In the construction phase, the waste is going to be piled up on the construction site without dissipation then to be loaded, transported and taken to the landfill. The interventions require to deviate as less as possible from the natural and ambiental features, and to take care about visual degradation .

Measures to mitigate influence on the infrastructure

It is required to ensure planning the construction of infrastructure facilities for adequate water supply as soon as possible, evacuation and treatment of wastewater, collection and disposal of waste at the sanitary landfill, with the development of traffic infrastructure. In the coming period, these activities should be carried out by investors in cooperation with the institution of authority on the local and state

level and in accordance with the plans for their construction, and in accordance with the plans for their construction

Measures to mitigate influence on the ambiental noise

In the building construction phase, to be used technically correct construction machinery. The activities to be carried out in the planned hours, without prolongation, so as not to upset the local population, in accordance with the Decision on the fortification of acoustic zones on the territory of the Capital City.

PROTECTION MEASURES AGAINST ELEMENTAL AND OTHER DISASTERS

In order to make protection against elemental disaster, to be acted in accordance with the Law on the Protection and rescue ("Official Gazette of Montenegro", Articles 13/07, 05/08, 32/11 and 54/16) and other applicable regulations and acts. In addition to the protection measures achieved by the urban planning itself, these conditions include obligations during the preparation of the technical documentation in order to achieve necessary preventive measures for the protection against disasters and destruction. In order to provide protection against elemental and other weather conditions and due to the unfavorable geological and seismic soil conditions, all decisions about the future construction and space arrangement must be based on the findings and recommendations of the geographic geological surveys. It is required to carry out additional survey of geotechnical research in terms of hydrological properties of the soil, as well as the construction of other relevant elements for the foundation of buildings, construction of roads and buildings of communal infrastructure. Due to the high degree of seismic hazard, all calculated seismic stability of the construction is to be prepared on the basis of micro-seismic data, and objects of general interest to be calculate with a greater degree of general seismicity. Before repairing the traffic network and facilities that require bigger intervention in the ground (depth greater than 2 m), it is necessary to anticipate appropriate remediation works. The urban technical decision, with the disposition of the facilities, and the arrangement of the free surfaces, provides the possibility of the mobilization of all municipal vehicles, which should be considered within the preparation of the technical documentation. In terms of construction protection measures, facilities and infrastructure should be designed and built in accordance with the applicable technical regulations and standards for the appropriate content. All other elements re to the protection of material goods and citizens should be in accordance with regulations for protection against natural disasters and fires, so that for each construction is required to obtain the conditions and approval of the municipal authoritative body on the technical documentation and as built object.

FIRE PROTECTION S AND EXPLOSION MEASURE

In order to provide protection against fires within the planning document, all facilities are provided with traffic access for firefighting vehicles, with the prescribed distance of the road from the facility. Width of the planned roads are adopted to the access and maneuvering of the fire protection vehicles. The distance between certain buildings is ensured by the Planning documentation, as well as the conditions for evacuation, in case of fire. Water is provided for firefighting, as part of the decision for the hydro-technical system, During the preparation of investment-technical documentation for marine facilities, tourism and mixed purpose, for fire protection measures purposes, it is required to provide devices for automatic fire alarm devices, devices for fire extinguishing and prevention its spread. For these facilities, it is mandatory to prepare designs or studies of fire protection (and for explosion, if it is a facility within zone defined for fire and explosion hazards and rescue plans according to the threat assessment for each hazard separately and to obtain appropriate opinions and consents in accordance with the applicable regulations. As for the facilities for storing, overflowing or which are used for trading of hazardous materials, it is obligatory to obtain an opinion from the competent authority about the location, as these facilities and installations would not endanger with their zones the neighboring facilities. While designing the building and also applying all the Regulations for this area all other fire protection measures are provided. Project documentation should be prepared according to:- The Law on Protection and Rescue ("Official Gazette of MNE" is valid by law and act); no. 13/071 05/08 32111 j 54/16) and other relevant

Rulebooks and Acts – Rulebook on technical requirements for protection of garages for passenger cars from fire and explosion ("Official Gazette of Montenegro no 9/12).

MEASURES FOR PREVENTION AND CONTROL OF ACCIDENTS

The construction of a large number of buildings entails a domino effect during accidents. In order to prevent this, it is required for everyone in the industrial complex to contribute to the development of the Accident Prevention Plan.

Pursuant to Article 39, 40, 41, 42, of the Law on Environment ("Official Gazette of Montenegro", No. 52116), the operator of a **Seveso** plant i.e complex where the activities are being performed with one or more hazardous substances might presented, it is obliged to take all required measures for preventing a chemical accident and to limit the impact on human life, health and the environment creating conditions for risk management in accordance with this law.

The degree of risk of a chemical accident **Seveso** plant or the complex where the activities are performed with one or more hazardous substances may be presented is determined depending on the amount of hazardous substances. The operator of the **Seveso** plant is obliged to submit a notification to the Agency and prepare the Accident Prevention Plan, and depending on the quantity of hazardous substances, ie degree of accident risk also to prepare Safety report and Accident protection plan. The quantities of dangerous matter in categories determining the degree of severity of the plant will be determinate by The Ministry with the consent of the State Administration body responsible for protection and rescue.

Notice and content of the Accident Prevention Plan

The Accident prevention plan contains goals and principles of the operator's operation, in order to control the danger of a chemical accident. The Accident prevention plan must contain sufficient elements proportional to the degree of accident risk based on which the operator provides a high level of protection from chemical accident. The operator is obliged to provide notice to the Agency: before drafting the Accident Prevention Plan about:

1) a new **Seveso** plant, ie complex, at least three months before starting the works; 2) the existing **Seveso** plant, ie complex; 3) an existing **Seveso** plant, ie a complex in which the quantities of hazardous substances have increased so as to cause a higher degree of risk of a chemical accident, latest by three months since the day that change has occurred; 4) permanent cessation of operation of the **Seveso** plant, ie complex, as in the case of modification of Seveso plant, or complex, any change that may affect on the possibility of a chemical accident.

2) The operator is obliged to prepare the Accident prevention plan no later than six months after submitting the notification from paragraph 3 of this Article. Closer content of the Accident prevention plan of crash and notification is determined by the regulation of the Ministry.

Content of the Safety Report and Accident protection plan

Safety report includes: information on the management system and organization of the operator in order to prevent a chemical accident; description of the location where is Seveso plant located, respectively the complex; description of Seveso plant, i.e. complex; analysis of risk from chemical accident and manner of its prevention; protection measures and intervention measures to limit the chemical consequences accident; list of dangerous chemicals and etc .

Accident protection plan includes measures that are taken within the Seveso plant, i.e. complex in the event of a chemical accident or in the event of the occurrence of circumstances that may cause a chemical accident. Safety report and **Accident protection plan** is provided by an operator who, in accordance with the quantities of hazardous substances, and higher degree of risk of a chemical accident, for:

1) a new Seveso plant, i.e. three months before the starting of works; 2) the existing Seveso plant, or complex; 3) the existing Seveso plant, ie a complex in which the carcasses of hazardous substances have increased so as to cause a higher degree of risk of a chemical accident, latest by six months since the day that change has occurred.

2) Report on safety and Accident Prevention Plan, is approved by Agency. The consent referred to in paragraph 4 of this Article shall be issued based on the request accompanied by proof of payment of the administrative fee.

3) The operator is obliged to review the Safety report periodically and update it if required: 1) at least every five years; 2) on its own initiative or at the request of the Agency due to new disturbances which occurred based on the analyses of other chemical accidents or avoided accidents. In the near future, the methodology for preparing the Safety report and the Accident protection Plan shall be determined by the regulation of the Ministry of Agriculture.

Protection zones

In the immediate vicinity of industrial plants having a significant impact on human health and life in the environment, planning documents determine the protection of the zones in which it is allowed to build residential buildings, schools, hospitals and agricultural production, depending on the level of the contamination of air, soil water or another segments of the living environment.

GUIDELINES FOR SOLID MUNICIPAL WASTE MANAGEMENT

When planning solid waste management, the principles adopted by the State Waste Management Plan for the period 2014-2020 should be followed, the Law on Waste Management ("Official Gazette MNE", no. 64/11 and 39/16) Local plan for management of municipal and non-hazardous construction waste in the Capital City of Podgorica for the period 2016-2020

The goal of the Local management plan for municipal and construction waste is to minimize the impact of waste on the environment and to increase the efficiency of resource use on the territory of the Capital City, and thus to contribute to the sustainable development through the development of management systems. Also, to provide controlling the generation of waste, waste recovery and incentives for investing and affirming the eco-friendly opportunities that arise from waste. Local management plan waste should contribute to the development of the Capital city through the establishment and development of a waste management system to control waste management, to reduce the impact of waste production on the environment, to increase resource efficiency, to enable proper waste flow to the landfill and waste disposal. economic opportunities that arise from the management of the waste.

All these activities are based on the principles of waste management:

- the principle of sustainable development, which ensures more efficient use of resources, reduction of waste quantities and waste management, as well as a way to contribute to the achievement of sustainable development goals;
- the principle of proximity and regional waste management, for the purpose of waste treatment as far as possible at the site in accordance with the economic justification of site selection, while regional waste management is provided by the development and application of regional strategic plans based on state policy;
- the principle of precaution, rather than precautionary activity, by taking measures to prevent negative influences on the life and health of people in the event of a shortage of scientific and professional data;
- the "polluter pays" principle, according to which the waste producer pays the costs of waste management and preventive activities and the costs of other measures due to harmful effects on human life and health;

- the principle of hierarchy, which ensures the observance of the order of priorities in waste management, namely: prevention, preparation for reusing, recycling and other means of processing (use of energy) and waste disposal.

Also, in accordance with Article 26 of the Law on Waste Management ("Official Gazette of MNE, No. 64/11 139/16) all companies producing more than 200 kg of hazardous waste annually or more than 20 tons of hazardous waste, are obliged to prepare Waste management Plan.

Municipal waste management implies the following Plan solutions:

- consistent and continued cleaning of the area from bulky and hazardous waste;
- establishing a waste management system on a regional basis;
- encouraging primary separation of municipal waste;
- control and prevention of ash dumping;
- supporting for recycling, ie using again.

The municipal waste collection system will relay on the measures for decreasing waste at the site of its generation respecting the conditions prescribed in the bylaws, the drafting of which preparation has been provided by the Law on Waste Management, which should also include primary separation and collection of the certain categories of waste.

Considering that this Planning documentation covers the construction of facilities, during the implementation of the mentioned activities, certain quantities of waste will be generated, which will be collected in containers within the urban plots at the entrance, where the design should have envisaged a special space for the installation of garbage containers. To determine required number of containers in accordance to the surface of the facility, taking into account the production of municipal solid waste, in cooperation with the competent municipal company. At the collection site, ensure the selection of waste by separating containers for glass, plastic and metal. Waste collection is done by special vehicles to the sanitary land field. Waste collection and transport should be organized in the evening or in the morning.

Locations for setting up a container should be in the form # depending on the needs in the predictions of the 2-3 containers. Typical one is a container with a capacity of 1.1 m^3

During the implementation of these container places, make sure that the containers are located on concrete plateaus or in rose-built places (concrete boxes).

For unobstructed removal of garbage, all to provide with a direct access of the utility vehicle. to concrete boxes

During the construction of the facilities and the construction site, it is obligatory to collect waste separately: - and other similar construction waste, - hazardous waste (glue, oil, solvent and other construction chemicals and their packaging).

The Law on Environmental Protection ("Official Gazette of MNE ", Article 52/16) regulates the protection of the environment and its development, instruments and measures for the protection of the environment, public participation in environmental protection and quality assurance of the environment , ensuring biological and land diversity, rational usage of the natural goods and energy on the most favorable manner for the environment.

The Law on Integrated Prevention and Control of Environmental Pollution ("Official Gazette of the Republic of Montenegro", No. 80/05 and "Official Gazette of Montenegro", No. 54/09, 40/11, 42/15 and 54/15) regulates the conditions and the procedure of issuing an integrated permit for plants and activities that may have negative impacts on human health, life, environment and material goods. It also refers to the types of activities and facilities, supervision and other issues of importance about the prevention and controlling of environmental pollution, as well as the responsibilities of the local authorities in charge for the protection of: Environment - issuance of permits for plants for construction,

where commencement of work, or performance of activities is to be issued by the competent local authority.

Bearing in mind mentioned and in accordance with the Law on Waste Management, Local plan deals with the issues of municipal and non-hazardous construction waste management. In accordance with that and based on mentioned Law, it is required that KAP as well as other manufacturers of industrial waste prepare Plan on managing waste and in accordance with that define treating with the remaining types of waste".

MEASURES FOR THE PROTECTION OF CULTURAL GOODS

In the area of the Plan implementation, it was stated that there are no Law protected cultural assets within. An initiative for the protection of architectural objects of the 20th century was accepted, meaning that Administration building of the aluminum complex (KAP) was proposed as a property with potential cultural values. The potential values of this facility will be reviewed by the relevant body in charge for the protection of cultural property, in accordance with the Law.

If archeological remains are found during the execution of works, all works should be suspended and inform the competent institution about that, in order to take required activities for their protection, and later the investor is conditioned by the provision of archaeological supervision insurance over the excavation works. According to Article 87 of the Law on the Protection of Cultural Property, if, during the implementation of construction or any other activity finding of archaeological significance appears, the Contractor (investor), is obliged to:

- Interrupt the works and secure the site, as a result of possible damage, entry and unauthorized access of other people;
- Immediately report the finding, make the report, to the Directorate for the Protection of Cultural Heritage, the public institution for the protection of cultural property, the administrative body for the police or the administrative body for the safety of the sea;
- Preserves the discovered objects and place them on the place where are found until the authorized persons of the subjects from point 2 arrive;
- Communicate all relevant information regarding the location and position of the palaces at the time of the discovery of the circumstances

Except from point 3, the discoverer may, for the protection of the findings, immediately hand over them to one of the subjects from point 2. All further obligations of the Administration and the investor are defined by Article 88 of the Law on Protection of Cultural Property.

The following objects cannot be built in the vicinity of cultural heritage buildings and its protective zone:

- facilities for extraction and processing of mineral raw materials and construction materials (quarries, etc.)which endanger the cultural good by vibrations, explosions and other lands;
- borrowers of construction materials (stone, gravel, sand, etc.) who, through their work performance, could devastate the culturally well-protected environment, endanger the land and landscape characteristics, or endanger the cultural property;
- industrial plants with harmful emissions (harmful gases and smoke, wastewater, vibrations, etc.) may endanger cultural property;
- waste disposal of municipal or industrial waste;

Protective zones around cultural monuments should not only be declared, but also effectively formed in a manner that does not endanger the rights of the owners and the space users.

The eventual construction of large infrastructural systems (water management, energy, transport) must be in accordance with the conditions and measures for the protection of cultural goods, whereby the design of the goods is carried out in a manner that maximally preserves the best possible preservation.

MEASURES FOR THE PROTECTION OF NATURAL GOODS

The basic criterion for determining landscape protection measures is the sensitivity of the area. Planning the purpose and management of space should strive to preserve the authentic features of the landscape, and future development will be based on the principles of "sustainable development". Particular emphasis is on the obligation to adopt maximum measures for the protection of the environment before the implementation of ecological "sensitive" activities, such as energy facilities, tourist facilities and traffic routes, if located in sensitive ecosystems, such as karst areas and areas.

Considering that the spatial zone LSL directly borders with a part of the protected natural asset RP "Pjva ", accordingly, it is necessary to respect the guidelines and conditions for nature protection set out in Article 9, paragraph 1 of the Law on Nature Protection, as follows:

1. Overview of protected and registered natural assets;
2. Measures for protection and improvement of the environment;
3. Measures for the conservation of biological, geological and regional diversity;
4. Measures to protect and improve the protection and registration of natural resources;
5. Measures for maintenance and management in accordance with the ecological needs of habitats inside and outside protected areas;
6. Measures for restoration of destroyed sites;
7. Measures, methods and technical means that contribute to the preservation of the favorable status of species;
8. Protection measures from management plans for the protection of natural assets and ecologically significant sites;
9. Guidelines for the implementation of landscape architecture projects, i.e. landscaping

GUIDELINES FOR STAGE IMPLEMENTATION OF THE PLANNING DOCUMENT

Infrastructural equipment and roads will be implemented in stages and in accordance with the program of investing investments as well as in accordance with the Dynamic plan of investors and real requirements of the space users.

CONDITIONS FOR MOVING PERSONS WITH SPECIAL NEEDS

It is required to enable access for persons with special needs to all facilities which, by their function, imply the presence of citizens who are not employed in working organizations. It is required to provide unimpeded movement of the wheelbarrow through the facilities where persons with special needs work, to provide access to the appropriate diminished elevators and sanitary facilities. While preparing the technical documentation for the said objects, it is obligatory to implement the provisions of the Rulebook on the following conditions and the manner of adapting the objects for access and movement of persons with reduced mobility and persons with disabilities (Official Gazette of Montenegro, No. 48/1Z 44/15).

GUIDELINES FOR INCREASING ENERGY EFFICIENCY USE OF RENEWABLE ENERGY SOURCES

In order to rationalize energy consumption and the increasingly pronounced requirements for the protection of the human environment, two basic measures are proposed: saving and the use of alternative energy sources. Sustainable energy consumption should be given priority through rational consumption planning, implementation of energy efficiency measures in all segments of the energy system. Sustainable construction is certainly one of the most important segments of sustainable development, which includes:

- use of construction materials that are not harmful to the environment;
- energy efficiency of buildings;
- waste management during construction or demolition of facilities.
- Energy and environmental construction tends to:

- reduction of heat losses from the building by improving the thermal protection of external elements and a more favorable ratio of the base and volume of the building;
- increase of heat additions in the building by favorable orientation of the building and use of the sun energy;
- use of renewable energy sources in buildings (mass, sun, wind, etc.);
- increasing the energy efficiency of thermal energy systems.

The goal of comprehensive energy savings, and thus environmental protection, is to create preconditions for system rehabilitation and reconstruction of existing buildings, and then to increase the mandatory thermal protection of new facilities. When building new facilities, it is important to anticipate everything that is needed to achieve quality and optimal energy efficiency already in the conceptual design phase in cooperation with the designer.

Therefore it is necessary to:

- analyze the location, orientation and shape of the building;
- apply a high level of thermal insulation of the complete outer shell of the building and avoid thermal bridges; .
- use thermal benefits from the sun and protect yourself from the sun;
- use an energy efficient heating, cooling and ventilation system, and combine it with renewable energy sources.

The three most important levels of energy efficiency are:

- reduction of energy losses by means of thermal insulation of the building,

- efficient use of energy,

- efficient energy production.

Guidelines for reducing energy losses are:

- maximum thermal insulation, compactness of the building and absence of thermal bridges: all components of the building envelope must have insulation whose U-value for walls is 0.4W (m2K), for floors 0.4-0.5 W (m2K), and for roof 0.8 W (m2K);

- windows must have double or triple glazing and insulated frames: U-value of 1.30W (m2K), including frame, and g-value of 0.5 (total solar transmission) for glazing;

- degree of tightness of the building: the result of the leak test must be 0.6, air change and clock.

Energy efficiency includes:

- preheating of fresh air;

- orientation to the south and the possibility of sunshine during the winter;

- energy saving for heating achieved by passive use of solar energy;

- solar collectors for domestic hot water preparation;

- low-consumption household appliances - energy efficient: washing machines, refrigerators, freezers, lamps, etc. represent another useful part of the concept of passive energy efficiency.

CONDITIONS FOR USING OF SPACE WHILE INTRODUCING TO THE PURPOSE

Until the space is brought to its intended use, it should be enabled to use the space unhindered if it is in accordance with the planned purposes, but not expand the existing use which is contrary to the

planned purposes. In the undeveloped area, according to the Plan provided for certain contents, construction is not allowed until the plots are brought to their intended use, ie until the infrastructural equipping of the plots.

PLANNED CAPACITIES (TABLE)

BASIC DATA ABOUT NATURAL CHARACTERISTICS OF PODGORICA

Topography of space

Podgorica is located in the northern part of the Zeta plain, in the contact zone with the hilly-**###** The geographical locality is determined by 42 ° 26 1 northern geographical latitude and 19 ° 16 east longitude. The area covered by the DUP is 10-30 mnv, while the area for construction. is cca 14-27 mnv. This height difference covers an area of 373.34 ha, so that in the lower part this is a terrain suitable for construction.

Engineering geological characteristics

The geological material the terrain consists gravelly sands of non-flat granulometric composition of variable degree of binding. Sometimes these are completely unconnected sediments, and sometimes a real conglomerate is practically incompressible, which can be found in vertical sections and in under caps and vaults. The lithological structure is characterized by good water permeability, and the deep outflow of underground water everywhere is 4 m below the level of the terrain. The load capacity of the terrains ranges from 300-500 kN / m2 for 1 category. Due to indistinct slope the whole space of the terrace belongs to the category of stabile terrains.

Degree of seismic intensity

From the macro seismic point of view, Podgorica is located with a very highlighted seism activity. According to the seismological map, the urban area is covered by the a 8 MCS scale of the maximum intensity of the expected earthquake for a return period of 1OO years, with a probability of 63%. The seismic hazard for this area refers to two characteristic models of the conglomerated terrace, ie. for model C1 where the thicknesses of the sediment of the surface layer is (up to ### less than 35 m, j model S2 where thickness is less than 35m , and C2 thickness is greater than 35 m.

The parameters are as follows:

- seismic coefficient Ks 0.079- 0.090
- coefficient of dynamics Kd 1, OO> Kd> 0.47
- soil acceleration Qmax (q) 0.288- 0.360
- intensity u (MCS) 9 ° MCS

Hydrological characteristics

Groundwater is pissing and below 16-20 m below ground level.

Climatic characteristics

The urban area of Podgorica is characterized by a less modified maritime influence of the Adriatic Sea. Spe**##**microclimatic characteristics are in the city are, where the anthropogenic influence is significantly greater. Air pollution, as well as total urban morphology and air currents, humidity, sunshine, radiation, etc

Air temperature.

The average annual temperature registered in Podgorica was 15.5 C. On average, the coldest month is January with 5 C, and the warmest July with 26.70 C. The maritime influence is reflected on the warmer autumn from spring, with 21.08 C with softer temperature transitions from winter to summer, than from summer to winter. During the vegetation period in September, the average air temperature

is 21.8 ° C, while the average daily temperatures are 14 C from April to October. The average time period that requires heating of residential premises extends from November 10 to March 30, with a total duration of 142 days.

Air humidity

Average relative humidity is 65 6% with max of 77 2% in November and min of 49, 4%

During the vegetation period, the relative humidity is 56.7%.

Sunny period, cloudiness and rain.

The average annual astonishment is 2,456 hours. The sunniest month is July with 344.1, and shortest December with 93.0 hours. In the vegetative period, the total duration of 1,658 hours. Annual cloudiness has average value of 5.2 tenths sky coverage. The highest cloudiness in November was 7.0, and the least in August 2.8. Average value of cloudiness in vegetation period is 4.3. The average precipitation is 1,692 mm per year, with a maximum of 248.4 mm in December a minimum of 42.0 mm, in July. The precipitation regime reflects the uneven distribution by months with the development of summer local depressions with bad weather and rain. The vegetation period is 499 1 m precipitation or 20.6% of the middle annual crop. The period of snowing lasts from November to March, with an average duration of 5.4 days, and snow rarely lasts longer than one day.

The appearances of a fog ,thunder and hail

The average annual fog frequency is 9 days, with extremes of 1 to 16 days. Fog period lasts from October to June, with the most commonly in December and January (ro 2.6 days). Bad weather (thunderstorms) occurs average 53.7 day during the year, with a maximum of 7.7 days, in and a minimum of 1.9 days in January. The appearance of the hail is registered only 0.9 days on average per year, with a staggering maximum of 4 days.

Winds

The frequency of winds and silence is expressed in per mille, with the total number of winds from all directions silence taken as 1000% o. The highest frequency occurs in the north wind with 227%, and the lowest in the east 6% o. The north wind most often occurs in summer, and in the spring. The silence lasts a total of 380 with the highest frequency in December and the lowest in July. The highest average annual speed is northeast wind (6.2 m / sec), which increases in value during the winter (average 8.9 n / s. Maximum wind speed of 34.8 m / sec. (125.3 km / h) strong winds are most common in the winter period with an average of 20.8 days, and the rarest in the summer time 10.8 days. During the vegetation period, strong winds occur for an average of 22.1 days.

Assessment from the aspect of natural conditions

From the aspect of natural conditions, this area has a number of advantages for construction and urbanization. The level is due to the low level of groundwater as well as the good stability of the terrain are the characteristics that go into the favor of the climate. Unfavorable conditions of wind, sun and rain should be taken into account when planning facilities.

LEGAL FRAMEWORK

The textual and graphic part of the DUP "industrial zone of KaP" which prescribes in detail the construction of the facility, conditions for connection and infrastructure network within the Plan documentation, as well as separates with urban-technical conditions are available in the Register of valid planning documentation on the following address: http://www.planovidozvole.mrt.gov.me/LAMP/PiappingDocument?m=PG, run by the Ministry of Sustainable Development and Tourism.

Technical documentation is being prepared by an authorized company registered in the Central register of the Commercial Court for the performance of technical documentation and which meet the

requirements prescribed ("Official Gazette of Montenegro" No. 64/17, 44/18, 63/18 and 11/19) in accordance with the issued urban-technical conditions issued by the Secretariat for Spatial Planning and Sustainable Development.

Technical documentation - Conceptual design and Main design, their revision and possible additional studies, should be prepared in accordance with the mentioned Law, Rulebook on the manner of preparation and current technical documentation for construction of the facility (Official Gazette of Montenegro ", No. 44/18), and other regulations and norms for the preparation of technical documentation and construction of facilities.

Originator of the > URBANISTIC AND TECHNICAL CONDITIONS 1 • PRICE OFFICIAL:

M.R. Radmila Maljevic, B.Sc. Head of the Sector for Construction and Legalization of Facilities

APPENDICES

Excerpts from graphic attachments to the planning document,

Technical conditions for the connection of the company "Vodovod i kanalizacija" d.o.o.,

Real estate sheets and a copy of the plan, issued by the Real Estate Administration - Podgorica Regional Unit

DELIVERED: To the applicant, for the files of the subject, and archive .

CRNA GORA
GLAVNI GRAD- PODGORICA
Sekretarijat za planiranje prostora
i održivi razvoj

SEKTOR ZA IZGRADNJU I
LEGALIZACIJU OBJEKATA
Broj: 08-332/20-902
Podgorica, 11.09.2020. godine

Glavni grad Podgorica

P O D G O R I C A

Na vaš zahtjev broj 08-332/20-902 od 21.08.2020.godine dostavljamo Vam jedan primjerak urbanističko-tehničkih uslova broj 08-332/20-902 od 21.08.2020.godine, za urbanističke parcele broj. **2F,3F,9F** u zahvatu DUP-a "Industrijska zona KAP-a", sa katastrom instalacija i tehničkim uslovima priključenja na gradski vodovod i kanalizaciju broj 113UPI-041/20-5133 od 09.09.2020.godine, izdatim od d.o.o "Vodovod i kanalizacija" iz Podgorice.

Provjerom Registra planske dokumentacije Ministarstva održivog razvoja i turizma, utvrđeno je da se DUP "Industrijska zona KAP-a", ("Sl.list CG - opštinski propisi" br.69/19), nalazi u navedenom Registru.

PRILOG: Kao u tekstu

Rukovodioc sektora
za izgradnju i legalizacioju objekata:
Radmila Maljević,dipl.ing.sao.

URBANISTIČKO - TEHNIČKI USLOVI

Sekretarijat za planiranje prostora i održivi razvoj **08-352/20-902** **9. august 2020. godine**	**Glavni grad Podgorica**

.	**Sekretarijat za planiranje prostora i održivi razvoj**, na osnovu člana 74. Zakona o planiranju prostora i izgradnji objekata ("Službeni list Crne Gore" br. 64/17, 44/18, 63/18 i 11/19), Uredbe o povjeravanju dijela poslova Ministarstva održivog razvoja i turizma jedinicama lokalne samouprave („Službeni list Crne Gore", br. 075/19), DUP "Industrijska zona Kap –a" ("Službeni list Crne Gore - opštinski propisi", br.69/19) i podnijetog zahtjeva Glavni grad Podgorica iz Podgorice (br. 08-332/20 902 od 21.08. 2020. godine), izdaje:
.	**URBANISTIČKO-TEHNIČKE USLOVE** za izradu tehničke dokumentacije za izgradnju objekata na urbanističkoj parceli **UP 2 F, 3 F i 9 F u zahvatu DUP –a "Industrijska zona Kap –a" ("Službeni list Crne Gore - opštinski propisi"**, br.69/19). Precizan podatak o učešću površina svih katastarskih parcela u površini urbanističke parcele biće definisan elaboratom parcelacije po planskom dokumentu, koji izrađuje preduzeće ovlašćeno za geodetske poslove, nakon čega je elaborat neophodno ovjeriti u Upravi za nekretnine - Područnoj jedinici Podgorica.
.	**PODNOSILAC ZAHTJEVA:** **Glavni grad Podgorica**
.	**POSTOJEĆE STANJE I OSNOVNI PODACI IZ PLANSKOG DOKUMENTA** U skladu sa podacima iz listova nepokretnosti br. 157, 154, 445, 456, 56, 3900, 3897 – izvod i kopije plana, izdatih od Uprave za nekretnine - Područne jedinice Podgorica, katastarske parcele koje su sadržane u listovima nepokretnosti su neizgrađene. Listovi nepokretnosti navedeni u zahtjevu podnosioca i kopija plana predstavljaju sastavni dio ovih UTU –a. Uslovi se, shodno zahtjevu Investitora, odnose za prostor koji predstavljaju **UP 2 F, 3 F i 9 F u zahvatu DUP –a "Industrijska zona Kap –a"**
.	**PLANIRANO STANJE** **Namjena prostora u zahvatu urbanističkih parcela** ❖ **UT USLOVI ZA IZGRADNJU OBJEKATA KOMUNALNE INFRASTRUKTURE – PREČISTAČ OTPADNIH VODA** **Na parcelama u okviru bloka F planirani su objekti postrojenja za prečišćavanje otpadnih voda. Postrojenje za prečišćavanje otpadnih voda planirano je na parcelama UP2F, UP3F i UP 4F. Na UP 9F planiran je novi ispust prečišćenih otpadnih voda iz oba postrojenja.** Objekte i postrojenja u okviru urbanističkih parcela postaviti u prostoru oivičenom građevinskim linijama, a u skladu sa tehnološkim potrebama ove namjene. Visine i gabarite planiranih objekata

ove namjene uskladiti sa potrebama tehnološkog procesa uz poštovanje:

Opštih urbanističkih uslova za objekte o kojima treba voditi računa kada je u pitanju sigurnost vazdušnog saobraćaja a dati su u opštim uslovima.

Uslovi za kvalitet obrađenih efluenata koje postrojenja za prečišćavanje komunalnih otpadnih voda ispuštaju u životnu sredinu regulisan je crnogorskim „Zakonom o upravljanju komunalnim otpadnim vodama" (Službeni list Crne Gore, br. 002/17 od 10.01.2017. godine), kojim su uslovi Evropske direktive o urbanim otpadnim vodama (UWWD 91/271/EC) transponovani u crnogorsko zakonodavstvo.

Parcele se prema uslovima ovog plana mogu udružiti uz poštovanje smjernica i parametara iz plana. Preporuka plana je da Idejno rješenje odobreno od strane resornih subjekata predstavlja sastavni dio UTU-a za ovu vrstu objekata .

Napomena: Prilikom izrade tehničke dokumentacije koristiti i *Pravilnik o načinu obračuna površina i zapremine zgrade* („Službeni list CG", broj 60/18), odnosno dati obračun bruto i neto površina u skladu sa standardom MEST EN 15221-6.

Uslovi priključenja objekta

Objekat se po pravilu priključuje na najbližu saobraćajnicu. Uslove priključenja na saobraćajnu infrastrukturu daće organi, organizacije i preduzeća koji su zakonom za to ovlašćeni.

OSTALI USLOVI

- Dozvoljava se fazna realizacija što je isto uslovljeno potrebama budućih korisnika, samoj tehnologiji,organizaciji i realizaciji izgradnje, fazna izgradnja će se izvoditi u skladu sa dinamikom koju predloži investitor u okviru idejnog rješenja.
- Novoplanirani objekti duži od 30m. moraju imati dilaticionu spojnicu.
- Broj objekta i razmještaj na parceli zavisi od vrsta proizvoda za skladištenje i tehnoloških potrebe
- Nesmetan pristup I kretanje licima smanjene pokretljivosti u skladu sa Zakonom.
- Svi budući objekti koji se budu radili u zoni koridora dalekovoda 110 kv vodova, moraju biti projektovani u skladu sa "Pravilnikom o tehničkim normativima za izgradnju nadzemnih elektroenergetskih vodova nazivnog napona od 1 kV do 400 kV" ("Službeni list SFRJ", br. 65/88 i 18/92), sa obaveznom izradom Elaborata o mogućnosti izgradnje objekata u zoni dalekovoda 110 KV u sklopu projektne dokumentacije, i dobiti saglasnost od CGES-a (Elektroprenosni Sistem).
- saobraćajne površine podrazumijevaju prvenstveno uređenu saobraćajnu mrežu koja je osnova za dalji planksi razvoj u smislu infrastrukturnog opremanja. Takođe obuhvata prostore koji su namjenjeni željeznici I njenoj budućoj rekonstrukciji ,pa je samim tim dat I koridor u kom bi se eventualno dešavala pomjeranja trase., Zatim obuhvata-kolsko-pješačke saobraćajnice, parking, I ostale elemente saobraćaja.

MJERE I SMJERNICE ZAŠTITE

MJERE ZAŠTITE ŽIVOTNE I STVORENE SREDINE

Mjere za ublažavanje uticaja na vode

U fazi građenja objekata potrebno je sprovoditi sljedeće mjere:

- Usvajanje dobre građevinske prakse da bi se izbjegao negativan uticaj na podzemne vode.
- Planom izvođenja građevinskih radova, te detaljnom razradom tehnoloških postupaka treba potpuno predvidjeti mjere planskog i sigurnog prikupljanja svih nepotrebnih materija (otpadaka), njihovog transporta i odlaganja na najbližu deponiju.
- U svim varijantama tehnologije izvođenja radova održati stabilnim/prirodnim hidrološki režim podzemnih voda, u prvom redu sprečavanjem isticanja vode/isušivanja.
- U najvećoj mogućoj mjeri sačuvati biljni pokrivač, odnosno ostaviti buffer zone formirane od biljnog pokrivača između planiranih pristupnih puteva i vodotoka.
- Uspostaviti kontinuirani nadzor tokom izvođenja radova uz prisustvo specijaliste za zaštitu životne sredine.
- Sve površine gradilišta i ostale zona privremenog uticaja potrebno je nakon završetka građevinskih radova sanirati u skladu sa Planom sanacije, odnosno,zavisno o budućem korištenju prostora dovesti u prvobitno stanje.

Mjere za ublažavanje uticaja na vazduh

Tokom faze građenja, na ispusnim cijevima svih mašina i vozila sa dizel-motorima obezbijediti da imaju filtere za odvajanje čađi. Redovnim (planskim periodičnim) i vanrednim tehničkim pregledima mašina i vozila osigurati maksimalnu ispravnost i funkcionalnost sistema sagorijevanja pogonskog goriva, koristiti (i redovito kontrolisati) gorivo – sa garantiranim standardom kvaliteta. Tokom izvođenja radova vršiti polijevanje vodom zemljišta na eventualnim lokacijama gdje može doći do veće emisije prašine.

Mjere za ublažavanje uticaja na pedološke karakteristike

Neophodno je pripremiti projekat pripremnih radova koji će biti u saglasnosti sa uslovima koje izdaje nadležni organ, kao i u slučaju korišćenja materijala za izgradnju sa okolnih lokaliteta, čiji uslovi treba da budu određeni u glavnim projektima planiranih objekata.

U fazi građenja, eventualno nastali otpad, bez rasipanja, utovariti na transportna sredstva i odmah odvesti na odlagalište ili za to propisano mjesto uz adekvatno zbrinjavanje istog. Nije dozvoljeno odlaganje materijala u korito ili na obale vodotoka.

Pridržavati se dobre radne/građevinske prakse i planiranja

Za izvođenje radova izabrati mehanizaciju i transportna sredstva koja će minimalno uticati na degradaciju zemljišta. Građevinsku mehanizaciju održavati redovno, te prepoznati potencijalna mjesta curenja i odmah izvršiti njihova saniranja. Zabraniti mijenjanje ulja i dosipanje goriva na lokalitetu, već to provoditi na najbližoj benzinskoj pumpi. Preporučuje se korištenje ekološki prihvatljivi lubrikanata (EPL), umjesto štetnih lubrikanata (ulja i maziva) proizvedenih od mineralnih ulja. Ovo posebno naglašavamojer je štetno djelovanje mineralnih ulja kumulativno ukoliko dođe na slobodni prostor. Bilo koji diozemljišta kontaminiran sa prosutim uljem ili gorivom izvođač radova treba posuti piljevinom, te ukloniti I odložiti na odobreno odlagalište.

U slučaju akcidenta (izlivanje ili curenje goriva ili ulja) hitno intervenisati u skladu sa pripremljenimplanom mjera i aktivnosti u ovakvim slučajevima.

Mjere za ublažavanje uticaja na floru i faunu

U fazi građenja ukloniti sav otpadni materijal od uklonjene vegetacije i šiblja, te obezbijediti tokom radova monitoring. Za izvođenje radova izabrati mehanizaciju i transportna sredstva koja će zahtijevati što manje proširenje postojećih puteva. Neophodne su i redovne administartivne mjere (učešće ekološke inspekcije).

Mjere za ublažavanje uticaja na pejzaž
U fazi građenja, otpad ne gomilati na lokaciji gradnje, već bez rasipanja, utovariti na transportna sredstva i odvesti na odlagalište. Intervencije u prostoru trebaju što manje odudarati od prirodnih i ambijentalnih obilježja u kojima nastaju, te što manje dovoditi do vizuelne degradacije.

Mjere za ublažavanje uticaja na infrastrukturu
Neophodno je obezbjediti što brže planiranje i izgradnju objekata infrastrukture za adekvatno vodosnabdevanje, evakuaciju i tretman otpadnih voda, sakupljanje i odlaganje otpada na sanitarnoj deponiji, uz razvoj saobraćajne infrastrukture. U narednom periodu ove aktivnosti treba da sprovedu zainteresovani korisnici prostora / investitori u saradnji sa nadležnim organima lokalne i centralne vlasti, a u skladu sa planovima za njihovu izgradnju

Mjere za ublažavanje uticaja na ambijentalnu buku
U fazi građenja objekata, koristiti tehnički ispravnu građevinsku mehanizaciju. Aktivnosti provoditi u predviđenim radnim satima, bez produžavanja, da se ne bi uznemirilo lokalno stanovništvo,shodno Rješenju o utvrđivanju akustičnih zona na teritoriji Glavnog grada.

MJERE ZAŠTITE OD ELEMENTARNIH I DRUGIH NEPOGODA

U cilju zaštite od elementarnih nepogoda postupiti u skladu sa Zakonom o zaštiti i spašavanju ("Službeni list CG", br. 13/07, 05/08, 32/11 i 54/16) i ostalim važećim pravilnicima i aktima. Pored mjera zaštite koje su postignute samim urbanističkim rješenjem ovim uslovima se nalažu obaveze prilikom izrade tehničke dokumentacije kako bi se ostvarile potrebne preventivne mjere zaštite od katastrofa i razaranja. Radi zaštite od elementarnih i drugih nepogoda, zbog konstatovanih nepovoljnosti inženjersko geoloških i seizmičkih uslova tla, sva rješenja za buduću izgradnju i uređenje prostora moraju se zasnivati na nalazima i preporukama inženjersko-geoloških istraživanja sa mikroseizmičkom rejonizacijom terena. Neophodno je sprovesti nakanadna geotehnička istraživanja u pogledu hidroloških svojstava tla, kao i konstatovanje drugih relevantnih elemenata za temeljenje objekata, postavljanje saobraćajnica i objekata komunalne infrastrukture. Zbog visokog stepena seizmičke opasnosti sve proračune seizmičke stabilnosti izgadnje zasnivati na posebno izrađenim podacima mikroseizmičke rejonizacije, a objekte od opšteg interesa srašunati sa većim stepenom opšte seizmičnosti kompleksa. Pri planiranju saobraćajne mreže i objekata koji zahtijevaju veće intevencije u tlu (dubina veća od 2m) potrebno je predvidjeti odgovarajuće sanacione radove. Urbanističko rješenje dispozicijom objekata, saobraćajnica i uređenjem slobodnih površina obezbjedjuje mogućnost intevencije svih komunalnih vozila, o čemu treba posebno voditi računa pri izradi tehničke dokumentacije. U pogledu građevinskih mjera zaštite, objekti i infrastruktura treba da budu projektovani i građeni u skladu sa važećim tehničkim normativima i standardima za odgovarajući sadržaj. Svi drugi elementi u vezi zaštite materijalnih dobara i stanovnika treba da budu u skladu sa važećim propisima o zaštiti od elementarnih nepogoda i požara, tako da je za svaku gradnju potrebno pribaviti uslove i saglasnost od nadležnog organa u opštini, na tehničku dokumentaciju I izvedeni objekat.

MJERE ZAŠTITE OD POŽARA I EKSPLOZIJA

U cilju zaštite od požara u okviru planskog rješenja svim objektima je obezbijeđen saobraćajni pristup za vatrogasna vozilia, sa propisanom udaljenošću kolovoza od objekta. Širine planiranih saobraćajnica prilagođene su pristupu i manevrisanju vatrogasnih vozila. Planskim rješenjem je obezbijeđena udaljenost izmedju pojedinih objekata, kao i uslovi za evakuaciju u slučaju požara. U okviru rješenja hidrotehničkog sistema obezbijeđena je voda za gašenje požara. U cilju obezbjeđenja mjera zaštite od požara, prilikom izrade investiciono-tehničke dokumentacije za

objekte marine, turzma i mješovite namjene, potrebno je predvidjeti uredjaje za automatsku dojavu požara, uredjaje za gašenje požara i sprečavanje njegovog širenja. Za ove objekte je obavezno izraditi projekte ili elaborate zaštite od požara (i eksplozija ako se radi o objektima u kojima se definišu zone opsanosti od požara i eksplozija), planove zaštite i spašavanja prema izrađenoj procjeni ugroženosti za svaki hazard posebno, te na navedeno pribaviti odgovarajuća mišljenja i saglasnosti u skladu sa važećom regulatoivom. Za objekte u kojima se skladište, pretaču, koriste ili u kojima se vrši promet opasnih materija, obavezno je pribaviti mišljenje na lokaciju od nadležnog organa, kako ovi objekti i instalacije svojim zonama ne bi ugrozili susjedne objekte.
Prilikom projektovanja objekata, a primjenom svih Pravilnika koji važe za ovu oblast, obezbjeđuju se sve ostale mjere zaštite od požara. Projektnu dokumentaciju raditi shodno:
- Zakonu o zaštiti i spašavanju ("Službeni list CG", br. 13/07, 05/08, 32/11 i 54/16) i ostalim važećim pravilnicima i aktima;
- Pravilniku o tehničkim zahtjevima za zaštitu garaža za putničke automobile od požara i eksplozija („Službeni list CG", broj 9/12).

MJERE ZA SPREČAVANJE I KONTROLU UDESA

Izgradnja većeg broja objekata sa sobom povlači tokom havarija i domino efekat. Kako bi se sprečio potrebno je da svi korisnici industrijskog kompleksa daju svoj doprinos u izradi Plan prevencije udesa.

Shodno članu 39,40 ,41,42, Zakona o životnoj sredini („Službeni list CG", broj 52/16), operater seveso postrojenja, odnosno kompleksa u kojem se obavljaju aktivnosti u kojima je prisutna ili može biti prisutna jedna ili više opasnih materija, dužan je da preduzme sve neophodne mjere za sprječavanje hemijskog udesa i ograničavanja uticaja tog udesa na život i zdravlje ljudi i životnu sredinu u cilju stvaranja uslova za upravljanje rizikom u skladu sa ovim zakonom.

Stepen rizika od hemijskog udesa seveso postrojenja, odnosno kompleksa u kojem se obavljaju aktivnosti u kojima je prisutna ili može biti prisutna jedna ili više opasnih materija, utvrđuje se u zavisnosti od količine opasnih materija. Operater seveso postrojenja dužan je da Agenciji dostavi obavještenje i izradi Plan prevencije udesa, i u zavisnosti od količina opasnih materija, odnosno stepena rizika od udesa, izradi Izvještaj o bezbjednosti i Plan zaštite od udesa. Količine opasnih materija po kategorijama, kojima se određuje stepen rizika seveso postrojenja, utvrđuje Ministarstvo, uz saglasnost organa državne uprave nadležnog za zaštitu i spašavanje.

Obavještenje i sadržaj Plana prevencije udesa

Plan prevencije udesa sadrži ciljeve i principe djelovanja operatera, radi kontrole opasnosti od hemijskog udesa. Plan prevencije udesa mora da sadrži dovoljno elemenata proporcionalnih stepenu rizika od udesa na osnovu kojih operater obezbjeđuje visok stepen zaštite ljudi i životne sredine od hemijskog udesa. Operater je dužan da Agenciji, prije izrade Plana prevencije udesa, dostavi obavještenje o:

1) novom seveso postrojenju, odnosno kompleksu najmanje tri mjeseca prije početka rada; 2) postojećem seveso postrojenju, odnosno kompleksu; 3) postojećem seveso postrojenju, odnosno kompleksu u kojem su se količine opasnih materija povećale tako da uzrokuju veći stepen rizika od hemijskog udesa, najkasnije tri mjeseca od dana promjene; 4) trajnom prestanku rada seveso postrojenja, odnosno kompleksa, kao i u slučaju modifikacije

seveso postrojenja, odnosno kompleksa, svakoj promjeni koja može uticati na mogućnost nastanka hemijskog udesa.

2) Plan prevencije udesa operater je dužan da izradi najkasnije šest mjeseci po dostavljanju obaveštenja iz stava 3 ovog člana. Bliži sadržaj Plana prevencije udesa i obavještenja utvrđuje se propisom Ministarstva.

Sadržaj Izvještaja o bezbjednosti i Plana zaštite od udesa

Izvještaj o bezbjednosti sadrži naročito: informacije o sistemu upravljanja i organizacije operatera u cilju sprječavanja hemijskog udesa; opis lokacije na kojoj se nalazi seveso postrojenje, odnosno kompleks; opis seveso postrojenja, odnosno kompleksa; analizu rizika od hemijskog udesa i način njegovog sprječavanja; mjere zaštite i interventne mjere za ograničavanje posljedica hemijskog udesa; popis opasnih materija i dr.

Plan zaštite od udesa sadrži naročito mjere koje se preduzimaju u okviru seveso postrojenja, odnosno kompleksa u slučaju hemijskog udesa ili u slučaju nastanka okolnosti koje mogu izazvati hemijski udes. Izvještaj o bezbjednosti i Plan zaštite od udesa obezbjeđuje operater koji u skladu sa količinama opasnih materija ima veći stepen rizika od hemijskog udesa i to za:

1) novo seveso postrojenje, odnosno kompleks najmanje tri mjeseca prije početka rada; 2) postojeće seveso postrojenje, odnosno kompleks; 3) postojeće seveso postrojenje, odnosno kompleks u kojem su se količine opasnih materija povećale tako da uzrokuju veći stepen rizika od hemijskog udesa, najkasnije šest mjeseci od dana promjene.

2) Na Izvještaj o bezbjednosti i Plan zaštite od udesa saglasnosti daje Agencija. Saglasnost iz stava 4 ovog člana izdaje se na osnovu zahtjeva uz koji se prilaže dokaz o uplaćenoj administrativnoj taksi.

3) Operater je dužan da Izvještaj o bezbjednosti periodično pregleda i po potrebi ažurira: 1) najmanje svakih pet godina; 2) samoinicijativno ili na zahtjev Agencije zbog novih činjenica do kojih se došlo na osnovu analize drugih hemijskih udesa ili izbjegnutih udesa. Bliži sadržaj, metodologiju izrade Izvještaja o bezbjednosti i Plana zaštite od udesa utvrđuju se propisom Ministarstva.

Zaštitne zone

U neposrednoj blizini industrijskih postrojenja koja imaju negativan uticaj na zdravlje ljudi i životnu sredinu, planskim dokumentima se utvrđuju zaštitne zone u kojima nije dozvoljena izgradnja stambenih objekata, škola, bolnica kao i poljoprivredna proizvodnja, u zavisnosti od stepena zagađenja vazduha, vode, tla ili drugih segmenata životne sredine.

SMJERNICE ZA UPRAVLJANJE ČVRSTIM KOMUNALNIM OTPADOM

Prilikom planiranja upravljanja čvrstim otpadom treba se rukovoditi principima usvojenim Drzavnim planom upravljanja otpadom za period 2014-2020. godine, Zakonom o upravljanju otpadom („Službeni list CG", br. 64/11 i 39/16) i Lokalnim planom upravljanja komunalnim i neopasnim građevinskim otpadom u Glavnom gradu Podgorica za period 2016-2020.godinu.

Osnovni cilj lokalnog plana upravljanja komunalnim i neopasnim gradjevinskim otpadom je minimizacija uticaja otpada na životnu sredinu i povećanja efikasnosti korišćenja resursa na teritoriji Glavnog grada, odnosno doprinos održivom razvoju kroz razvoj sistema upravljanja otpadom koji će obezbijediti kontrolu stvaranja otpada, iskorišćenje otpada i podsticaje za investiranje i afirmaciju ekonomskih mogućnosti koje nastaju iz otpada. Lokalni plan upravljanja

otpadom treba da doprinese održivom razvoju Glavnog grada kroz uspostavljanje i razvoj sistema upravljanja otpadom koji će kontrolisati nastajanje otpada, smanjiti uticaj produkcije otpada na životnu sredinu, povećati efikasnost resursa, omogućiti pravilan tok otpada do njegovog konačnog odlaganja na sanitarnu deponiju, stimulisati investiranje i maksimizirati ekonomske mogućnosti koje nastaju iz otpada.

Sve ove aktivnosti zasnovane su na principima upravljanja otpadom:

-pricip održivog razvoja, kojim se obezbjeđuje efikasnije korišćenje resursa, smanjenje količine otpada i postupanje sa otpadom na način kojim se doprinosi ostvarivanju ciljeva održivog razvoja;

- princip blizine i regionalnog upravljanja otpadom, radi obrade otpada što je moguće bliže mjestu nastajanja u skladu sa ekonomskom opravdanošću izbora lokacije, dok se regionalno upravljanje otpadom obezbjeđuje razvojem i primjenom regionalnih strateških planova zasnovanih na nacionalnoj politici;

- princip predostrožnosti, odnosno preventivnog djelovanja, preduzimanjem mjera za sprečavanje negativnih uticaja na životnu sredinu i zdravlje ljudi i u slučaju nepostojanja naučnih i stručnih podataka;

-princip "zagađivač plaća", prema kojem proizvođač otpada snosi troškove upravljanja otpadom i preventivnog djelovanja i troškove sanacionih mjera zbog negativnih uticaja na životnu sredinu i zdravlje ljudi;

- princip hijerarhije, kojim se obezbjeđuje poštovanje redosljeda prioriteta u upravljanju otpadom i to: sprječavanje, priprema za ponovnu upotrebu, recikliranje i drugi način prerade (upotreba energije) i odstranjivanje otpada.

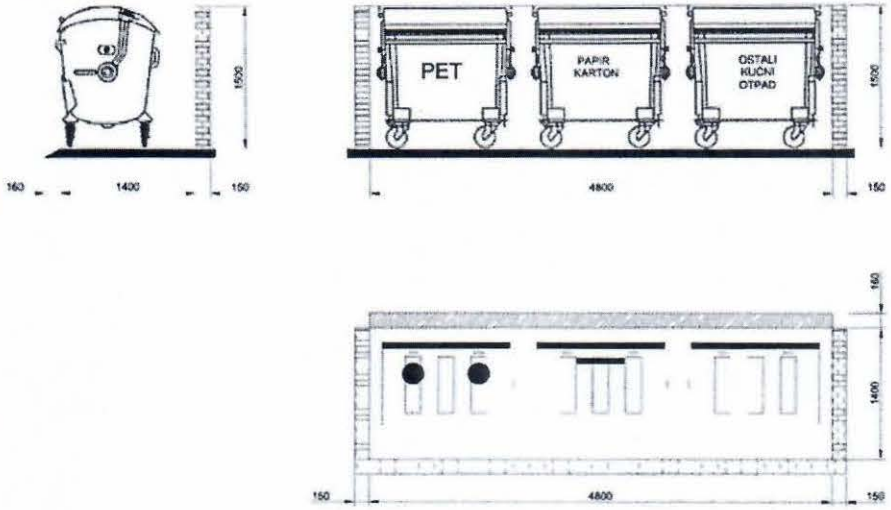
Takođe, u skladu sa članom 26 . Zakona o upravljanju otpadom („Službeni list CG, br. 64/11 I 39/16) sva privredna društva koja na godišnjem nivou proizvedu više od 200 kg opasnog otpada ili više od 20 tona neopasnog otpada, dužni su da sačine plan upravljanja otpadom.

Upravljanje komunalnim otpadom podrazumijeva sljedeća planska rješenja:
- dosledno i kontinuirano čišćenje prostora od kabastog i opasnog otpada;
- uspostavljanje sistema upravljanja otpadom na regionalnim osnovama;
- podsticanje primarne separacije komunalnog otpada;
- kontrolu i prevenciju neplanskog deponovanja; i
- podsticanje recikliranja, odnosno ponovnog korišćenja.

Sistem sakupljanja otpada u opštini, oslanjaće se na primjenu mjera za smanjivanje otpada na mjestu njegovog nastanka, uz poštovanje uslova propisanih u podzakonskim aktima, čija izrada je predviđena Zakonom o upravljanju otpadom, a koji treba da obuhvati primarno odvajanje i prikupljanje pojedinih kategorija otpada .

S obzirom da je ovim planskim dokumentom planirana izgradnja objekata, prilikom pomenutih aktivnosti generisaće se određene kolicine otpada, koje će se prikupljati u kontejnerima u okviru urbanističke parcele na ulaznom dijelu, gdje projektom uređenja treba predvidjeti poseban prostor za postavljanje kontejnera za smeće. Potreban broj kontejnera odrediti prema površini objekta, imajući u vidu produkciju čvrstog komunalnog otpada, u saradnji sa nadležnim komunalnim preduzećem. Na mjestu sakupljanja obezbijediti primarnu selekciju otpada odvajanjem kontejenera za staklo, plastiku i metal. Odvoženje otpada vršiće se specijalnim vozilima do sanitarne deponije. Sakupljanje i transprt otpada je potrebno organizovati u kasnim večernjim ili ranim jutarnjim časovima.

Lokacije za postavljanje kontera treba da su u vidu niša i u zavisnosti od potreba u njima predvidjeti 2- 3 kontejnera. Kao tipski uzet je kontejner kapaciteta 1,1m3.



Prilikom realizacije ovih kontejnerskih mjesta voditi računa da kontejneri budu smješteni na izbetoniranim platoima ili u posebno izgrađenim nišama (betonskim boksovima)

Za neometano obavljanje iznošenja smeća svim nišama obezbijediti direktan prilaz komunalnog vozila.
U toku izgradnje objekata na gradilištu obavezno odvojeno prikupljati: - šut i drugi sličan građevinski otpad, - opasan otpad (lijepkovi, boje, rastvarači i druga građevinska hemija i njihova ambalaža) .

Zakonom o životnoj sredini („Službeni list CG ", broj 52/16), uređuju se principi zaštite životne sredine i održivog razvoja, instrumenti i mjere zaštite životne sredine, učešće javnosti o pitanjima životne sredine i istim se obezbjeđuje cjelovito očuvanje kvaliteta životne sredine, očuvanje biološke i pejzažne raznovrsnosti, racionalno korišćenje prirodnih dobara i energije na najpovoljniji način za životnu sredinu.

Zakonom o integrisanom spriječavanju i kontroli zagađivanja životne sredine ("Službeni list RCG", br. 80/05 i "Službeni list CG", br. 54/09, 40/11, 42/15 i 54/15) uređuju se uslovi i postupak izdavanja integrisane dozvole za postrojenja i aktivnosti koje mogu imati negativne uticaje na zdravlje ljudi, životnu sredinu ili materijalna dobra, vrste aktivnosti i postrojenja, nadzor i druga pitanja od značaja za sprječavanje i kontrolu zagađivanja životne sredine, kao i propisane nadležnosti organa lokalne uprave nadležnog za poslove zaštite životne sredine - za izdavanje dozvole za postrojenja za koja dozvolu ili odobrenje za izgradnju i početak rada, odnosno obavljanje aktivnosti izdaje nadležni organ lokalne uprave.

Imajući u vidu da, shodno Zakonu o upravljanju otpadom, Lokalni plan tretira pitanja upravljanja komunalnim i neopasnim građevinskim otpadom. Shodno tome a na osnovu pomenutog Zakona potrebno je da KAP kao i ostali proizvođači industijskog otpada sačine Plan upravljanja otpadom proizvodača otpada i u skladu sa tim definišu postupanje sa „ostalim vrstama otpada".

MJERE ZAŠTITE KULTURNIH DOBARA

U zoni zahvata plana konstatovano je da nema Zakonom zaštićenih kulturnih dobara. Prihvaćena je inicijativa za zaštitu objekata arhitekture XX vijeka kojom je objekat Upravne zgrade aluminijskog kombinata predložen kao dobro sa potencijalnim kulturnim vrijednostima. Potencijalne vrijednosti ovog objekta preispitaće nadležni organ za zaštitu kulturnih dobara, u skladu sa zakonom.

Ukoliko se prilikom izvodenja radova naiđe na arheološke ostatke, sve radove treba obustaviti i o

tome obavijestiti nadležnu instituciju, kako bi se preduzele sve neophodne mjere za njihovu zaštitu, a kasnije se investitor uslovljava osiguranjem arheološkog nadzora nad radovima iskopavanja. Prema članu 87 Zakona o zaštiti kulturnih dobara, ukoliko se, prilikom izvođenja građevinskih ili bilo kojih drugih aktivnosti naiđe na nalaze od arheološkog značaja, izvođač radova (pronalazač), dužan je da:

- Prekine radove i obezbijedi nalazište, odnosno nalazeod eventualnog oštećenja, uništenja i od neovlašćenog pristupa drugih lica;
- Odmah prijavi nalazište, odnosno nalaz, Upravi za zaštitu kulturnih dobara, najbližoj javnoj ustanovi za zaštitu kulturnih dobara, organu uprave nadležnom za poslove policije ili organu uprave nadležnom za poslove sigurnosti na moru;
- Sačuva otkrivene predmete na mjestu nalaženja u stanju u kojem su nađeni do dolaska ovlašćenih lica subjekata iz tačke 2;
- Saopšti sve relevantne podatke u vezi sa mjestom i položajem nalaza u vrijeme otkrivanja i o okolnostima

Izuzetno od tačke 3, pronalazač može pod kojim su otkriveni nalaze, radi njihove zaštite, odmah predati nekom od subjekata iz tačke 2. Sve dalje obaveze Uprave i Investitora definisane su članom 88 Zakona o zaštiti kulturnih dobara.
U blizini objekata kulturnog nasleđa i njegovoj zaštitnoj zoni ne mogu se graditi:

- objekti za ekstrakciju i preradu mineralnih sirovina i građevinskih materijala (kamenolomi i sl.) koji vibracijama, eksplozijama i na druge načine ugrožavaju kulturno dobro;
- pozajmišta građevinskog materijala (kamen, šljunak, pijesak i sl.) koji bi svojim radom mogli da devastiraju kulturno dobro i njegovu zaštićenu okolinu, ugrožavaju zemljište i pejsažne karakterisitike ili na drugi način ugrožavaju kulturno dobro;
- industrijski pogoni koji štetnim emisijama (štetni gasovi i dim, otpadne vode, vibracije i dr.) mogu ugroziti kulturno dobro;
- deponije komunalnog ili industrijskog otpada;

Zaštitne zone oko spomenika kulture treba ne samo da se proglase, nego i da se efektivno formiraju na način koji ne ugrožava prava vlasnika i korisnika toga prostora.

Eventualna izgradnja velikih infrastrukturnih sistema (vodoprivrede, energetike, saobraćaja) mora biti usklađena sa uslovima i mjerama zaštite kulturnih dobara, pri čemu se projektovanje u blizini dobara, obavlja na način koji maksimalno čuva autentičnost okruženja u skladu sa uslovima nadležne službe zaštite kulturnih dobara.

MJERE ZAŠTITE PRIRODNIH DOBARA

Osnovni kriterijum za utvrđivanje mjera zaštite pejzaža je osjetljivost područja. Planiranjem namjene i upravljanja prostorom treba težiti ka zadržavanju autentičnih odlika pejzaža, a budući razvoj bazirati na principima "održivog razvoja". Posebno se naglašava obaveza primjene maksimalnih mjera zaštite životne sredine pri realizaciji ekološki „osjetljivih" aktivnosti, kao što su energetski objekti, turistički objekti i prometniji putni pravci, ukoliko se nalaze u osjetljivim ekosistemima, kao što su kraški predjeli, zaštićena područja i sl.
Obzirom da se prostorno zona LSL neposredno graniči sa dijelom zaštćenog prirodnog dobra RP „ Piva", shodno tome potrebno je poštovati smjernice i uslove zaštite prirode koji su utvrđeni u članu 9, stav 1 Zakona o zaštiti prirode i to:

1. Pregled zaštićenih i registrovanih prirodnih dobara;
2. Mjere zaštite i unaprijeđenje životne sredine;
3. Mjere za očuvanje biološke , geološke i predione raznovrsnosti;

4. Mjere zaštite i unapređenja zaštićenih i registrovanih prirodnih dobara;
5. Mjere za održavanje i upravljanje u skladu sa ekološkim potrebama staništa unutar zaštićenih zona i van njih;
6. Mjere za obnavljanje uništenih staništa;
7. Mjere, metode i tehnička sredstva koja doprinose očuvanju povoljnog statusa vrsta;
8. Mjere zaštite iz planova upravljanja zaštićenim prirodnim dobrima i ekološki značajnim lokalitetima;
9. Smjernice za realizaciju projekata pejzažne arhitekture, odnosno uređenja terena;

SMJERNICE ZA ETAPNU REALIZACIJU PLANSKOG DOKUMENTA

Infrastrukturno opremanje i saobraćajnice će se realizovati etapno u skladu sa programom investicionih ulaganja kao i dinamičkim planom investitora i realnih potreba korisnika prostora.

USLOVI ZA KRETANJE LICA SA POSEBNIM POTREBAMA

Potrebno je omogućiti pristup lica sa posebnim potrebama u sve objekte koji svojom funkcijom podrazumjevaju prisustvo građana koji nisu zaposleni u radnim organizacijama. Kroz objekte u kojima je omogućen rad licima sa posebnim potrebama neophodno je obezbjediti nesmetano kretanje kolica, pristup u odgovarajuće dimenzionisane liftove i sanitarne prostorije. Prilikom izrade tehničke dokumentacije za predmetne objekte, obavezno je implementiranje odredbi iz Pravilnika o bližim uslovima i načinu prilagođavanja objekata za pristup i kretanje lica smanjene pokretljivosti i lica sa invaliditetom (Službeni list Crne Gore, br.48/13 i 44/15).

SMJERNICE ZA POVEĆANJE ENERGETSKE EFIKASNOSTI I KORIŠĆENJE OBNOVLJIVIH IZVORA ENERGIJE

U cilju racionalizacije potrošnje energije i sve izraženijih zahtjeva za zaštitom čovjekove okoline predlažu se dvije osnovne mjere: štednja i korišćenje alternativnih izvora energije. Održivoj potrošnji energije treba dati prioritet racionalnim planiranjem potrošnje, implementacijom mjera energetske efikasnosti u sve segmente energetskog sistema. Održiva gradnja je svakako jedan od značajnijih segmenata održivog razvoja koji uključuje:

- upotrebu građevinskih materijala koji nisu štetni po životnu sredinu;
- energetsku efikasnost zgrada;
- upravljanje otpadom nastalim prilikom izgradnje ili rušenja objekata.

Energetski i ekološki održivo graditeljstvo teži:
- smanjenju gubitaka toplote iz objekta poboljšanjem toplotne zaštite spoljnih elemenata i povoljnim odnosom osnove i volumena zgrade;
- povećanju toplotnih dobitaka u objektu povoljnom orijentacijom zgrade i korišćenjem sunčeve energije;
- korišćenju obnovljivih izvora energije u zgradama (biomasa, sunce, vjetar itd.);
- povećanju energetske efikasnosti termoenergetskih sistema.

Cilj sveobuhvatne uštede energije, a time i zaštite životne sredine je stvoriti preduslove za sistemsku sanaciju i rekonstrukciju postojećih zgrada, a zatim i povećanje obavezne toplotne zaštite novih objekata. Kod gradnje novih objekata važno je već u fazi idejnog rješenja u saradnji sa projektantom predvidjeti sve što je potrebno da se dobije kvalitetna i optimalna energetski

efikasna zgrada. Zato je potrebno:
- analizirati lokaciju, orjentaciju i oblik objekta;
- primjeniti visoki nivo toplotne izolacije kompletnog spoljnjeg omotača objekta i izbjegavati toplotne mostove;
- iskoristiti toplotne dobitke od sunca i zaštititi se od pretjeranog osunčanja;
- koristiti energetski efikasan sistem grijanja, hlađenja i ventilacije, i kombinovati ga sa obnovljivim izvorima energije.

Najvažni su tri stepena energetske efikasnosti su:
- smanjenje gubitaka energije pomoću termičke izolacije objekta,
- efikasno korišćenje energje,
- efikasna proizvodnja energije.

Smjernice za smanjenje gubitaka energije su:

- maksimalna termička izolacija, kompaktnost građevine i nepostojanje termičkih mostova: sve komponente omotača zgrade moraju imati izolaciju čija je U-vrijednost za zidove 0.4W(m2K), za podove 0.4-0.5 W(m2K), i za krov 0.8 W(m2K);
- prozori moraju imati dvoslojno ili troslojno staklo i izolovane ramove: U-vrijednost od 1.30W(m2K), uključujući okvir, i g-vrijednost od 0.5 (ukupna solarna transmisija) za zastakljivanje;
- stepen zaptivenosti zgrade: rezultat testa zaptivenosti mora biti 0.6, promjena vazduha na sat.

Efikasno korišćenje energije obuhvata:
- predgrijavanje svježeg vazduha;
- orijentaciju ka jugu i mogućnost osunčanosti tokom zime;
- uštedu energije za grijanje koja se postiže pasivnom upotrebom solarne energije;
- solarne kolektore za pripremu tople vode u domaćinstvu;
- kućne aparate koji malo troše - energetski efikasni: veš-mašine, frižideri, zamrzivači, lampe itd.

predstavljaju još jedan koristan dio koncepta pasivne energetske efikasnosti.

USLOVI ZA KORIŠĆENJE PROSTORA DO PRIVOĐENJA NAMJENI

Do privođenja prostora namjeni treba omogućiti nesmetano korišćenje prostora ako je isto usklađeno sa planiranim namjenama, ali ne i proširivanje postojećeg korišćenja koje je u suprotnosti sa planiranim namjenama. Na neizgrađenom prostoru, Planom predviđenom za određene sadržaje, nije dozvoljena gradnja do privođenja parcela namjeni, odnosno do infarstrukturnog opremanja parcela.

PLANIRANI KAPACITETI

Prikazani su u tabeli:

Broj urbanističke parcele	Površina urbanističke parcele [m²]	Planirana zuzetost objekata [m²]	Planirana izgrađenost BRGP [m²]	Planirani max. indeks zauzetosti Iz	Planirani max. indeks izgrađenosti Ii	Planirana spratnost	broj zaposlenih-korisnika	Postojeći objekti	Planirana namjena
BLOK F									
UP1F	17965	8990	8990	0.50	0.50	VP,P+1	18	886	IOK-TS I pumpna stanica
UP2F	75297	37574	37574	0.50	0.50	VP,P+1	75	0	IOK- PPOV
UP3F	36087	18044	18044	0.50	0.50	VP,P+1	36	0	IOK- PPOV
UP4F	25462	12731	12731	0.50	0.50	VP,P+1	25	0	IOK- PPOV
UP5F	4456	1114	1560	0.25	0.35	VP,P+1	3	0	IP- proizvodno zanatstvo, skladišta, stovarišta,
UP6F	4173	1043	1461	0.25	0.35	VP,P+1	3	0	IP- proizvodno zanatstvo, skladišta, stovarišta,
UP7F	10649	2662	4260	0.25	0.40	VP,P+1	9	0	IP- proizvodno zanatstvo, skladišta, stovarišta,
UP8F	6277	1569	2197	0.25	0.35	VP,P+1	4	0	IP- proizvodno zanatstvo, skladišta, stovarišta,
UP9F	16974	0	0	0.00	0.00	0	0	0	IOK-Komunalne djelatnosti-ispust prečišćenih otpadnih voda
UP10F	5865	1466	2053	0.25	0.35	VP,P+1	4	0	IP- proizvodno zanatstvo, skladišta, stovarišta,
UP11F	5067	1267	1773	0.25	0.35	VP,P+1	4	0	IP- proizvodno zanatstvo, skladišta, stovarišta,

OSNOVNI PODACI O PRIRODNIM KARAKTERISTIKAMA PODGORICE

Topografija prostora

Podgorica se nalazi na sjevernom dijelu Zetske ravnice, u kontaktnoj zoni sa brdsko-planinskim zal
Njen geografski lokalitet je određen sa 42 $^{0}26^{l}$ sjeverne geografske širine i 19^{0} 16^{l} istočne geog
dužine. Područje u zahvatu DUP-a je na koticca 10-30 mnv, dok je prostor namjenjen za izgradi
koti cca 14-27 mnv. Ova visinska razlika se prostire na površini od 373,34 ha, tako da je u najv
dijelu ovo ravan teren pogodan za izgradnju.

Inženjersko geološke karakteristike

Geološku građu terena čine šljunkovii pjeskovi neravnomjernog granulometrijskog sast
promjenljivog stepena vezivosti. Nekad su to posve nevezani sedimenti, a nekad pravi konglor
praktično nestišljivi, koji se drže u vertikalnim odsjecima i u podkapinama i svodovima. Nav
litološke strukture karakteriše dobra vodopropustljivost, a dubina izdani podzemne vode svuda je
od 4 m od nivoa terena. Nosivost terena kreće se od 300-500 kN/m^2 za I kategoriju. Zbog neizra
nagiba čitav prostor terase spada u kategoriju stabilnih terena.

Stepen seizmičkog intenziteta

Sa makroseizmičkog stanovišta Podgorica se nalazi u okviru prostora sa vrlo izraženom seizm
aktivnošću. Prema seizmološkoj karti gradsko područje je obuhvaćeno sa 8° MCS skale
maksimalnog intenziteta očekivanog zemljotresa za povratni period od 100 godina, sa vjerovatn
pojave 63%. Seizmički hazard za ovaj prostor odnosi se na dva karakteristična modela
konglomeratisane terase, tj. za model C1 gdje je debljina sedimenata površinskog sloja (do p
manja od 35 m, i model C_2 gdje je ta debljina veća od 35 m.

Dobijeni parametri su sljedeći:

- koeficijent seizmičnosti Ks 0,079 - 0,090
- koeficijent dinamičnosti Kd 1,00 >Kd > 0,47
- ubrzanje tla Qmax(q) 0,288 - 0,360
- intenzitet u (MCS) 9° MCS

Hidrološke karakteristike

Podzemna voda je niska iiznosi 16-20 m ispod nivoa terena.

Klimatske karakteristike

Urbano područje Podgorice karakteriše slabije modifikovan maritimni uticaj Jadranskog mora. Spe
mikroklimatske karakteristike su u području grada, gdje je znatno veći antropogeni uticaj indust
aerozagađenje, kao i ukupne urbane morfologije na vazdušna strujanja, vlažnost, osunčanje, to
zračenje i dr.

Temperatura vazduha

U Podgorici je registrovana srednja godišnja temperatura od 15,5° C. Prosječno najhladniji mje
januar sa 5° C, a najtopliji jul sa 26,7° C. Maritimni uticaj ogleda se u toplijoj jeseni od proljeća z
C, sa blažim temperaturnim prelazima zime u ljeto, od ljeta u zimu. U toku vegetacionog perioda
septembar) prosječna temperatura vazduha iznosi 21,8°C, dok se srednje dnevne temperature
14° C, javljaju od aprila do oktobra. Srednji vremenski period u kome je potrebno grijanje stamb
radnih prostorija proteže se od 10 novembra do 30 marta, u ukupnom trajanju od 142 dana.

Vlažnost vazduha

Prosječna relativna vlažnost vazduha iznosi 65,6%, sa max od 77,2% u novembru i min od 49,4%

Tokom vegetacionog perioda, prosječna relativna vlažnost vazduha je 56,7%.

Osunčanje, oblačnost i padavine

Srednja godišnja suma osunčanja iznosi 2.456 časova. Najsunčaniji mjesec je jul sa 344,1, a najkra osunčanje ima decembar sa 93,0 časova. U vegetacionom periodu osunčanje traje 1.658 časo Godišnji tok oblačnostiima prosječnu vrijednost od 5,2 desetina pokrivenosti neba. Najveća oblačnost u novembru 7,0, a najmanja u avgustu 2,8. Prosječna vrijednost oblačnosti u vegetacionom periodu 4,3. Srednji prosjek padavina iznosi 1.692 mm godšnje, sa maksimumom od 248,4 mm, u decembr minimumom od 42,0 mm, u julu. Padavinski režim oslikava neravnomjernost raspodjele po mjesecim uz razvijanje ljetnjih lokalnih depresija sa nepogodama i pljuskovima. Vegetacioni period ima 499,1 m padavina ili 20,6 % od srednje godšnje količine. Period javljanja snježnih padavina traje od novembra marta, sa prosječnim trajanjem od 5,4 dana, a snijeg se rijetko zadržava duže od jednog dana.

Pojave magle, grmljavine i grada

Prosječna godišnja čestina pojave magle iznosi 9 dana, sa ekstremima od 1 do 16 dana. Period javljar magle traje od oktobra do juna, sa najčešćom pojavom u decembru i januaru (po 2,6 dana). Nepogo (grmljavine) javljaju se u toku godine prosječno 53,7 dana, sa maksimumom od 7,7 dana, u juni minimumom od 1,9 dana, u januaru. Pojava grada registruje se u svega 0,9 dana prosječno godišnje, zabilježenim maksimumom od 4 dana.

Vjetrovi

Učestalost vjetrova i tišina izražena je u promilima, pri čemu je ukupan zbir vjetrova iz svih pravac tišina uzet kao 1000 ‰. Najveću učestalost javljanja ima sjeverni vjetar sa 227 ‰, a najmanju istočni 6 ‰. Sjeverni vjetar se najčešće javlja ljeti, a najrjeđe u proljeće. Tišine ukupno traju 380 ‰, najvećom učestalošću u decembru, a najmanjom u julu. Najveću srednju brzinu godišnje ir sjeveroistočni vjetar (6,2 m/sec), koji najveću vrijednost bilježi tokom zime (prosječno 8,9 m/se Maksimalna brzina vjetra od 34,8 m/sec. (125,3 km/čas i pritisak od 75,7 kg/m²) zabilježena je k sjevernog vjetra. Jaki vjetrovi su najčešći u zimskom periodu sa prosječno 20,8 dana, a najrjeđi ljeti 10,8 dana. Tokom vegetacionog perioda jaki vjetrovi se javljaju prosječno 22,1 dan.

Ocjena sa aspekta prirodnih uslova

Sa aspekta prirodnih uslova, ovo područje ima niz povoljnosti za izgradnju i urbanizaciju. Ravan tere nizak nivo podzemnih voda kao i dobra stabilnost terena su karakteristike koje idu u prilog gradn Klimatski uslovi su, kao i na cijeloj teritoriji grada, povoljni za gradnju tokom cijele godine. Priizgradı odnosno planiranju objekata treba voditi računa o nepovoljnim uslovima vjetra, sunca i kiše.

ZAKONSKI OKVIR

Tekstualni i grafički dio DUP –a ''Industrijska zona Kap –a'' kojima su detaljno propisani način izgradnje objekta, uslovi za priključenje na infrastrukturnu mrežu na nivou planskog dokumenta, kao i separate sa urbanističko -tehničkim uslovima dostupni su u Registru važeće planske dokumentacije na sljedećoj adresi: http://www.planovidozvole.mrt.gov.me/LAMP/PlanningDocument?m=PG, kojeg vodi Ministarstvo održivog razvoja i turizma.

Tehničku dokumentaciju izrađuje ovlašćeno privredno društvo koje je upisano u centralni registar Privrednog suda za obavljanje djelatnosti izrade tehničke dokumentacije i koje ispunjavaju uslove propisane ("Službeni list Crne Gore" br. 64/17, 44/18, 63/18 i 11/19) u skladu sa izdatim urbanističko-tehničkim uslovima izdatim od strane Sekretarijata za prostorno planiranje i održivi razvoj.

Tehničku dokumentaciju - idejno rješenje i glavni projekat, reviziju istih i eventualne dodatne elaborate, potrebno je izraditi u skladu sa navedenim Zakonom, Pravilnikom o načinu izrade i sadržini tehničke dokumentacije za građenje objekta („Službeni list Crne Gore", br. 44/18), i ostalom regulativom i normativima iz oblasti izrade tehničke dokumentacije i izgradnje objekata.

	OBRAĐIVAČ URBANISTIČKO-TEHNIČKIH USLOVA I OVLAŠĆENO SLUŽBENO LICE: **M.P.**	**Radmila Maljević, dipl.ing.saob.** Rukovodilac Sektora za izgradnju i legalizaciju objekata
	PRILOZI Izvodi iz grafičkih priloga planskog dokumenta, Tehnički uslovi priključenja preduzeća "Vodovod i kanalizacija" d.o.o., Listovi nepokretnosti i kopija plana, izdati od Uprave za nekretnine - Područna jedinica Podgorica	

DOSTAVLJENO: Podnosiocu zahtjeva, u spise predmeta i arhivi.

DRUŠTVO SA OGRANIČENOM ODGOVORNOŠĆU "VODOVOD I KANALIZACIJA"
81000 PODGORICA, ul. Zetskih vladara bb,
PIB: 02015641, PDV: 20/31-00109-1
Telefoni: centrala 020/440 300, fax: 440 362, komerc. sl. tel/fax: 440 364
Vodovodna mreža: 440 309, kanalizacija: 440 325, tehnička priprema 440 312
E-mail: vikpg@t-com.me, Web. www.vikpg.co.me
Žiro računi:
PG banka: 550-1105-66
CKB: 510-8284-20
Prva banka CG: 535-9562-08
Hipotekarna banka: 520-9074-13

Broj: 113UPI-041/20-5133

CRNA GORA

GLAVNI GRAD PODGORICA

Sekretarijat za planiranje prostora i održivi razvoj

Pisarnica: Glavni grad Podgorica
Sekretarijat za planiranje prostora i održivi razvoj
Podgorica
Primljeno: 10 09 2020
Org. jed. | Klas. znak | Redni broj | Prilog | Vrijednost
120933, 3000-389/2020

DOO "Vodovod i kanalizacija" Podgorica postupajući po zahtjevu **Sekretarijata za planiranje prostora i održivi razvoj**, na osnovu člana 74 Zakona o planiranju prostora i izgradnji objekata (Službeni list CG broj 64/17), člana 19 Odluke o javnom vodosnabdijevanju na teritoriji Glavnog grada (Službeni list CG – opštinski propisi br. 027/15 i 034/16), člana 10 Odluke o prikupljanju, prečišćavanju i ispuštanju otpadnih voda na teritoriji Glavnog grada (Službeni list CG – opštinski propisi br. 027/15) i člana 5 Odluke o prikupljanju i ispuštanju atmosferskih voda na teritoriji Glavnog grada (Službeni list CG – opštinski propisi br. 027/15) izdaje

TEHNIČKE USLOVE PRIKLJUČENJA NA GRADSKI VODOVOD I KANALIZACIJU

Na osnovu zahtjeva Sekretarijata za planiranje prostora i održivi razvoj broj 08-332/20-902 od 09.09.2020.godine, koji je kod nas evidentiran pod brojem 113UPI-041/20-5133 od 09.09.2020. godine, za izdavanje tehničkih uslova priključenja na gradski vodovod i kanalizaciju **za izgradnju objekata komunalne infrastrukture – postrojenja za prečišćavanje otpadnih voda na UP 2F, UP 3F i UP 9F, u zahvatu DUP-a "Industrijska zona KAP-a" u Podgorici, investitora Glavnog grada Podgorce** (prema urbanističko-tehničkim uslovima 08-332/20-902 od 09.09.2020. godine, izdatim od strane Sekretarijata za planiranje prostora i održivi razvoj), propisujemo sljedeće tehničke uslove priključenja na gradski vodovod i kanalizaciju. U prilogu dostavljamo situaciju sa ucrtanim postojećim hidrotehničkim instalacijama na predmetnoj lokaciji. Položaj prikazanih cjevovoda je ucrtan kao spoj osovina poklopaca šahtova, što ne odgovara stvarnom položaju cijevi, koji kod vodovoda može biti udaljen od osovine poklopca i par metara. Stvarni položaj mora se utvrditi uvidom u svaki šaht pojedinačno. Napominjemo da se u blizini lokacije može naići na priključne cjevovode za koje ovo Društvo ne posjeduje potrebne podatke o visinskom i horizontalnom položaju, jer prilikom izgradnje ovih cjevovoda nije uradjen katastar instalacija, a na cjevovodu nijesu izvedeni vodovodni šahtovi, te u sadašnjem stanju nema mogućnosti da ih snimimo i ucrtamo njihov tačan položaj. U slučaju da priključne cijevi prolaze preko predmetne parcele, iste se moraju izmjestiti prije početka radova na objektu, a na osnovu zahtjeva investitora. Troškovi izmiještanja padaju na teret investitora, a vodoinstalaterske radove izvodi isključivo d.o.o. "Vodovod i kanalizacija" Podgorica.

Predmetne parcele su neizgradjene. UTU-ima je na UP 2F planiran objekat maksimalne površine prizemlja 37574m2, spratnosti Vp do P+1. Na UP 3F planiran je objekat maksimalne površine prizemlja 18044m2, spratnosti Vp do P+1. Na UP 9F je planiran ispustprečišćenih otpadnih voda. Namjena objekata je prečišćavanje otpadnih voda.

Predmetnim DUP-om je planirana izgradnja saobraćajnice zapadno od predmetne parcele, u sklopu koje je predvidjena izgradnja atmosferske kanalizacije Ø900mm

a) Vodovod:

Priključenje objekata na vodovodnu mrežu može se obaviti na postojećem cjevovodu PEVG DN160mm pored predmetne lokacije, u postojećem vodovodnom čvoru Č8887. Napominjemo da je gradska vodovodna mreža namijenjena isključivo za snabdijevanje stanovništva pitkom vodom, tako da će se sa nje moći obezbijediti isključivo sanitarna voda za potrebe objekata, a ne i tehnološka i protivpožarna, za šta je potrebno obezbijediti alternativno vodosnabdijevanje – sopstveni bunar.

U slučaju racionalne i tehnički logične potrošnje u vodovodnom sistemu biće obezbijedjen pritisak na mjestu priključenja oko 2-4bar.

U nastavku navodimo osnovne elemente koje mora da sadrži vodovodni i kanalizacioni priključak na teritoriji Glavnog grada:

Za registrovanje utroška vode svakog objekta posebno, potrebno je predvidjeti ugradnju vodomjera odgovarajućih dimenzija u šahtu ispred objekta. Ukoliko ima više poslovnih jedinica, za registrovanje utroška vode potrebno je ugraditi posebne vodomjere u šahtu ispred objekta za svaku poslovnu jedinicu posebno, a nikako u objektu i samim jedinicama. Šaht treba da bude u posjedu podnosioca zahtjeva, 1 do 2m od ivice parcele gledajući iz pravca mjesta priključenja na ulični cjevovod. Minimalne dimenzije svijetlog otvora šahta za vodomjere su 1.2x1.2x1.2m (u koji se može smjestiti maksimalno 3 mala vodomjera), obavezno sa drenažom, penjalicama i poklopcem tako postavljenim da se pri silazu u šaht ne gazi po vodomjerima. Projektom obavezno prikazati detalj vodomjernog šahta - vodoinstalaterski i gradjevinski, sa specifikacijom i pravim dimenzijama fazonskih komada i armatura, da bi dokazali usvojene dimenzije, osnovu i presjek kao i njegovu lokaciju na situaciji.

Kod vodomjera ∅50 mm i više obavezno se ispred vodomjera ugradjuje zatvarač, hvatač nečistoće, MDK komad, ravni komad za smirenje toka vode, a iza vodomjera ravni komad i zatvarač. Dužina ravnog dijela za smirenje toka ispred i iza vodomjera zavisi od profila vodomjera. Prilikom dimenzionisanja vodomjernog šahta voditi računa o dimenzijama komada koji se ugradjuju.

Svi vodomjeri koji se ugradjuju moraju biti klase C, sa mesinganim, horizontalnim kućištem, impulsnim mehanizmom i radio modulom za daljinsko očitavanje, sa magnetnim ventilom prije i propusnim ventilom poslije vodomjera, koji su prilagodjeni usvojenom programu i opremi d.o.o. "Vodovod i kanalizacija" Podgorice. Vodomjeri moraju biti sa horizontalnom osovinom, baždareni i moraju imati plombu Metrološkog zavoda Crne Gore sa oznakom ME.

Vodoinstalaterske radove na izradi priključka, nabavci i ugradnji vodomjera, izvodi **isključivo** d.o.o. "Vodovod i kanalizacija" Podgorica po zahtjevu korisnika. Prilikom izvodjenja pripremnih radova za ugradnju vodomjera, obavezno konsultovati nadležnu službu d.o.o. "Vodovod i kanalizacija" Podgorica, koja nabavlja i ugradjuje vodomjere. U slučaju nepoštovanja navedenog, odnosno nelegalnog priključenja na vodovodnu mrežu, vodovodni priključak će biti ukinut i preduzete odgovarajuće zakonske mjere.

Nakon sprovodjenja postupka za dobijanje odobrenja za gradnju objekta i prijave gradnje nadležnom organu, potrebno je da podnesete zahtjev ovom Društvu za dobijanje gradilišnog vodovodnog priključka. Ukoliko umjesto vlastitog gradilišnog priključka investitor za gradjenje koristi gradsku vodu preko svog ili tudjeg registrovanog vodomjera za domaćinstvo, ili na neki drugi način, ta potrošnja će se posebno obračunati i mora da se reguliše prije dobijanja trajnog priključka.

b) Fekalna kanalizacija:

Gradski sistem kanalizacione mreže je separatni, tako da se ne dozvoljava upuštanje atmosferskih voda u fekalnu kanalizaciju i obrnuto.

Dovod otpadnih voda sa teritorije Glavnog grada je predvidjen putem kolektorske mreže fekalne kanalizacije do planiranog cjevovoda Ø1300mm, kojim će se voda dovesti do samog postrojenja za prečišćavanje, u svemu u skladu sa Idejnim projektom svih primarnih kolektora fekalne kanalizacije sa područja grada ka lokaciji novog uredjaja za prečišćavanje otpadnih voda na lokaciji KAP-a.

Prečišćene vode iz objekta evakuisati putem novog kolektora i ispusta na parceli 9F u rijeku Moraču.

c) Atmosferska kanalizacija

Na ovom području ne postoji izgradjena atmosferska kanalizacija. Projektom obuhvatiti rješenje odvodjenja kišnih voda sa krova objekata, kao i cijele lokacije objekata. Po pravilu, kišne vode ne smiju upuštati direktno u gradsku atmosfersku kanalizaciju (kada dodje do njene realizacije). Dimenzije retenzionog bazena dokazati proračunom. Dimenzionisati ga za prihvatanje prvog poplavnog talasa 15-to minutne kiše intenziteta 264 l/s/ha. Međutim, u ovom slučaju, zbog blizine recipijenta, odvodjenje kišnih voda sa cijele lokacije objekata izvršiti izgradnjom sistema kolektora i upuštanjem u recipijent – rijeku Moraču. Prije upuštanja u recipijent, predvidjeti separator za prečišćavanje atmosferskih voda sa predmetne lokacije.

d) Tehnička opremljenost projekta hidrotehničkih instalacija

Projekat treba da sadrži sve tekstualne i grafičke priloge za glavni projekat u skladu sa Pravilnikom o načinu izrade i sadržini tehničke dokumentacije za gradjenje objekta (Službeni list CG broj 044/18). Projekat unutrašnjih instalacija vodovoda i kanalizacije treba izraditi u skladu s pravilima struke i odredbama važeće zakonske regulative, a mora obuhvatiti interne instalacije vodovoda i kanalizacije do priključenja na gradski ulični vodovod odnosno do javne ulične kanalizacije uključujući i same spojeve sa istim.

U predmjeru radova obavezno treba razdvojiti radove na unutrašnjoj vodovodnoj instalaciji, koje obavlja izvodjač radova na objektu, od dijela vodovodnog priključka, koje izvodi d.o.o. "Vodovod i kanalizacija" Podgorica.

Projekat obavezno mora da sadrži preglednu situaciju u odgovarajućoj razmjeri, sa svim prikazanim elementima relevantnim za izbor projektnog rješenja. Svrha pregledne situacije na kojoj insistiramo kao obaveznom dijelu projekta, je da se može sagledati kako koncepcija kompletnog rješenja, tako i veza svih ostalih priloga datih projektom.

Napominjemo da je potrebno nakon obrade projektne dokumentacije u dijelu spoljnih i unutrašnjih instalacija, projekat dostaviti d.o.o. "Vodovod i kanalizacija" Podgorica na provjeru poštovanja uslova priključenja i davanja saglasnosti na projekat.

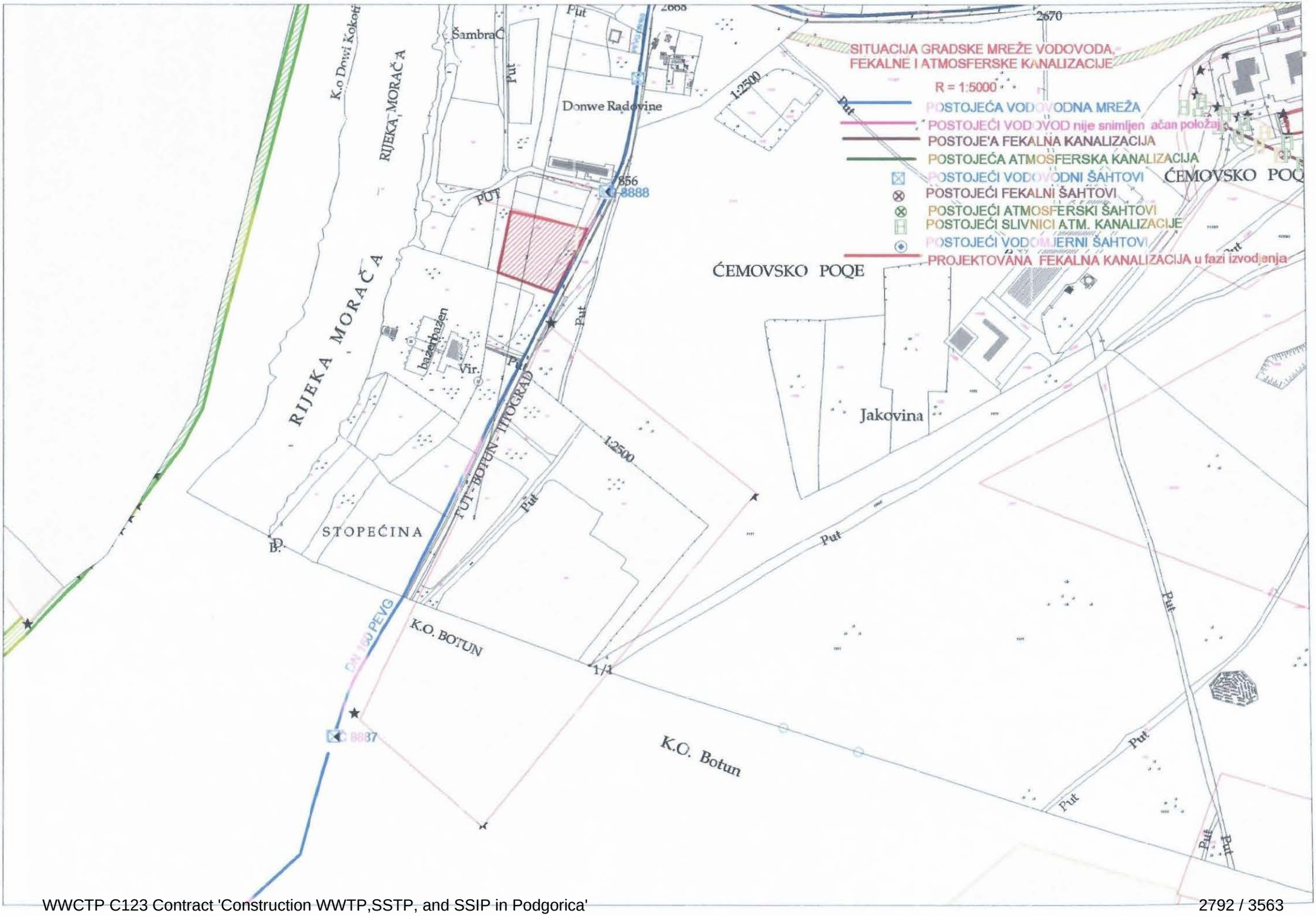
Ovi uslovi važe 6 (šest) mjeseci od dana izdavanja.

Prilog: Situacija R = 1:5000

Podgorica,
10.09.2020. godine

DRUŠTVO SA OGRANIČENOM ODGOVORNOŠĆU "VODOVOD I KANALIZACIJA" PODGORICA 2

Izvršni direktor,
Filip Makrid, dipl.inž.građ.

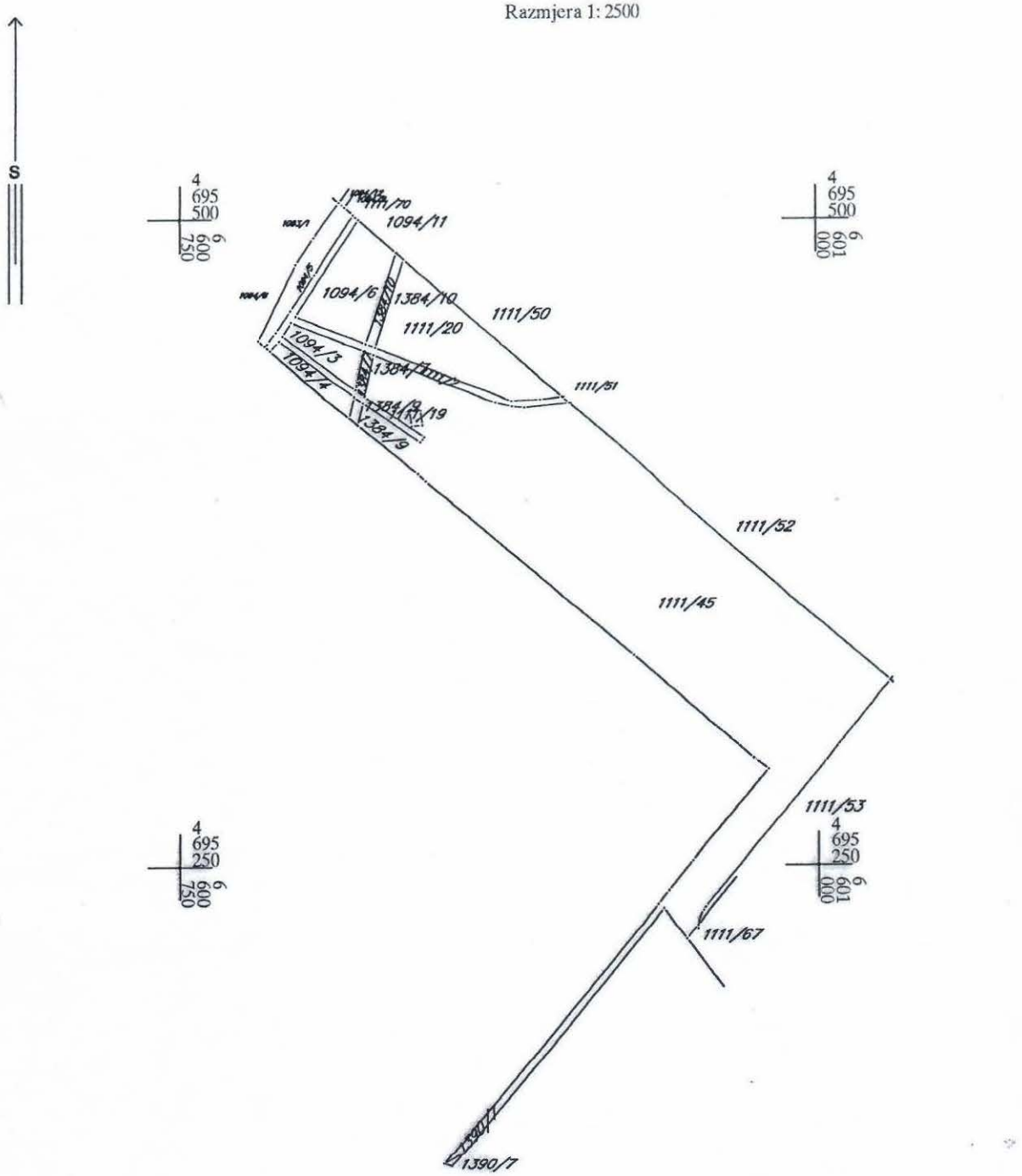

SITUACIJA GRADSKE MREŽE VODOVODA,
FEKALNE I ATMOSFERSKE KANALIZACIJE
R = 1:5000
POSTOJEĆA VODOVODNA MREŽA
POSTOJEĆI VODOVOD nije snimljen ačan položaj
POSTOJE'A FEKALNA KANALIZACIJA
POSTOJEĆA ATMOSFERSKA KANALIZACIJA
POSTOJEĆI VODOVODNI ŠAHTOVI
POSTOJEĆI FEKALNI ŠAHTOVI
POSTOJEĆI ATMOSFERSKI ŠAHTOVI
POSTOJEĆI SLIVNICI ATM. KANALIZACIJE
POSTOJEĆI VODOMJERNI ŠAHTOVI
PROJEKTOVANA FEKALNA KANALIZACIJA u fazi izvodjenja
RIJEKA MORAČA
K.o Dvivi Kokoti
Šambrać
Donwe Radovine
Put
2668
2670
1:2500
856
8888
PUT
ĆEMOVSKO POQE
Jakovina
hazerhazen
Vir.
PUT - BOTUN - TITOGRAD
STOPEĆINA
K.O. BOTUN
K.O. Botun
1/1
8887

CRNA GORA
UPRAVA ZA NEKRETNINE
PODRUČNA JEDINICA: PODGORICA
Broj:
Datum: 03.09.2020.

Katastarska opština: DAJBABE
Broj lista nepokretnosti: 3897
Broj plana: 4
Parcele: 1094/3, 1094/4, 1094/5, 1094/6, 1111/2
1111/19, 1111/20, 1111/45

KOPIJA PLANA

Razmjera 1: 2500



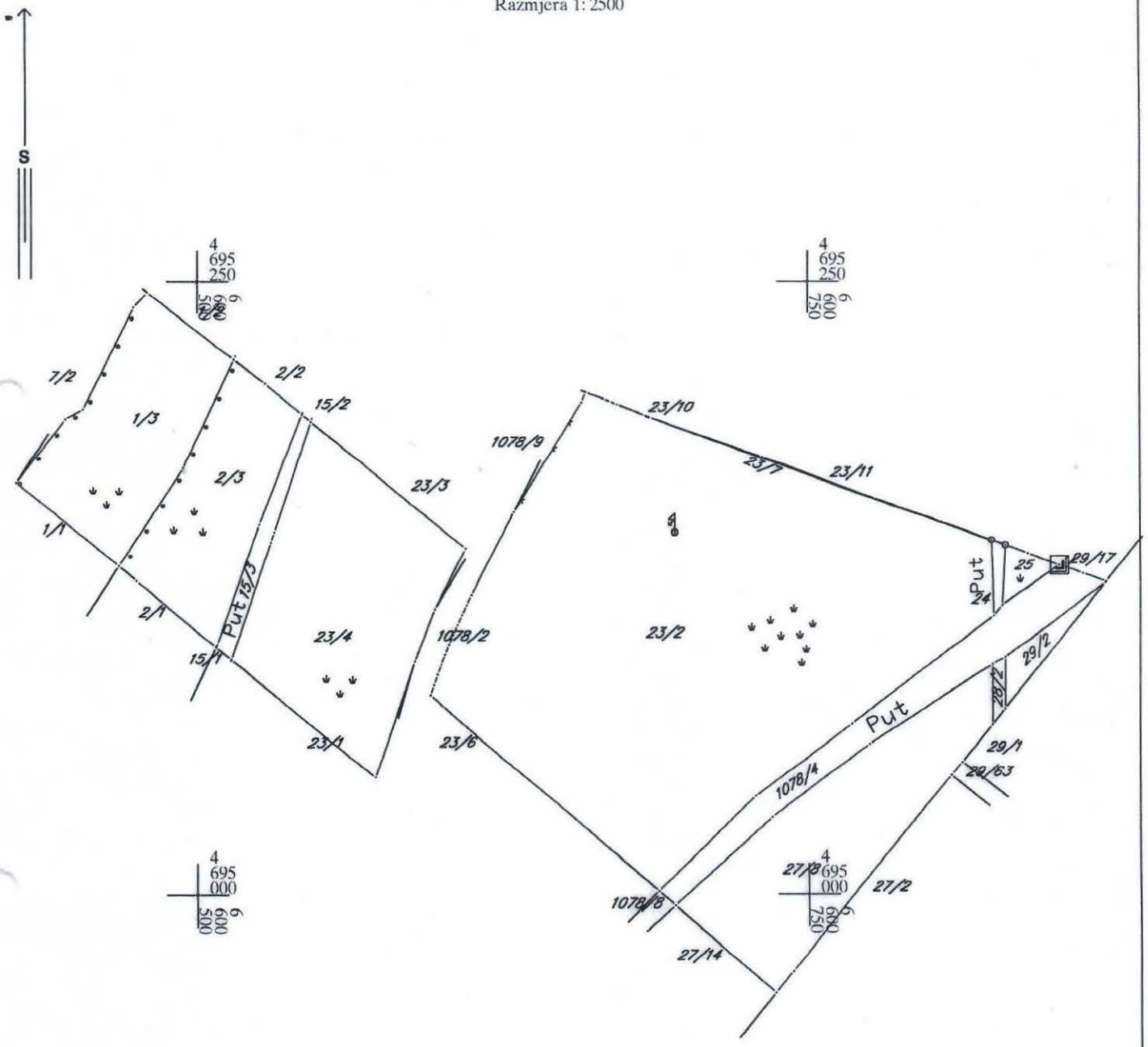
IZVOD IZ DIGITALNOG PLANA
Obradio:

CRNA GORA
UPRAVA ZA NEKRETNINE
PODRUČNA JEDINICA: PODGORICA
Broj: 101-917/20-3308/20
Datum: 03.09.2020.

Katastarska opština: BOTUN
Broj lista nepokretnosti: 154.157.456.445.
Broj plana: 1,4
Parcele: 1/3, 2/3, 23/2, 23/7, 24, 25, 27/8
28/2, 29/2, 15/3, 1078/4, 23/4

KOPIJA PLANA

Razmjera 1: 2500



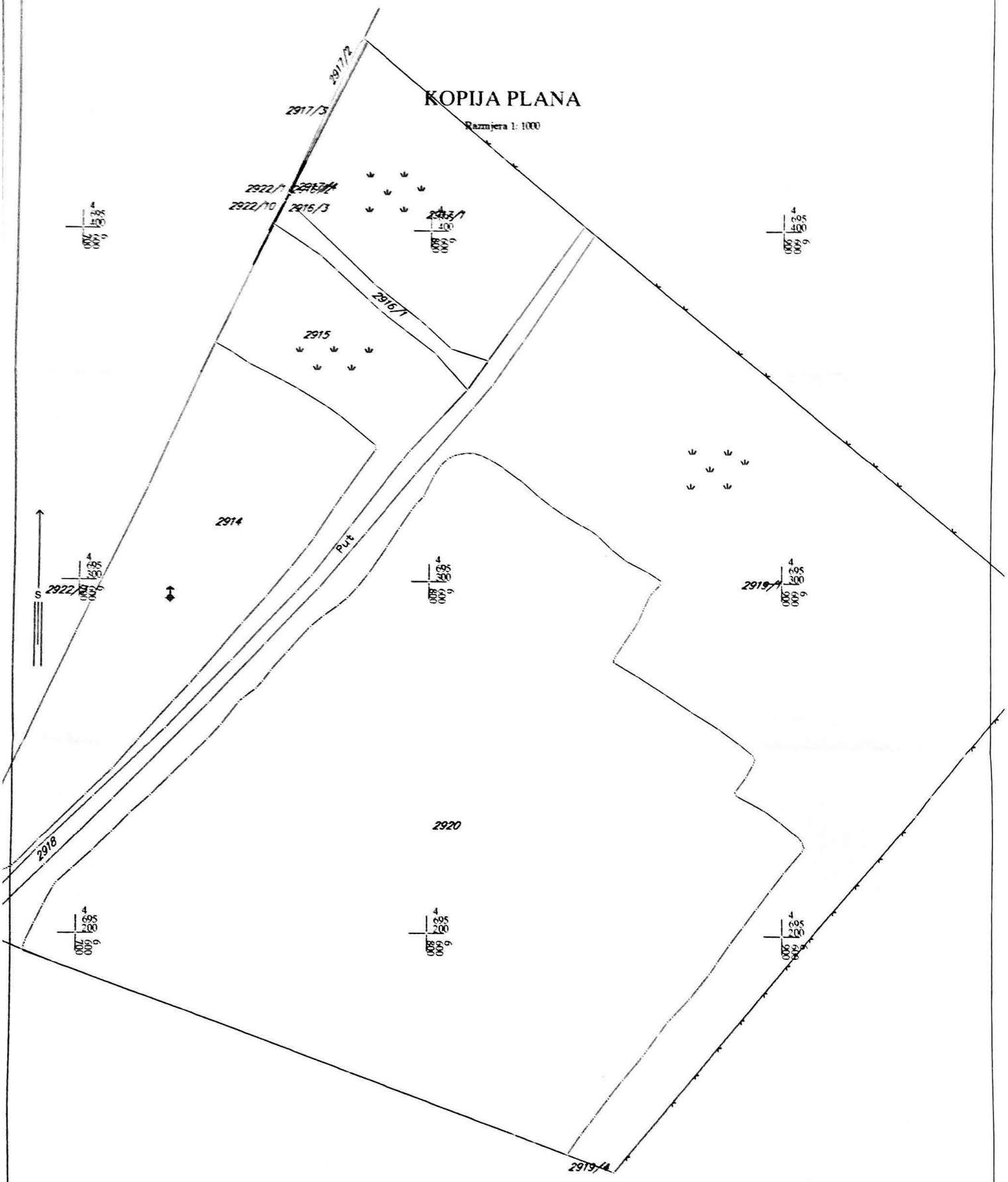
IZVOD IZ DIGITALNOG PLANA
Obradio:

CRNA GORA
UPRAVA ZA NEKRETNINE
PODRUČNA JEDINICA PODGORICA
Broj: 101-917703-3308
Datum: 03.09.2020.

Katastarska opština: DAJBABE
Broj lista nepokretnosti: 563900
Broj plana: 25
Parcele: 2916/2, 2917/2, 2917/1, 2914, 2915, 2916/1, 2918, 2919/1, 2920

KOPIJA PLANA

Razmjera 1: 1000



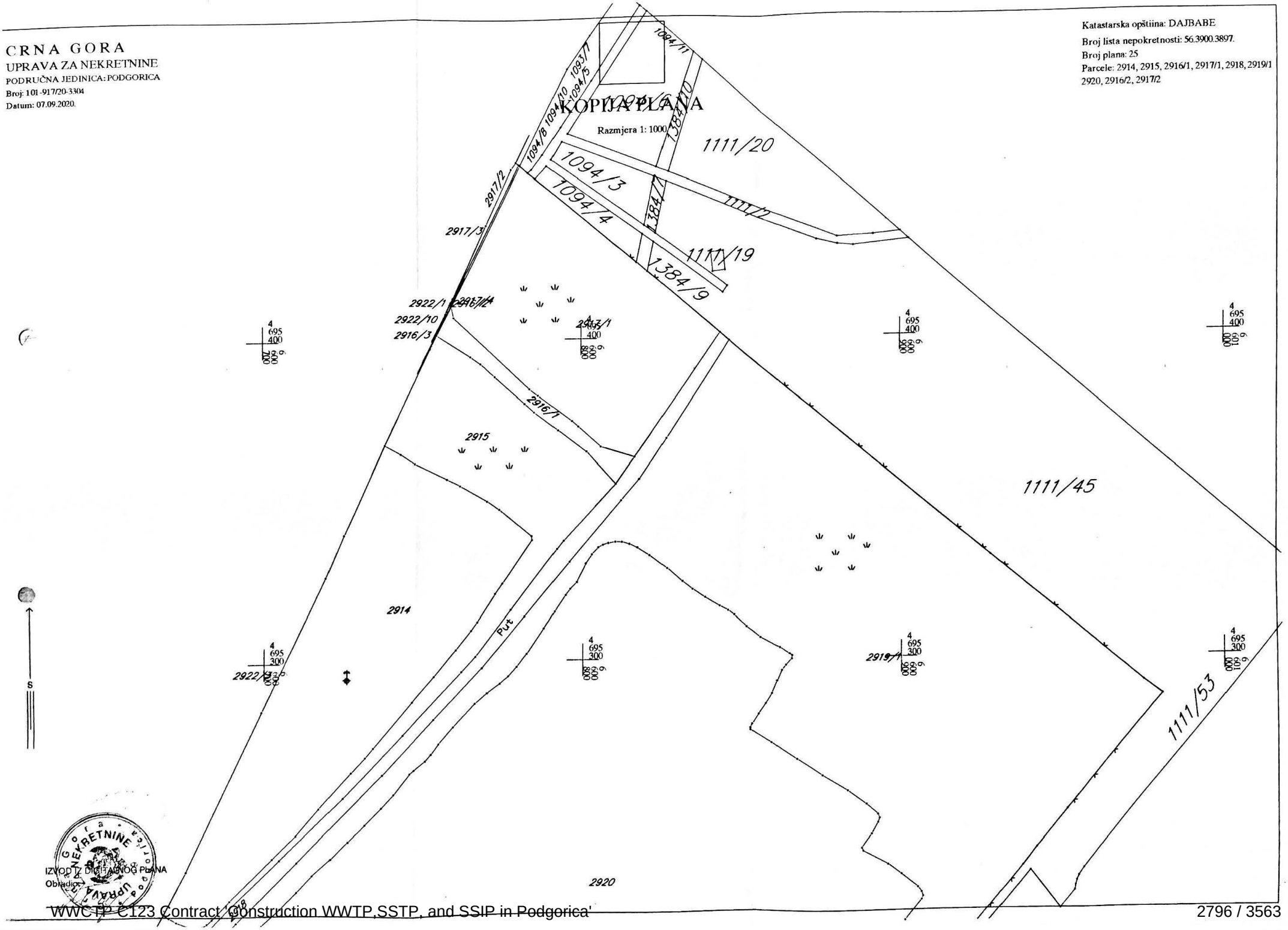
IZVOD IZ DIGITALNOG PLANA

CRNA GORA
UPRAVA ZA NEKRETNINE
PODRUČNA JEDINICA: PODGORICA
Broj: 101-917/20-3304
Datum: 07.09.2020.

Katastarska opština: DAJBABE
Broj lista nepokretnosti: 56.3900.3897.
Broj plana: 25
Parcele: 2914, 2915, 2916/1, 2917/1, 2918, 2919/1
2920, 2916/2, 2917/2

KOPIJA PLANA

Razmjera 1: 1000



IZVOD IZ DIGITALNOG PLANA
Obradio:

176000000395
101-919-31608/2020

UPRAVA ZA NEKRETNINE

PODRUČNA JEDINICA
PODGORICA

Broj: 101-919-31608/2020
Datum: 03.09.2020.
KO: BOTUN

Na osnovu člana 173 Zakona o državnom premjeru i katastru nepokretnosti ("Sl. list RCG" br. 29/07, "Sl. list CG" br. 73/10, 032/11, 040/11, 043/15, 037/17 i 17/18), postupajući po zahtjevu SEKRETARIJAT ZA PLANIRANJE PROSTORA I ODRZIVI RAZVOJ 03-352/20-902/1, , za potrebe izdaje se

LIST NEPOKRETNOSTI 157 - IZVOD

Podaci o parcelama

Broj	Podbroj	Broj zgrade	Plan Skica	Datum upisa	Potes ili ulica i kućni broj	Način korišćenja Osnov sticanja	Bon. klasa	Površina m^2	Prihod
15	3				SADOVI	Nekategorisani putevi -		650	0.00
1078	4		1 2	20/02/2017	ĆEMOVSKO POLJE	Nekategorisani putevi -		2759	0.00
Ukupno								**3409**	**0.00**

Podaci o vlasniku ili nosiocu

Matični broj - ID broj	Naziv nosioca prava - adresa i mjesto	Prava	Obim prava
0000002019710	GLAVNI GRAD PODGORICA NJEGOŠEVA 13 Podgorica	Svojina	1/1

Ne postoje tereti i ograničenja.

Naplata takse je oslobođena na osnovu člana 17 Zakona o administrativnim taksama ("Sl.list CG, br. 18/19). Naplata naknade oslobođena je na osnovu člana 174 Zakona o državnom premjeru i katastru nepokretnosti ("Sl. list RCG" br. 29/07, "Sl. list CG" br. 73/10, 032/11, 040/11, 043/15, 037/17 i 17/18).

Načelnik

Marko Bulatović,dipl.prav

Datum i vrijeme: 03.09.2020. 08:45:47

176000000395
101-919-31610/2020

UPRAVA ZA NEKRETNINE

PODRUČNA JEDINICA
PODGORICA

Broj: 101-919-31610/2020
Datum: 03.09.2020.
KO: BOTUN

Na osnovu člana 173 Zakona o državnom premjeru i katastru nepokretnosti ("Sl. list RCG" br. 29/07, "Sl. list CG" br. 73/10, 032/11, 040/11, 043/15, 037/17 i 17/18), postupajući po zahtjevu SEKRETARIJAT ZA PLANIRANJE PROSTORA I ODRZIVI RAZVOJ 03-352/20-902/1, , za potrebe izdaje se

LIST NEPOKRETNOSTI 445 - IZVOD

Podaci o parcelama

Broj	Podbroj	Broj zgrade	Plan Skica	Datum upisa	Potes ili ulica i kućni broj	Način korišćenja Osnov sticanja	Bon. klasa	Površina m^2	Prihod
1	3				LAKAT	Pašnjak 3. klase ODLUKA DRŽAVNOG ORGANA		4742	7.11
2	3				LAKAT	Pašnjak 5. klase ODLUKA DRŽAVNOG ORGANA		3985	3.19
Ukupno								**8727**	**10.30**

Podaci o vlasniku ili nosiocu

Matični broj - ID broj	Naziv nosioca prava - adresa i mjesto	Prava	Obim prava
0000002019710	GLAVNI GRAD PODGORICA JOVANA TOMAŠEVIĆA 2A Podgorica	Svojina	1/1

Ne postoje tereti i ograničenja.

Naplata takse je oslobođena na osnovu člana 17 Zakona o administrativnim taksama ("Sl.list CG, br. 18/19). Naplata naknade oslobođena je na osnovu člana 174 Zakona o državnom premjeru i katastru nepokretnosti ("Sl. list RCG" br. 29/07, "Sl. list CG" br. 73/10, 032/11, 040/11, 043/15, 037/17 i 17/18).

Načelnik

Marko Bulatović,dipl.prav

Datum i vrijeme: 03.09.2020. 08:50:35

176000000089
101-919-31913/2020

UPRAVA ZA NEKRETNINE

PODRUČNA JEDINICA
PODGORICA

Broj: 101-919-31913/2020
Datum: 04.09.2020.
KO: BOTUN

Na osnovu člana 173 Zakona o državnom premjeru i katastru nepokretnosti ("Sl. list RCG" br. 29/07, "Sl. list CG" br. 73/10, 032/11, 040/11, 043/15, 037/17 i 17/18), postupajući po zahtjevu , , za potrebe izdaje se

LIST NEPOKRETNOSTI 154 - IZVOD

Podaci o parcelama

Broj	Podbroj	Broj zgrade	Plan Skica	Datum upisa	Potes ili ulica i kućni broj	Način korišćenja Osnov sticanja	Bon. klasa	Površina m^2	Prihod
23	4				SADOVI	Pašnjak 5. klase -		7349	5.88
Ukupno								**7349**	**5.88**

Podaci o vlasniku ili nosiocu

Matični broj - ID broj	Naziv nosioca prava - adresa i mjesto	Prava	Obim prava
0000002019710	GLAVNI GRAD PODGORICA NJEGOŠEVA 13 Podgorica	Svojina	1/1

Ne postoje tereti i ograničenja.

Naplata takse je oslobođena na osnovu člana 17 Zakona o administrativnim taksama ("Sl.list CG, br. 18/19). Naplata naknade oslobođena je na osnovu člana 174 Zakona o državnom premjeru i katastru nepokretnosti ("Sl. list RCG" br. 29/07, "Sl. list CG" br. 73/10, 032/11, 040/11, 043/15, 037/17 i 17/18).

Načelnik

Marko Bulatović,dipl.prav

Datum i vrijeme: 04.09.2020. 13:12:29

SPISAK PODNIJETIH ZAHTJEVA NA NEPOKRETNOSTIMA					
Br. parcele podbroj	Zgrada / PD	Predmet	Datum i vrijeme	Podnosilac	Sadržina
23/4		101-2-465-7689/1-2018	08.06.2018 07:43	CRNOGORSKI ELEKTRIBUTIVNI	ZA EKSPROPRIJACIJU KO BOTUN LN 43 PARC 381 LN 154 PARC 401/1

176000000395
101-919-31607/2020

UPRAVA ZA NEKRETNINE

PODRUČNA JEDINICA
PODGORICA

Broj: 101-919-31607/2020
Datum: 03.09.2020.
KO: BOTUN

Na osnovu člana 173 Zakona o državnom premjeru i katastru nepokretnosti ("Sl. list RCG" br. 29/07, "Sl. list CG" br. 73/10, 032/11, 040/11, 043/15, 037/17 i 17/18), postupajući po zahtjevu SEKRETARIJAT ZA PLANIRANJE PROSTORA I ODRZIVI RAZVOJ 03-352/20-902/1, , za potrebe izdaje se

LIST NEPOKRETNOSTI 456 - IZVOD

Podaci o parcelama

Broj	Podbroj	Broj zgrade	Plan Skica	Datum upisa	Potes ili ulica i kućni broj	Način korišćenja Osnov sticanja	Bon. klasa	Površina m^2	Prihod
23	2		3 2	09/04/2020	SADOVI	Pašnjak 3. klase ODLUKA DRŽAVNOG ORGANA		26346	39.52
23	7		3 2	20/02/2017	SADOVI	Pašnjak 3. klase ODLUKA DRŽAVNOG ORGANA		35	0.05
24			1 4		SADOVI	Pašnjak 5. klase ODLUKA DRŽAVNOG ORGANA		124	0.10
25			1 2		SADOVI	Nekategorisani putevi ODLUKA DRŽAVNOG ORGANA		275	0.00
27	8		3 2	20/02/2017	SADOVI	Pašnjak 5. klase ODLUKA DRŽAVNOG ORGANA		5914	4.73
28	2		3 2		ĆEMOVSKO POLJE	Nekategorisani putevi ODLUKA DRŽAVNOG ORGANA		117	0.00
29	2		3 2		ĆEMOVSKO POLJE	Pašnjak 5. klase ODLUKA DRŽAVNOG ORGANA		430	0.34
Ukupno								**33241**	**44.75**

Podaci o vlasniku ili nosiocu

Matični broj - ID broj	Naziv nosioca prava - adresa i mjesto	Prava	Obim prava
6176133126361	CRNA GORA -SUBJ.RASPOL.GLAVNI GRAD Podgorica	Svojina	1/1

Podaci o teretima i ograničenjima

Broj	Podbroj	Broj zgrade	PD	Redni broj	Način korišćenja	Datum upisa Vrijeme upisa	Opis prava
23	2			1	Pašnjak 3. klasc	03/07/2020 12:40	ZABILJEŽBA SPORA PO TUŽBI PREDATA KOD PRIVREDNOG SUDA P.BR. 410/2020 OD 25.06.2020 GODINE
23	7			1	Pašnjak 3. klasc	03/07/2020 12:40	ZABILJEŽBA SPORA PO TUŽBI PREDATA KOD PRIVREDNOG SUDA P.BR. 410/2020 OD 25.06.2020 GODINE
24				1	Pašnjak 5. klasc	03/07/2020 12:40	ZABILJEŽBA SPORA PO TUŽBI PREDATA KOD PRIVREDNOG SUDA P.BR. 410/2020 OD 25.06.2020 GODINE
25				1	Nekategorisani putevi	03/07/2020 12:40	ZABILJEŽBA SPORA PO TUŽBI PREDATA KOD PRIVREDNOG SUDA P.BR. 410/2020 OD 25.06.2020 GODINE

Datum i vrijeme: 03.09.2020. 08:44:23

Podaci o teretima i ograničenjima							
Broj	Podbroj	Broj zgrade	PD	Redni broj	Način korišćenja	Datum upisa Vrijeme upisa	Opis prava
27	8			1	Pašnjak 5. klase	03/07/2020 12:40	ZABILJEŽBA SPORA PO TUŽBI PREDATA KOD PRIVREDNOG SUDA P.BR. 410/2020 OD 25.06.2020 GODINE
28	2			1	Nekategorisani putevi	03/07/2020 12:40	ZABILJEŽBA SPORA PO TUŽBI PREDATA KOD PRIVREDNOG SUDA P.BR. 410/2020 OD 25.06.2020 GODINE
29	2			1	Pašnjak 5. klase	03/07/2020 12:40	ZABILJEŽBA SPORA PO TUŽBI PREDATA KOD PRIVREDNOG SUDA P.BR. 410/2020 OD 25.06.2020 GODINE

Naplata takse je oslobođena na osnovu člana 17 Zakona o administrativnim taksama ("Sl.list CG, br. 18/19). Naplata naknade oslobođena je na osnovu člana 174 Zakona o državnom premjeru i katastru nepokretnosti ("Sl. list RCG" br. 29/07, "Sl. list CG" br. 73/10, 032/11, 040/11, 043/15, 037/17 i 17/18).

Načelnik

Marko Bulatović,dipl.prav

SPISAK PODNIJETIH ZAHTJEVA NA NEPOKRETNOSTIMA

Br. parcele podbroj	Zgrada PD	Predmet	Datum i vrijeme	Podnosilac	Sadržina
23/2		101-2-954-7313/1-2020	01.07.2020 12:03	ĐUROVIĆ MAJA	ZA ZABILJEŽBU SPORA KO DAJBABE LN 334 KO BOTUN LN 456 KO CIJEVNA LN 779
23/7		101-2-954-7313/1-2020	01.07.2020 12:03	ĐUROVIĆ MAJA	ZA ZABILJEŽBU SPORA KO DAJBABE LN 334 KO BOTUN LN 456 KO CIJEVNA LN 779
24/0		101-2-954-7313/1-2020	01.07.2020 12:03	ĐUROVIĆ MAJA	ZA ZABILJEŽBU SPORA KO DAJBABE LN 334 KO BOTUN LN 456 KO CIJEVNA LN 779
25/0		101-2-954-7313/1-2020	01.07.2020 12:03	ĐUROVIĆ MAJA	ZA ZABILJEŽBU SPORA KO DAJBABE LN 334 KO BOTUN LN 456 KO CIJEVNA LN 779
27/8		101-2-954-7313/1-2020	01.07.2020 12:03	ĐUROVIĆ MAJA	ZA ZABILJEŽBU SPORA KO DAJBABE LN 334 KO BOTUN LN 456 KO CIJEVNA LN 779
28/2		101-2-954-7313/1-2020	01.07.2020 12:03	ĐUROVIĆ MAJA	ZA ZABILJEŽBU SPORA KO DAJBABE LN 334 KO BOTUN LN 456 KO CIJEVNA LN 779
29/2		101-2-954-7313/1-2020	01.07.2020 12:03	ĐUROVIĆ MAJA	ZA ZABILJEŽBU SPORA KO DAJBABE LN 334 KO BOTUN LN 456 KO CIJEVNA LN 779

176000000395
101-919-31606/2020

UPRAVA ZA NEKRETNINE

PODRUČNA JEDINICA
PODGORICA

Broj: 101-919-31606/2020
Datum: 03.09.2020.
KO: DAJBABE

Na osnovu člana 173 Zakona o državnom premjeru i katastru nepokretnosti ("Sl. list RCG" br. 29/07, "Sl. list CG" br. 73/10, 032/11, 040/11, 043/15, 037/17 i 17/18), postupajući po zahtjevu SEKRETARIJAT ZA PLANIRANJE PROSTORA I ODRZIVI RAZVOJ 03-352/20-902/1, , za potrebe izdaje se

LIST NEPOKRETNOSTI 56 - IZVOD

Podaci o parcelama

Broj	Podbroj	Broj zgrade	Plan Skica	Datum upisa	Potes ili ulica i kućni broj	Način korišćenja Osnov sticanja	Bon. klasa	Površinu m^2	Prihod
2916	2		47 86/88		STOPETINA	Nekategorisani putevi -		3	0.00
2917	2		47 86/88	15/04/2020	STOPETINA	Pašnjak 2. klase -		43	0.08
Ukupno								**46**	**0.08**

Podaci o vlasniku ili nosiocu

Matični broj - ID broj	Naziv nosioca prava - adresa i mjesto	Prava	Obim prava
6176133126361	CRNA GORA -SUBJ.RASPOL.GLAVNI GRAD Podgorica	Svojina	1/1

Ne postoje tereti i ograničenja.

Naplata takse je oslobođena na osnovu člana 17 Zakona o administrativnim taksama ("Sl.list CG, br. 18/19). Naplata naknade oslobođena je na osnovu člana 174 Zakona o državnom premjeru i katastru nepokretnosti ("Sl. list RCG" br. 29/07, "Sl. list CG" br. 73/10, 032/11, 040/11, 043/15, 037/17 i 17/18).

Načelnik

Marko Bulatović,dipl.prav

Datum i vrijeme: 03.09.2020. 08:42:02

176000000395
101-919-31604/2020

UPRAVA ZA NEKRETNINE

PODRUČNA JEDINICA
PODGORICA

Broj: 101-919-31604/2020
Datum: 03.09.2020.
KO: DAJBABE

Na osnovu člana 173 Zakona o državnom premjeru i katastru nepokretnosti ("Sl. list RCG" br. 29/07, "Sl. list CG" br. 73/10, 032/11, 040/11, 043/15, 037/17 i 17/18), postupajući po zahtjevu SEKRETARIJAT ZA PLANIRANJE PROSTORA I ODRZIVI RAZVOJ 03-352/20-902/1, , za potrebe izdaje se

LIST NEPOKRETNOSTI 3900 - IZVOD

Podaci o parcelama

Broj	Podbroj	Broj zgrade	Plan Skica	Datum upisa	Potes ili ulica i kućni broj	Način korišćenja Osnov sticanja	Bon. klasa	Površina m^2	Prihod
2914			47 86/88	02/07/2020	STOPETINA	Njiva 3. klase RAZMJENA		5823	66.96
2915			47 86/88	02/07/2020	STOPETINA	Pašnjak 2. klase RAZMJENA		3146	5.66
2916	1		47 86/88	02/07/2020	STOPETINA	Nekategorisani putevi RAZMJENA		396	0.00
2917	1		47 86/88	02/07/2020	STOPETINA	Pašnjak 2. klase RAZMJENA		3901	7.02
2918			47 86/88	02/07/2020	STOPETINA	Nekategorisani putevi RAZMJENA		1178	0.00
2919	1		47 86/88	02/07/2020	STOPETINA	Pašnjak 2. klase RAZMJENA		16655	29.98
2920			47 89/88	02/07/2020	STOPETINA	Njiva 3. klase RAZMJENA		23277	267.69
Ukupno								**54376**	**377.31**

Podaci o vlasniku ili nosiocu

Matični broj - ID broj	Naziv nosioca prava - adresa i mjesto	Prava	Obim prava
6176000200007	CRNA GORA -DR.MARKOVIĆA BR. 106 Podgorica	Svojina	1/1
2019710000000	~~CRNA GORA- SUBJEKT RASPOLAGANJA GLAVNI GRAD~~ PODGORICA Podgorica	Raspolaganje	1/1

Ne postoje tereti i ograničenja.

Naplata takse je oslobođena na osnovu člana 17 Zakona o administrativnim taksama ("Sl.list CG, br. 18/19). Naplata naknade oslobođena je na osnovu člana 174 Zakona o državnom premjeru i katastru nepokretnosti ("Sl. list RCG" br. 29/07, "Sl. list CG" br. 73/10, 032/11, 040/11, 043/15, 037/17 i 17/18).

Načelnik

Marko Bulatović,dipl.prav

Datum i vrijeme: 03.09.2020. 08:39:44

176000000395

101-919-31602/2020

UPRAVA ZA NEKRETNINE

PODRUČNA JEDINICA
PODGORICA

Broj: 101-919-31602/2020
Datum: 03.09.2020.
KO: DAJBABE

Na osnovu člana 173 Zakona o državnom premjeru i katastru nepokretnosti ("Sl. list RCG" br. 29/07, "Sl. list CG" br. 73/10, 032/11, 040/11, 043/15, 037/17 i 17/18), postupajući po zahtjevu SEKRETARIJAT ZA PLANIRANJE PROSTORA I ODRZIVI RAZVOJ 03-352/20-902/1, , za potrebe izdaje se

LIST NEPOKRETNOSTI 3897 - IZVOD

Podaci o parcelama

Broj	Podbroj	Broj zgrade	Plan Skica	Datum upisa	Potes ili ulica i kućni broj	Način korišćenja Osnov sticanja	Bon. klasa	Površina m^2	Prihod
1094	3		11 4	02/07/2020	POLJE	Pašnjak 5. klase RAZMJENA		344	0.28
1094	4		11 4	02/07/2020	POLJE	Pašnjak 5. klase RAZMJENA		256	0.20
1094	5		11 4	02/07/2020	POLJE	Pašnjak 5. klase RAZMJENA		425	0.34
1094	6		11 4	02/07/2020	POLJE	Nekategorisani putevi RAZMJENA		962	0.00
1111	2		10 3	02/07/2020	POLJE	Pašnjak 5. klase RAZMJENA		659	0.53
1111	19		10 3	02/07/2020	POLJE	Bunar RAZMJENA		24	0.00
1111	20		10 3	02/07/2020	POLJE	Pašnjak 5. klase RAZMJENA		1584	1.27
1111	45		10 3	02/07/2020	POLJE	Pašnjak 5. klase RAZMJENA		13440	10.75
1384	7		23 3	02/07/2020	POLJE	Nekategorisani putevi RAZMJENA		61	0.00
1384	9		23 3	02/07/2020	POLJE	Nekategorisani putevi RAZMJENA		35	0.00
1384	10		23 3	02/07/2020	POLJE	Nekategorisani putevi RAZMJENA		133	0.00
1390	7		10 3	02/07/2020	POLJE	Nekategorisani putevi RAZMJENA		11	0.00
Ukupno								**17934**	**13.37**

Podaci o vlasniku ili nosiocu

Matični broj - ID broj	Naziv nosioca prava - adresa i mjesto	Prava	Obim prava
6176000200007	CRNA GORA -DR.MARKOVIĆA BR. 106 Podgorica	Svojina	1/1
2019710000000	~~CRNA GORA- SUBJEKT RASPOLAGANJA GLAVNI GRAD~~ PODGORICA Podgorica	Raspolaganje	1/1

Ne postoje tereti i ograničenja.

Datum i vrijeme: 03.09.2020. 08:35:52

Naplata takse je oslobođena na osnovu člana 17 Zakona o administrativnim taksama ("Sl.list CG, br. 18/19). Naplata naknade oslobođena je na osnovu člana 174 Zakona o državnom premjeru i katastru nepokretnosti ("Sl. list RCG" br. 29/07, "Sl. list CG" br. 73/10, 032/11, 040/11, 043/15, 037/17 i 17/18).

Načelnik

Marko Bulatović,dipl.prav

176000000089
101-919-31908/2020

UPRAVA ZA NEKRETNINE

PODRUČNA JEDINICA
PODGORICA

Broj: 101-919-31908/2020
Datum: 04.09.2020.
KO: BOTUN

Na osnovu člana 173 Zakona o državnom premjeru i katastru nepokretnosti ("Sl. list RCG" br. 29/07, "Sl. list CG" br. 73/10, 032/11, 040/11, 043/15, 037/17 i 17/18), postupajući po zahtjevu , , za potrebe izdaje se

LIST NEPOKRETNOSTI 157 - IZVOD

Podaci o parcelama

Broj	Podbroj	Broj zgrade	Plan Skica	Datum upisa	Potes ili ulica i kućni broj	Način korišćenja Osnov sticanja	Bon. klasa	Površina m^2	Prihod
1078	4		1 2	20/02/2017	ĆEMOVSKO POLJE	Nekategorisani putevi -		2759	0.00
Ukupno								**2759**	**0.00**

Podaci o vlasniku ili nosiocu

Matični broj - ID broj	Naziv nosioca prava - adresa i mjesto	Prava	Obim prava
0000002019710	GLAVNI GRAD PODGORICA NJEGOŠEVA 13 Podgorica	Svojina	1/1

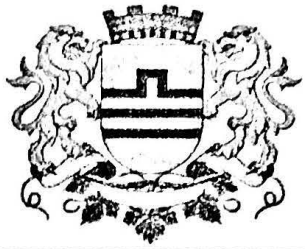
Ne postoje tereti i ograničenja.

Naplata takse je oslobođena na osnovu člana 17 Zakona o administrativnim taksama ("Sl.list CG, br. 18/19). Naplata naknade oslobođena je na osnovu člana 174 Zakona o državnom premjeru i katastru nepokretnosti ("Sl. list RCG" br. 29/07, "Sl. list CG" br. 73/10, 032/11, 040/11, 043/15, 037/17 i 17/18).

Načelnik

Marko Bulatović,dipl.prav

Datum i vrijeme: 04.09.2020. 13:07:49

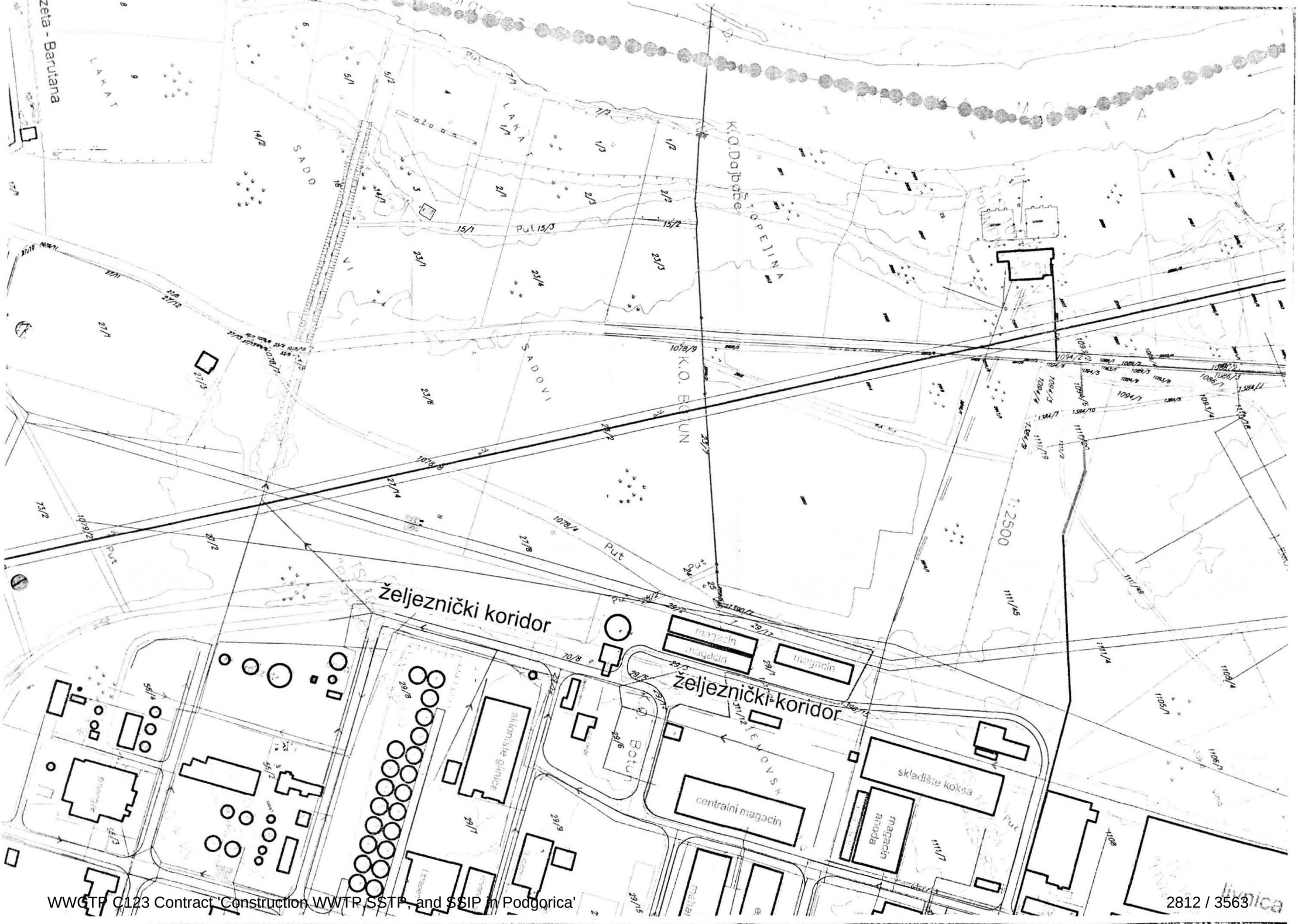
Crna Gora Glavni Grad Podgorica **Sekretarijat za planiranje prostora i održivi razvoj** Broj: 08-332/20-902 Podgorica, 10.09.2020.godine	

GRAFIČKI PRILOG –Geodetska podloga	01
Izvod iz DUP-a „Industrijska zona KAP-a " u Podgorici za urbanističke parcele UP 2F,3F,9F	


Rijeka Morača
6K5-45-22
K.O.Dajbabe
K.O. BOTUN
1:2500
Put
SADOVI
LAKAT
JEMOVSKO POLJE

Crna Gora Glavni Grad Podgorica **Sekretarijat za planiranje prostora i održivi razvoj** Broj: 08-332/20-902 Podgorica, 10.09.2020.godine	

GRAFIČKI PRILOG –Analiza stvorenih uslova	02
Izvod iz DUP-a „Industrijska zona KAP-a " u Podgorici za urbanističke parcele UP 2F,3F,9F	


Put
K.O. Dajbabe
STOPELINA
SADOVI
K.O. Botun
Put
željeznički koridor
željeznički koridor
magacin
magacin
magacin
skladište glinice
centralni magacin
skladište koksa
magacin anoda
1:2500

Crna Gora
Glavni Grad Podgorica
Sekretarijat za planiranje prostora i održivi razvoj

Broj: 08-332/20-902
Podgorica, 10.09.2020.godine

IOK

OBJEKTI KOMUNALNE INFRASTRUKTURE

GRAFIČKI PRILOG –Plan namjene površina	03
Izvod iz DUP-a „Industrijska zona KAP-a " u Podgorici za urbanističke parcele UP 2F,3F,9F	


Rijeka Mora
UP ZF1
UP 15F
UP 14F
UP 13F
UP 11E
UP 12F
UP 10F
UP 9F
UP 8F
UP 7F
UP 6F
UP 5F
UP ZF2
UP 1F
UP VPŠ
UP ZG1
UP 1G
UP ZF4
UP ZF3
UP ZG2
UP 2G
TS-KAP12
TS-N1
TS-KAP19
TS-N9
UP 52A
UP 4F
UP 3F
UP 2F
F
UP 50A
UP 41A
UP 40A
UP 25A

Crna Gora
Glavni Grad Podgorica
Sekretarijat za planiranje prostora i održivi razvoj

Broj: 08-332/20-902
Podgorica, 10.09.2020.godine

GRAFIČKI PRILOG –Plan parcelacije	04
Izvod iz DUP-a „Industrijska zona KAP-a " u Podgorici za urbanističke parcele UP 2F,3F,9F	

1055	6600598.48	4695138.59
1056	6600606.08	4695133.18
1057	6600572.70	4695047.92
1058	6600584.20	4695082.60
1059	6600601.98	4695125.14
1060	6600477.34	4695247.09
1061	6600424.97	4695168.91
1062	6600467.39	4695134.17
17	6600476.69	4695247.59
18	6600471.07	4695241.20
19	6600442.52	4695198.34
350	6600736.07	4694960.02
351	6600812.78	4695054.27
352	6600837.76	4695034.28
353	6600744.64	4694426.54
354	6600764.58	4694472.67
355	6600474.42	4694846.61
356	6600453.78	4694831.13
357	6600424.24	4694804.83
358	6600373.42	4694751.26
359	6600374.31	4694735.97
360	6600466.89	4694658.61
361	6600559.47	4694581.26
362	6600652.06	4694503.90
363	6600731.54	4694503.20
364	6600832.09	4695028.65
365	6600753.28	4694939.69
366	6600708.59	4694872.82
367	6600680.42	4694784.96
368	6600856.87	4695018.98
369	6600594.55	4695081.99
370	6600593.70	4695079.45
371	6600542.72	4694925.73
372	6600609.85	4695140.57
373	6600645.53	4695210.55
374	6600603.60	4695145.76
375	6600527.61	4695208.92
376	6600552.78	4695247.29
377	6600569.99	4695239.13
378	6600953.14	4695226.70
379	6600956.11	4695233.55
380	6600871.58	4695127.24
381	6600872.05	4695127.08
382	6600809.36	4695509.84
383	6600757.86	4695408.84
384	6600706.36	4695307.84
385	6600654.86	4695206.84
386	6600618.81	4695136.13
387	6600610.89	4695120.60
388	6600684.81	4695195.05
389	6600859.41	4695131.41
390	6600709.37	4695400.44
391	6600733.67	4695383.41
392	6600732.34	4695446.03
393	6600777.29	4695468.97
394	6600738.72	4695483.67
395	6600780.31	4695474.88
396	6600670.71	4695427.10
397	6600662.80	4695432.51
398	6600631.93	4695453.64
399	6600630.53	4695454.87
400	6600609.62	4695447.16


Rijeka Morača
UP ZF1
UP 15F
UP 14F
UP 13F
UP 11F
UP 12F
UP 10F
UP 9F
UP 8F
UP 7F
UP 6F
UP 5F
UP ZF2
UP ZF3
UP ZF4
UP 1F
UP 1G
UP VPŠ
UP ZG1
UP ZG2
UP 2G
UP TS-KAP12
UP 2F
UP TS-N1
UP 3F
UP 4F
UP TS-N9
UP TS-KAP16
UP 52A
UP 51A
UP 50A
UP 41A
UP 40A
UP 33A
UP 25A
F

Crna Gora Glavni Grad Podgorica **Sekretarijat za planiranje prostora i održivi razvoj** Broj: 08-332/20-902 Podgorica, 10.09.2020.godine	

GRAFIČKI PRILOG –Plan regulacije i nivelacije	05
Izvod iz DUP-a „Industrijska zona KAP-a " u Podgorici za urbanističke parcele UP 2F,3F,9F	

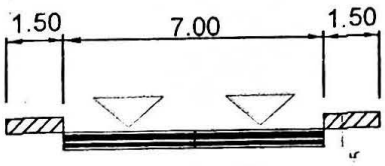
834	6600681.27	4695185.70
835	6600659.65	4695194.21
836	6600627.72	4695131.59
837	6600619.80	4695116.05
838	6600606.26	4695085.10
839	6600734.80	4694974.31
840	6600855.25	4695122.28
841	6600521.39	4695201.09
842	6600479.75	4695232.71
843	6600438.34	4695170.89
844	6600481.01	4695135.94
845	6600567.79	4695064.87
846	6600574.71	4695085.75
847	6600593.07	4695129.68
848	6600597.31	4695137.99
1317	6600812.51	4695494.00
1318	6600668.78	4695212.11
1319	6600688.35	4695204.40
1320	6600862.74	4695140.84
1321	6600868.70	4695138.80
1322	6600948.39	4695239.91
1323	6601015.08	4695320.85


Rijeka Mora
Put
UP ZF1
UP 15F
UP 14F
UP 13F
UP 11E
UP 12F
UP 10E
UP 9F
UP 8F
UP 7F
UP 6F
UP 5F
UP ZF2
UP 1F
UP ZF3
UP ZF4
UP VPŠ
UP ZG1
UP 1G
UP ZG2
UP 2G
UP TS-KAP12
UP TS-KAP16
UP TS-N9
TS-N1
UP 4F
UP 3F BOTUN
UP 2F
UP 52A
UP 54A
UP 50A
UP 41A
UP 40A
UP 33A
UP 25A
F
1:2500

Crna Gora
Glavni Grad Podgorica
Sekretarijat za planiranje prostora i održivi razvoj

Broj: 08-332/20-902
Podgorica, 10.09.2020.godine

presjek 2-2

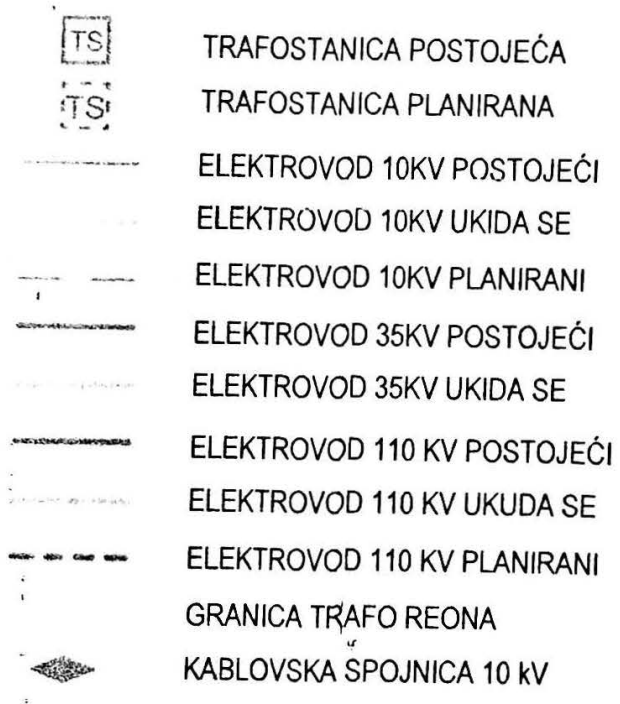


GRAFIČKI PRILOG –Plan saobraćajne infrastrukture	06
Izvod iz DUP-a „Industrijska zona KAP-a " u Podgorici za urbanističke parcele UP 2F,3F,9F	


K.O.Dowi Kokoti
Rijeka Mora
Put
UP ZF1
UP 16F
UP 15F
UP 17F
UP 14F
UP 13F
UP 11E
UP 12F
UP 10F
UP 9F
UP 8F
UP 7F
UP 6F
UP 5F
UP ZF2
UP 1F
UP ZF4
UP ZF3
UP ZD1
UP 53A
UP TS-KAP16
UP 52A
UP TS-N9
UP TS-N1
UP 4F
UP 3F BOTUN
UP 2F
UP 51A
UP 50A
UP 41A
F
1:2500

Crna Gora Glavni Grad Podgorica **Sekretarijat za planiranje prostora i održivi razvoj** Broj: 08-332/20-902 Podgorica, 10.09.2020.godine	

ELEKTROENERGETSKA INFRASTRUKTURA



GRAFIČKI PRILOG –Plan elektroenergetske infrastrukture	07
Izvod iz DUP-a „Industrijska zona KAP-a " u Podgorici za urbanističke parcele UP 2F,3F,9F	


Pijeka Morača
KUP-ZF1
TS 35/10 kV "Gornja Barutana"
UP 16F
UP 15F
UP 17F
UP 14F
UP 13F
UP 11E
UP 12F
UP 10F
UP 9F
TS 10/0,4kV "N1" 2x630kVA
UP 8F
UP 7F
UP 6F
UP 5F
UP ZF2
UP VPŠ
"Pumpna stanica"
TS 10/0,4kV
UP 1F
UP ZF3
UP ZF4
UP 1G
TS-KAP12
UP 2F
TS 10/0,4kV 2x1000kVA
"Kompresorna"
"Anode"
"Kovačnica"
TS-N1
UP 3F
BOTUN
UP 4F
TS-N9
UP 52A
TS-KAP16
TS 10/0,4kV 1x1000kVA
UP 53A
UP 54A
UP 50A
UP 41A
UP 40A
UP 33A
UP 49A
F
1:2500

Crna Gora Glavni Grad Podgorica **Sekretarijat za planiranje prostora i održivi razvoj** Broj: 08-332/20-902 Podgorica, 10.09.2020.godine	

HIDROTEHNIČKA INFRASTRUKTURA

- VODOVOD
- PLANIRANI VODOVOD
- UKIDANJE VODOVODA
- POSTOJEĆA FEKALNA KANALIZACIJA
- PLANIRANA FEKALNA KANALIZACIJA
- POSTOJEĆA ATMOSFERSKA KANALIZACIJA
- PLANIRANA ATMOSFERSKA KANALIZACIJA
- POSTOJEĆI VODOVOD TEHNOLOŠKE VODE- UKIDA SE CJELOKUPNI SISTEM
- BUNAR
- MJESTO PRIKLJUČENJA POSTOJEĆE NA PLANIRANU INFRASTRUKTURU
- MJESTO PRIKLJUČENJA POSTOJEĆE NA PLANIRANU INFRASTRUKTURU
- MJESTO PRIKLJUČENJA POSTOJEĆE NA PLANIRANU INFRASTRUKTURU

GRAFIČKI PRILOG –Plan hidrotehničke infrastrukture	08
Izvod iz DUP-a „Industrijska zona KAP-a " u Podgorici za urbanističke parcele UP 2F,3F,9F	


K.O. Donji Kokoti
Rijeka Morača
UP VPŠ
UP ZF1
SEPARATOR ULJA I MASTI
UP 15F
UP 11E
UP ZF2
UP 5F
UP 1F
UP 1G
UP ZF4
UP ZF3
UP 6F
UP 7F
UP 8F
UP 9F
UP 10F
UP 12F
UP 14F
UP 13F
DN110
DN250
DN900
DN1400
TS-KAP12
K24
UP 2F
UP 3F
BOTUN
UP 4F
UP 53A
EK23
TS-KAP16
UP 52A
UP 51A
UP 50A
UP 41A
UP 33
PRODAJA
na uređaju za prečišćavanje
F

Crna Gora Glavni Grad Podgorica **Sekretarijat za planiranje prostora i održivi razvoj** Broj: 08-332/20-902 Podgorica, 10.09.2020.godine	

ELEKTRONSKA KOMUNIKACIJA

	POSTOJEĆI TELEKOMUNIKACIONI ČVOR
	POSTOJEĆE TELEKOMUNIKACIONO OKNO
	POSTOJEĆA TELEKOMUNIKACIONA KANALIZACIJA
	PLANIRANO TELEKOMUNIKACIONO OKNO
	PLANIRANA TELEKOMUNIKACIONA KANALIZACIJA
2,3,4 x PVC	BROJ PVC CIJEVI 110MM U PLANIRANOJ TELEKOMUNIKACIONOJ KANALIZACIJI
1,2,...,317	BROJ PLANIRANOG TELEKOMUNIKACIONOG OKNA

GRAFIČKI PRILOG –Plan telekomunikacione infrastrukture	09
Izvod iz DUP-a „Industrijska zona KAP-a " u Podgorici za urbanističke parcele UP 2F,3F,9F	


K.O.Dowi Kokoti
Rijeka Mora
Put
UP ZF1
UP 16F
UP 15F
UP 17F
UP 14F
UP 13F
UP 11F
UP 12F
UP 10F
UP 9F
UP 8F
UP 7F
UP 6F
UP 5F
UP ZF2
UP 1F
UP ZF4
UP ZF3
UP 1G
UP 2F
UP TS-KAP12
UP TS-N1
UP 3F
UP 4F
UP ZD1
UP 53A
UP TS-KAP16
UP TS-N9
UP 52A
UP 54A
UP 50A
UP 41A
1:2500

Crna Gora Glavni Grad Podgorica **Sekretarijat za planiranje prostora i održivi razvoj** Broj: 08-332/20-902 Podgorica, 10.09.2020.godine	

GRAFIČKI PRILOG –Pejzažna arhitektura	10
Izvod iz DUP-a „Industrujska zona KAP-a “ u Podgorici za urbanističke parcele UP 2F,3F,9F	


Rijeka Mora
UP ZF1
UP 15F
UP 14F
UP 13F
UP 11E
UP 12F
UP 10F
UP 9F
UP 8F
UP 7F
UP 6F
UP 5F
UP ZF2
UP 1F
UP ZF4
UP 1G
UP VPŠ
UP ZF3
UP TS-KAP12
UP 2F
UP 3F BOTUN
UP 4F
UP TS-N1
UP TS-N9
UP TS-KAP16
UP 53A
UP 52A
UP 51A
UP 50A
UP 41A
UP 40
UP 33

3000-454 /2020

CRNA GORA
GLAVNI GRAD PODGORICA
SEKRETARIJAT ZA SAOBRAĆAJ

Vasa Raičkovića bb, 81000 Podgorica, Crna Gora
tel: +382 20 235-185, 235-188, 675-654
email: saobracaj@podgorica.me
www.podgorica.me

Minić

DRUŠTVO SA OGRANIČENOM ODGOVORNOŠĆU
"VODOVOD I KANALIZACIJA" Podgorica

Primljeno: 06. 10. 2020				
Org. jed.	Klas. znak	Redni broj	Prilog	Vrijednost
113	upt-041	20-5838		

Broj: D 11-341/20-1145
Podgorica, 30.09.2020.godine

12471

"VODOVOD I KANALIZACIJA", D.O.O. PODGORICA

P o d g o r i c a
069 816-653

Zahtjevom br. D 11-341/20 –1145 od 24.09.2020. godine obratili ste se vezano za izdavanje UTU -a priključenja na saobraćajnu infrastrukturu za izradu tehničke dokumentacije za postrojenje za prečišćavanje otpadnih voda, postrojenje za tretman kanalizacionog mulja i postrojenje za spaljivanje kanalizacionog mulja na urb. parcelama broj 2 F, 3 F i 9 F u zahvatu DUP -a "Industrijska zona KAP -a" u Podgorici.

Dostavljeni nacrt UTU -a potrebno je dopuniti sljedećim:

Postrojenje za prečišćavanje otpadnih voda, postrojenje za tretman kanalizacionog mulja i postrojenje za spaljivanje kanalizacionog mulja na urb. parcelama broj 2 F, 3 F i 9 F obuhvaćeno je DUP -om "Industrijska zona KAP -a" u Podgorici, u kojem je prikazana kontaktna sekundarna saobraćajna mreža preko koje je moguće ostvariti saobraćajni pristup ka gore navedenim urb. parcelama.

S tim u vezi, prilikom izrade projektne dokumentacije, sagledati mogućnost prilaznog puta sa postojeće javne saobraćajnice koju je potrebno prikazati u projektu do planiranih objekata, te namjenu saobraćajnih površina na priključku na javnu saobraćajnicu sekundarne mreže regulisati saobraćajnom signalizacijom.

Prilikom izrade projekta i tokom izvođenja radova uzeti u obzir postojeću regulaciju na kontaktnim saobraćajnicama kako bi se saobraćaj odvijao na bezbjedan način.

Saobraćajnu signalizaciju projektovati u skladu sa propisima i standardima koji važe u ovoj oblasti i u skladu sa Pravilnikom o saobraćajnoj signalizaciji (» Sl.list CG«, broj 32/14).

Rukovodilac Odjeljenja za saobraćaj i puteve:
Fahret Maljević dipl.inž.saob.

SEKRETARKA,
Lazarela Kalezić

Dostavljeno:
- podnosiocu zahtjeva
- a/a

2 0 2 0 0 2 4 3 9 0

2409 - 1651/2020

22073/1

DRUŠTVO SA OGRANIČENOM ODGOVORNOŠĆU
"VODOVOD I KANALIZACIJA" Podgorica

Primljeno: 08. 10. 2020				
Org. jed.	Klas. znak	Redni broj	Prilog	Vrijednost
		23242		

CRNA GORA
AGENCIJA ZA CIVILNO VAZDUHOPLOVSTVO

Broj: 02/1-348/20-1524/3
Podgorica, 05.10.2020. godine

VODOVOD I KANALIZACIJA d.o.o. Podgorica
Gospodin Filip Makrid, izvršni direktor

Predmet: **Posebni urbanističko-tehnički uslovi za izgradnju objekta na parcelama UP2F, UP3F i UP9F u zahvatu DUP-a Industrijska zona KAP-a**

Veza: **Vaš dopis broj 22073 od 24.09.2020. godine**

2 0 2 0 2 4 5 7 1

Poštovani gospodine Makrid,

U vezi sa Vašim dopisom broj 02/1-348/20-1524/1 od 24.09.2020. godine po pitanju izdavanja urbanističko-tehničkih uslova za potrebe izgradnje objekta na lokaciji urbanističkih parcela UP2F, UP3F i UP9F, u zahvatu Detaljnog urbanističkog plana „Industrijska zona KAP-a", obavještavamo Vas da za navedenu lokaciju važe posebni uslovi navedeni u pomenutom planskom dokumentu a koji su obavezujući za objekte u zonama kontrole postavljanja/izgradnje vazduhoplovnih prepreka za Aerodrom Podgorica:

1. Maksimalna granična vrijednost nadmorske visine najviše tačke planiranog objekta na UP2F, UP3F i UP9F ne smije iznositi više od 80 m nadmorske visine;
2. Nije dozvoljeno postavljanje solarnih panela na krovu ili pomoćnim djelovima objekta bez prethodne saglasnosti Agencije za civilno vazduhoplovstvo na prateću tehničku dokumentaciju uz specifikacije samih panela.
3. Vrsta, namjena i struktura objekta ne smiju prouzrokovati negativan uticaj na biljni i životinjski svijet odnosno objekat ne smije biti takav da se zbog njegove izgradnje ili funkcije povećava prisustvo ili kretanje ptica.

S poštovanjem,

Pomoćnik direktora
Renato Brkanović

Dostavljeno:

- Naslovu;
- a/a.

AGENCIJA ZA CIVILNO VAZDUHOPLOVSTVO
Joka Broza Tita bb
81000 Podgorica, Crna Gora
www.cazu.me

Društvo sa ograničenom odgovornošću
"Crnogorski elektrodistributivni sistem"
Ulica Ivana Milutinovića br. 12
tel: +382 20 408 400
fax: +382 20 408 413
www.cedis.me
Br. 30-20 - 8075
U Podgorici 01.12. 2020. godine

Na osnovu člana 74 Zakona o planiranju prostora i izgradnji objekata („Sl. list CG", br. 64/17, 44/18, 63/18 i 11/19), čl. 175, 177 i 179 Zakona o energetici („Sl. list CG", br. 5/16 i 51/17), člana 102 Pravila za funkcionisanje distributivnog sistema električne energije i čl. 6, 9 i 12 Pravila mjerenja električne energije u distributivnom sistemu („Sl.list CG" br. 7/2017), Ovlašćenja broj 10-10-21384 od 29.05.2020. godine, rješavajući po zahtjevu **„Vodovod i kanalizacija" d.o.o. Podgorica** broj **10-10-43913 od 20.10.2020. godine** i dopuni zahtjeva broj **30-20-02-11465 od 12.11.2020.godine,** za izdavanje uslova za izradu tehničke dokumentacije za priključenje sistema za prečišćavanje otpadnih voda u Podgorici i elektrana na biogas u okviru istog, izdaju se:

Uslovi za izradu tehničke dokumentacije za priključenje na distributivni sistem

Usvaja se zahtjev **„Vodovod i kanalizacija" d.o.o Podgorica** broj **10-10-43913 od 20.10.2020. godine** i dopuna zahtjeva broj **30-20-02-11465 od 12.11.2020.godine** i izdaju uslovi za izradu teničke dokumentacije za priključenje na distributivni sistem **sistema za prečišćavanje otpadnih voda u Podgorici i elektrana na biogas u okviru istog, na UP 2F, UP 3F i UP 9F, u zahvatu DUP-a „Industrijska zona KAP-a",** pod sljedećim elektroenergetskim, tehničkim i ostalim uslovima:

I. Za sistem za prečišćavanje otpadnih voda, koji uključuje postrojenje za prečiščavanje otpadnih voda, postrojenje za tretman kanalizacionog mulja i postrojenje za spaljivanje kanalizacionog mulja:

- Planirana jednovremena snaga: **2028kW + 378kW**
- Mjesto priključenja: **buduća TS 10/0,4kV 2 x (2500kVA+1000kVA), za koju je Investitor dužan pribaviti odobrenje nadležnog organa.**
- Drugi bitni uslovi za izradu tehničke dokumentacije:

Kako je izgradnja predmetnog objekta planirana na UP 2F i UP 3F , u zahvatu DUP-a „Industrijska zona KAP-a", i ista se nalazi u zoni dalekovoda DV 35kV „Zagorič – Gornja Zeta", neophodno je uraditi Elaborat o mogućnosti izgradnje objekta u zoni dalekovoda u skladu sa Pravilnikom o tehničkim normativima za izgradnju nadzemnih elektroenergetskih vodova nazivnog napona od 1kV do 400kV ("Sl. list SRJ" br.18/92). Eventualno izmještanje podzemnih i nadzemnih vodova pada na teret Investitora.
Izrada projektne dokumentacije i pribavljanje potrebnih odobrenja za izmiještanje elektroenergetskih vodova su tema posebnog postupka.

Elektroenergetske instalacije objekta projektovati odnosno izvesti prema:
- Pravilniku o tehničkim normativama za elektroinstalacije niskog napona ("Sl. list SFRJ" br.53/88,54/88)
- Pravilniku o izmjenama i dopunama pravilnika o tehničkim normativima za električneinstalacije niskog napona ("Sl. list SRJ" br.28/95)
- Pravilniku o tehničkim normativama za zaštitu objekta od atmosferskog pražnjenja („ Sl. List SRJ ", broj 11/96)
- kao i svim drugim važećim pravilnicima i standardima za ovu vrstu objekata

Pri izradi projekta poštovati tehniče preporuke CEDIS-a:
- Tehnička preporuka za priključenje potrošača na niskonaponsku mrežu TP-2 (dopunjeno izdanje)
- Tehnička preporuka – Tipizacija mjernih mjesta

Priključak postrojenja za rezervno napajanje naponom industrijske frekvencije (dizelelektrični agregat i slično) mora da bude izveden tako da nije moguć paralelan rad postrojenja rezervnog napajanja sa NN, SN mrežom i elektranom, niti povratno napajanje NN odnosno SN mreže i instalacija elektrane iz agregata, nezavisno od načina prebacivanja sa mrežnog na rezervno napajanje. Ovo se odnosi kako na fazne provodnike, tako i na neutralni provodnik.

II. Za buduću TS 10/0,4kV 2 x (2500kVA+100kVA):

Za buduću TS 10/0,4kV 2500+100kVA, definišu se uslovi za izradu tehničke dokumentacije:
- projektovati predmetni objekat u skladu sa projektnim zadatkom, dostavljenim od strane Investitora, kao i Odobrenjem nadležnog organa za izgradnju istog;
- uklapanje predmetne trafostanice u 10kV distributivnu mrežu predvidjeti povezivanjem sa TS 110/10kV „Podgorica 5" sa jedne strane i TS 35/10kV „Gornja Zeta" sa druge strane, kablovskim vodovima 3 x (XHE 49-A 1x240/25mm2), 12/20kV, trasom odobrenom od nadležnog organa.
- Glavnim projektom predvidjeti SN blok sa: tri ili više vodnih (kablovskih) ćelija, četiri transformatorske i jednom mjernom ćelijom;

III. Za elektrane na biogas:

1. Osnovni podaci o elektranama
- Tip objekta: **postrojenje za kogeneraciju**
- Namjena objekta: **proizvodnja električne i toplotne energije**

- Korišćena primarna energija: **biogas**

2. **Elektroenergetski uslovi**
   - Instalisana snaga: **2x400 kVA**
   - Naponski nivo sistema na koji se elektrana priključuje: **0.4 kV**
   - Pojedinačna snaga generatora u elektranama: **400 kVA**
   - Nazivni napon generatora: **0.4 kV**
   - Faktor snage elektrane (**cosϕ = 0,95)**
   - Način rada elektrane: paralelan rad sa mrežom Operatora distributivnog sistema

3.Način priključenja male elektrane na distributivni sistem:
   - Napon i vrsta priključka: **0.4 kV, trofazni**
   - Priključni vod: **NN kablovski vodovi odgovarajućeg tipa i presjeka**
   - Mjesto priključenja na sistem Operatora distributivnog sistema: **10 kV vodna ćelija prema napojnoj trafostanici**
   - Mjesto priključenja male elektrane (tačka povezivanja elektrane i sistema – spojno/kontaktno mjesto): **glavna niskonaponska distributivna tabla (MLDB).**

Tehnički zahtjevi za vrstu i karakteristike rasklopne opreme rastavnog i spojnog mjesta:
NN odjeljak u kom se priključuju elektrane mora biti opremljen:
- tropolnom rastavnom osigurač-sklopkom prema mreži,
- poluindirektnim, niskonaponskim, trofaznim, dvosmjernim brojilom,
- četvoropolnim prekidačem prema elektrani (630 A),
- mikroprocesorskim zaštitnim uređajem, sa mogućnošću daljinskog upravljanja.

Djelovanje prekidača za odvajanje na mjestu priključenja elektrane, koji mora biti opremljen zaštitnom jedinicom, u slučaju kvara mora da obezbijedi automatsko odvajanje elektrane i prestanak injektiranja energije. Pored automatske funkcije uključenja/isključenja rastavni element mora da ima i mogućnost manuelnog uključenja i isključenja. Status rastavnog elementa uključen/isključen, mora biti jasno vidljiv i dostupan osoblju CEDIS-a. Upravljanje ovim prekidačem je u isključivoj nadležnosti Operatora distributivnog sistema.

3.1. Transformator SN/NN kojim se mala elektrana priključuje na SN sistem:
- Prenosni odnos transformatora: **10/0.4 kV**
- Nazivna snaga transformatora: **2500 kVA**

3.2. Tehnički zahtjevi za izbor, način djelovanja i opsege podešavanja zaštitnih uređaja male elektrane i priključnog voda:

Ovim uslovima određuje se zaštita elektrane, elemenata rasklopne aparture i priključnog voda, od mogućih havarija i oštećenja usled kvarova i poremećaja u distributivnom sistemu. Zaštita od unutrašnjih kvarova nije predmet ovih uslova.

Zaštitni uređaji:

Za zaštitu generatora, te elemenata rasklopne aparature e elektrane i priključnog voda, od mogućih havarija i oštećenja usled kvarova i poremećaja u distributivnoj mreži primjenjuju se:
- sistemska zaštita i
- zaštita priključnog voda.

Sistemska zaštita sastoji se od: naponske i frekfentne zaštite, a zaštita priključnog voda, koja se ugrađuje na strani elektrane, sastoji se od: prekostrujne zaštite, kratkospojne zaštite, zemljospojne zaštite.
Djelovanjem zaštite mora se na spojnom prekidaču automatski prekinuti paralelan rad elektrane sa distributivnim sistemom.

Za paralelan rad elektrane sa distributivnim sistemom predvidjeti sljedeću zaštitu:
- zaštitu koja osigurava uslove za paralelan rad elektrane sa distributivnim sistemom (pod/prenaponska, pod/nadfrekventna, zaštita od ostrvskog rada),
- zaštitu od smetnji i kvarova u elektrani i
- zaštitu od kvarova i smetnji u mreži.

Opsezi podešenja zaštita:

podfrekventna f<(49.5)Hz,60 sec. f<<(49)Hz, 3 sec. f<<<(48.5),0.2sec.	**podnaponska** U<(1,0-0,9)Un 30 sec. U<<(1,0-0.85) Un 0.25 sec.	**(usmjerena) prekostrujna** I> In=5A (3-9)A (0,2-3)sec **kratkospojna** I>>(20-50)A (0,2-3)
nadfrekventna f>(51)Hz 3 sec.	**prenaponska** U>(0,9-1,1)Un 30 sec. U>>(0,9-1.13)Un 0.1 sec.	**Cosφ≥0,95-1**

a) Ugradnjom odgovarajućih zaštitnih i drugih tehničkih uređaja u objektu elektrane, treba obezbijediti da se priključenje elektrane na distributivni sistem na spojnom prekidaču može izvršiti samo ako je na svim faznim provodnicima prisutan napon sa strane distributivnog sistema.

b) **Nije dozvoljeno ostrvsko napajanje dijela distributivnog sistema iz elektrane. Potrebno je osigurati da nestankom mrežnog napona elektrana izlazi iz paralelnog pogona sa mrežom, djelovanjem zaštite od ostrvskog rada (LoM).**

c) **Obzirom da se radi o sistemu, koji pored mrežnog napajanja i elektrane (oba izvora rade paralelno) ima i rezervno napajanje (dizel električni agregat), ni u kom slučaju, ne smije se dozvoliti istovremeni rad agregata, elektrane i mreže. Prilikom nestanka mrežnog napajanja, elektrana se mora automatski isključiti.**

d) Zabranjeno je uključenje elektrane na distributivni sistem bez sinhronizacije. Za sinhronizaciju generatora na distributivni sistem koristi se generatorski prekidač.

e) U slučaju nestanka pomoćnog napona za napajanje zaštitnih uređaja i strujnih krugova komandi rasklopnih aparata u elektrani, treba predvidjeti automatsko isključenje elektrane.

f) Sva zaštitna oprema mora da radi nezavisno od rada sistema upravljanja, nadzora i komunikacije u okviru elektrane.

g) U elektrani je potrebno predvidjeti zaštitu od unutrašnjih kvarova koja de u slučaju njihove pojave odvojiti elektranu od distributivnog sistema u cilju selektivnosti zaštite srednjenaponskih izvoda i očuvanja kontinualnog rada ostalih korisnika distributivnog sistema u slučaju kvara u elektrani.

h) Pored standardnih blokada pogrešnog rada u postrojenju obezbijediti isključenje visokonaponskog prekidača transformatora na koji je priključen generator, u slučaju ispada prekidača dovoda (sistema).

i) Pomoćni napon u srednjenaponskom postrojenju treba da je u principu 110 V DC. Kapacitet baterije proračunati sa najmanjom autonomijom od 6 sati nakon nestanka napajanja 3x400 V, 50 Hz.

j) Zaštitni releji trebaju biti mikroprocesorski sa mogućnošću programiranja dodatnih funkcija (podnaponska i usmjerena zaštita reaktivne snage i sl.).

k) Zaštitni relej sa opcijama sistemskih zaštita u principu treba biti ugrađen na mjestu priključenja generatora. Izuzetno ova zaštita može biti ugrađena u dovodnoj ćeliji sa djelovanjem samo na isključenje transformatora. Relej mora imati mogućnost oscilografskog snimanja radi kasnije analize kvarova.

l) Funkcije zaštite se ne smiju kombinovati sa upravljačkim funkcijama (osim izuzetno za potrebe signalizacije).

m) Klimatski uslovi u prostoriji niskonaponskog/srednjenaponskog postrojenja moraju biti prilagođeni relejnoj opremi (najdešće -5 do +50°C).

n) Provjeriti postojanje opcije brzog tropolnog APU u napojnoj TS distributivnog i prenosnog sistema i zbog sigurnosti rada generatora male elektrane tražiti njegovo isključenje iz aktivnih opcija releja.

o) Zaštite generatora i druge pripadajuće zaštite elektrane su predmet odgovornosti Investitora i stručnih lica koje on angažuje.

p) **Obaveza investitora je da uradi Elaborat o podešenju relejne zaštite i dostavi CEDIS-u na saglasnost. Sva ispitivanja relejne zaštite male elektrane vrše se uz obavezno prisustvo ovlaštenog inženjera za relejnu zaštitu CEDIS-a, prema predhodno i usaglašenom Elaboratu o podešenju relejne zaštite.**

q) **Obaveza investitora je da pripremi program ispitivanja u probnom radu, usaglašen sa CEDIS-om. Program ispitivanja i mjerenja u probnom radu, mora obuhvatati simulaciju i provjeru stavki navedenih u čl. 109 stav 3 Pravila za funkcionisanje distributivnog sistema električne energije**

r) Mjerni transformatori moraju ispunjavati norme: MEST IEC 60044-1 i MEST IEC 60044-2. Strujni mjerni transformatori: naznačena struja primarnog namotaja bira se prema snazi elektrane, naznačena struja sekundarnih namotaja je 5A.

3.3. Mjerenje primljene/ predate električne energije

Lokacija i nazivni napon obračunskog mjernog mjesta: **10 kV mjerna ćelija (MVDB WWTP)**

Sadržaj opreme mjernog mjesta:

- multifunkcionalno brojilo dvosmjerno (smjer preuzete i smjer predate energije), sa integrisanim uređajem za upravljanje tarifama, za indirektno mjerenje snage, aktivne i reaktivne energije i registracijom krive snage;
- naponski mjerni transformatori u sve tri faze (jednopolno izolovani);
- strujni mjerni transformatori u sve tri faze;
- uređaj za prikupljanja podataka putem sistema za daljinsko prikupljanje mjernih podataka i
- ostali pomoćni uređaji za daljinsko prikupljanje mjernih podataka (komunikaciona oprema).

Elementi mjerne grupe i njihove tehničke karakteristike:

	Aktivna energija	Reaktivna energija	Snaga
Nazivna struja i klasa tačnosti mjerne garniture za mjerenje električne energije koju mala elektrana predaje u sistem	I_n = 5 A	I_n = 5 A	In = 5 A
	Kl. 1	Kl. 2	Kl. 1
Nazivna struja i klasa tačnosti mjerne garniture za mjerenje električne energije koju mala elektrana preuzima iz sistema	I_n = 5 A	I_n = 5 A	In = 5 A
	Kl. 1	Kl. 2	Kl. 1

Posebni zahtjevi za brojila, upravljačke uređaje i mjerne transformatore:

Mjerni transformatori	Klasa tačnosti
Strujni mjerni transformatori MEST IEC (60044-1)	Kl. 0,5 Fs ≤ 5;
Naponski mjerni transformatori MEST IEC (60044-2)	Kl. 0,5;

Pogonsko mjerenje u maloj elektranama:

Lokacija i nazivni napon obračunskog mjernog mjesta: **glavna niskonaponska distributivna tabla (MLDB), mjerenje na 0,4 kV**

Sadržaj opreme mjernog mjesta:

- multifunkcionalno brojilo dvosmjerno (smjer preuzete i smjer predate energije), sa integrisanim uređajem za upravljanje tarifama, za poluindirektno mjerenje snage, aktivne i reaktivne energije i registracijom krive snage;
- strujni mjerni transformatori u sve tri faze;
- uređaj za prikupljanja podataka putem sistema za daljinsko prikupljanje mjernih podataka i
- ostali pomoćni uređaji za daljinsko prikupljanje mjernih podataka (komunikaciona oprema).

Elementi mjerne grupe i njihove tehničke karakteristike:

	Aktivna energija	Reaktivna energija	Snaga
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	Kl. 1	Kl. 2	Kl. 1
Nazivna struja i klasa tačnosti mjerne garniture za mjerenje električne energije koju mala elektrana preuzima iz sistema	I_n = 5 A	I_n = 5 A	In = 5 A
	Kl. 1	Kl. 2	Kl. 1

Posebni zahtjevi za brojila, upravljačke uređaje i mjerne transformatore:

Mjerni transformatori	Prenosni odnos	Klasa tačnosti
Strujni mjerni transformatori MEST IEC (60044-1)	600/5/5A	Kl. 0,5 Fs ≤ 5;

a. Snaga postrojenja za kompenzaciju reaktivne snage: 120 kVAr

- Faktor snage u odnosu na elektrodistributivni sistem mora da iznosi: **cos ϕ ≥ 0,95**
- Naponski nivo kompenzacije (kV): **0.4 kV**
- Način regulacije faktora snage: **automatski**

b. Kvalitet električne energije:

- Dozvoljeno odstupanje napona od nazivnog napona u tački priključenja na sistem:
  - pri normalnim pogonskim uslovima (u stacionarnom režimu): **± 5 %**
  - u prelaznom režimu (isključenje/ uključenje generatora**): ± 3 %**
  - učestanost prelaznih pojava: < 1 u tri minuta
- Dozvoljena promjena napona (%): **± 5**
- Dozvoljeno odstupanje frekvence: **± 0,2 Hz**
- Zahtjev za oblikom naponske krive na mjestu priključenja na sistem: **sinusni oblik**

Mjerenja i signali koji se prenose Operatoru distributivnog sistema u realnom vremenu:

☒ aktivna i reaktivna snaga elektrane,
☒ napon na mjestu priključenja elektrane,
☒ uklopno stanje sklopnih aparata na mjestu priključenja male elektrane, komande uključenja i isključenja prekidača distributivnih vodova,
☒ signali djelovanja zaštitnih uređaja na mjestu priključenja elektrane i kvara pomoćnog napajanja.
☐ ostalo

Šef Službe za pristup mreži Regiona 2
Vladimir Babić,dipl.el.ing.
.....

Šef Službe za nestandardne priključke
i distribuirane izvore,
Gorjana Ćeranić,dipl.el. ing.
.....

Rukovodilac Sektora za pristup mreži ,
Ranko Vuković,dipl.el.ing.
.....

Dostavljeno:

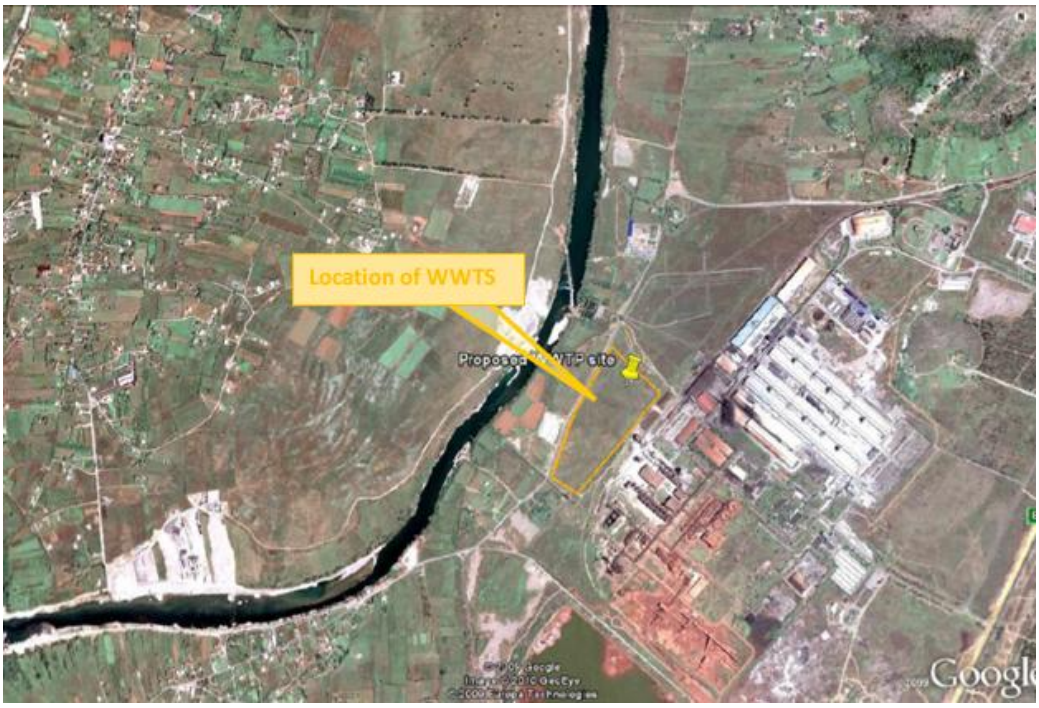
- Podnosiocu zahtjeva
- Službi za pristup mreži Regiona 2
- Službi za nestandardne priključke i DI
- a/a

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- **Urban-Technical Conditions (Urbanisticko-Tehnicki Uslovi)**
- **Environmental and Social Impact Assessment (ESIA)**
- **Environmental and Social Management Plan (ESMP)**
- **Geotechnical Survey Report**
- **Reports on Soil Contamination**
- **KAP Well Water Analyses Data**

DESIGN, CONSTRUCTION AND APPROVAL OF DESIGN PARAMETERS, TECHNOLOGY AND CAPACITIES OF WASTEWATER TREATMENT PLANT, SLUDGE TREATMENT AND INCINERATION PLANT AND SEWER EXTENSIONS

Environmental and Social Impact Assessment Report



September, 2020.

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ABBREVIATIONS

BOD	Biochemical Oxygen Demand
CETI	Center for Ecotoxicological Testing
DUP	Detailed Urban Plan
EIA	Environmental Impact Assessment
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
EMP	Environmental Management Plan
EU	European Union
KAP	Aluminium Plant Podgorica
MARD	Ministry of Agriculture and Rural Development
NEPA	Nature and Environmental Protection Agency of Montenegro
OSH	Occupational Safety and Health
SSTP	Sewage Sludge Treatment Plant
SSIP	Sewage Sludge Incineration Plant
ViK	Vodovod i kanalizacija
WWTP	Wastewater Treatment Plant
WB	World Bank

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1. EXECUTIVE SUMMARY

The construction of a new wastewater treatment plant for the Capital City of Podgorica is of great importance. Namely, the existing WWTP of the city of Podgorica, which is 38 years old, has a much smaller capacity than necessary, which is why it cannot provide the most modern wastewater and sludge treatment in accordance with current regulations on discharging treated wastewater into the natural environment. Efluents from the city of Podgorica are discharged into the Morača River, which provides the largest amount of water for Skadar Lake, a valuable and sensitive natural area that is under state and international protection.

The existing wastewater treatment plant in the Capital City of Podgorica was put into operation in 1978. The designed and installed capacity for 55,000 PE does not meet the current needs in terms of capacity, as well as the requirements for the quality of wastewater treatment in the Capital of Podgorica and the discharge of effluent into the Morača River. Also, the current plant cannot provide the most modern treatment of sewage sludge in accordance with the applicable regulations on the discharge of treated wastewater into the natural recipient, the Morača River.

The capital Podgorica and the company "Vodovod i kanalizacija" d.o.o. Podgorcia many years ago recognized that the improvement of sanitation and the situation in the field of wastewater treatment in Podgorica is a priority for improving the living conditions of the population and for the economic development of the city, and took the first key steps towards achieving that priority.

- preparation of two feasibility studies in 2004 and 2011 with the support of external development agencies;
- identification and allocation by urban documents of the location required for the new WWTP;
- assessment of existing technologies for wastewater treatment and identification of the most appropriate technological processes for wastewater and sludge;
- development of a long-term concept for the development of the sewerage network and transfer to the location of the new WWTP.

In order to solve the problem of wastewater treatment and treatment of sewage sludge from the Capital of Podgorica, Studies were conducted in 2004, 2008, 2011 and 2018, DUP KAP industrial zone in 2008. In the mentioned documents, the location for the new WWTP was selected. The site is located approximately 3 km south of Podgorica, on the left bank of the River Moraca and close to KAP (Aluminium Plant Podgorica).

"Industrial Zone - Aluminum Plant Podgorica" has reserved an area of 11.1 ha (UP 5 lok 1 + UP 5 lok 2) for the construction of WWTP, which is considered adequate for WWTP with a planned capacity of about 235,000 PE.

The design approach for the needs of the conceptual design of the WWTP covers the final time period until 2040 (235000 PE).

The design of the process will be in line with the recommendations of the German DWA / ATV, which represent the leading design experience in Central Europe, thus ensuring compliance with wastewater regulations.

In addition, the existing plant is meanwhile located within the urban extension area of Podgorica city and directly surrounded with housing and commercial areas, which are not compatible with an industrial facility of the type of a wastewater treatment plant.
Finally, existing badly designed and poorly maintained on-site sanitation facilities in unsewered areas of the city of Podgorica, installed in highly permeable underground are a constant threat for the quality of the underground water resources.

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The above picture of the existing situation emphasizes the necessity to urgently improve the sanitation situation in Podgorica through:

- Construction of state-of-the-art new wastewater treatment plant providing the required treatment efficiency to adequately protect the environment;
- Extension of the sewer network in unsewered areas allowing to remove defective on-site sanitation facilities;
- Improve the condition and maintenance of on-site sanitation facilities in areas which will remain unsewered at mid or long-term.

The project encompasses following main components:

- Construction of the new wastewater treatment plant for the city of Podgorica including sewage sludge treatment and incineration (Components 1, 2 and 3);
- Construction of the main collector from the site of the existing to the site of the new WWTP, including a pipe bridge over River Moraca (Components 4 and 5);
- Extension and densification of the secondary sewer network (Component 6);
- Development of measures for the separation of internal networks, reduction of the discharged pollution load and pre-treatment of effluents discharged to the public sewer by the 13.jul-Plantaze winery (Component 7);
- Preparation of detailed design and tender documentation for extensions of main collectors in currently unsewered areas (Component 8).

ESIA Study report refers to Components 1,2 and 3 of the project for sewer network extensions and construction of the new wastewater treatment plant for the city of Podgorica and concerns the construction of the wastewater treatment plant (WWTP), Sewage Sludge Treatment Plant (SSTP), Sewage Sludge Incineration Plant (SSIP) and common facilities of the plant.

This document represents an upgrade of the proposed projects, as well as an assessment of their possible environmental and social impacts, both beneficial and harmful. The proposed incentives and mitigation measures are listed where necessary together with an assessment of the initial responsibility for their implementation.

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2. INTRODUCTION

2.1. Project background and Purpose

The existing wastewater treatment plant in the Capital City of Podgorica was put into operation in 1978. The designed and installed capacity for 55,000 PE does not meet the current needs in terms of capacity, as well as the requirements for the quality of wastewater treatment in the Capital of Podgorica and the discharge of effluent into the Morača River. Also, the current plant cannot provide the most modern treatment of sewage sludge in accordance with the applicable regulations on the discharge of treated wastewater into the natural recipient, the Morača River.

The development of the Capital, ie the increase in the number of inhabitants, affected the deterioration of the state of wastewater treatment at the old plant, which was especially evident in accident situations that Efluent from the old plant in Podgorica is partially discharged into the Morača River. We must point out that the river Morača provides the largest amount of water for Skadar Lake. Skadar Lake is a valuable and sensitive natural area of the National Park, which is under the protection of the state of Montenegro and the international community, and especially the EU.

In addition, the existing plant is located in the wider city zone of Podgorica and is surrounded by residential and commercial areas that are not compatible with such an industrial plant.

Finally, the existing poorly designed and poorly maintained sanitation facilities in the areas of Podgorica where there is no sewerage, and which are placed on extremely permeable surfaces, pose a constant threat to the quality of groundwater sources.

The above picture of the current situation emphasizes the need for urgent improvement of the situation in the field of sanitation in Podgorica:

- construction of a modern new wastewater treatment plant that provides the necessary treatment efficiency in order to adequately protect the environment;
- expanding the sewerage network to zones without sewerage, which will enable the removal of defective sanitary facilities;
- improving the condition and maintenance of sanitary facilities in areas that are not covered by the sewerage network, and which will be connected to the network in the medium or long term.

The capital Podgorica and the company "Vodovod i kanalizacija" Ltd. Podgorcia many years ago recognized that the improvement of sanitation and the situation in the field of wastewater treatment in Podgorica is a priority for improving the living conditions of the population and for the economic development of the city, and took the first key steps towards achieving that priority.

- preparation of two feasibility studies in 2004 and 2011 with the support of external development agencies;
- identification and allocation by urban documents of the location required for the new WWTP;
- assessment of existing technologies for wastewater treatment and identification of the most appropriate technological processes for wastewater and sludge;
- development of a long-term concept for the development of the sewerage network and transfer to the location of the new WWTP.

In order to solve the problem of wastewater treatment and treatment of sewage sludge from the Capital of Podgorica, Studies were conducted in 2004, 2008, 2011 and 2018, DUP KAP industrial zone in 2008. In the mentioned documents, the location for the new WWTP was selected. The site is located approximately 3 km south of Podgorica, on the left bank of the River Moraca and close to KAP (Aluminium Plant Podgorica).

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Some time ago, the Government of Germany, through the development bank KfW, expressed interest in providing financial support for the implementation of a new wastewater treatment plant and collector transfer for the city of Podgorica.

2.2. Overview of the Project and related facilities

DUP (Detailed Urban Plan)"Industrial Zone - Aluminum Plant Podgorica" has reserved an area of 11.1 ha (UP 5 lok 1 + UP 5 lok 2) for the construction of WWTP, which is considered adequate for WWTP with a planned capacity of about 235,000 PE.

In addition, 2.5 ha is reserved for the construction of the KAP WWTP (UP4), and the DUP also reserves space for the installation of collectors for the discharge of purified effluents into the Morača River (UP 6).

The design approach for the needs of the conceptual design of the WWTP covers the final time period until 2040 (235000 PE).

A more modern purification process was selected to take into account the existing economic and operational aspects of the project. This process offers the most energy efficient purification process to achieve the lowest possible operating costs (OPEX).

The proposed conceptual design for the WWTP Podgorica takes into account the individual process units selected, emphasizing the most sustainable reliability and operability of plants and equipment, taking into account the special conditions of the project.
The design of the process will be in line with the recommendations of the German DWA / ATV, which represent the leading design experience in Central Europe, thus ensuring compliance with wastewater regulations.

Primary wastewater treatment plants include the following process units (designations):

- Mechanical purification
- Protective chamber (optional)
- Rough grids
- Inlet pumping station
- Fine grids
- Fecal receiving station
- Odor control
- Sand and grease removal
- Flow meter and sampling
- Primary purifier with pumping station for primary sludge

The biological wastewater treatment plants will include two combined steps of the process of secondary wastewater treatment for organic carbon removal and tertiary wastewater treatment for nutrient removal (BNR).

The recommended biological treatment process was determined taking into account the complexity of facilities and MEICA installations, needs in terms of operability and process control, reliability and ease of servicing equipment, to maintain a very high degree of availability and efficiency of the system with low operating costs. Limitations on available space have also been taken into account.

Biological wastewater treatment plants include the following treatment units (designations):

- Secondary Purification / Carbon Removal
- Carbon removal (BOD5)
- Final purifier with pump for recirculation and excess sludge (WAS)

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- Effluent control window
- Tertiary nutrient purification / removal
- Nitrification
- Denitrification
- Biological phosphorus removal (EBPR)
- Phosphorus deposition (CPR)

Sludge treatment includes two main steps of the sludge stabilization and sludge dehydration process to meet the requirements of domestic regulations and UWWD 91/271 / EEC and the Sewage Sludge Directive 86/278 / EEC, which include the following main process steps:

- sludge stabilization by anaerobic sludge digestion;
- sludge heating and sludge transport;
- digester gas system and reuse of that gas;
- sludge thickening and dehydration plants.

Sludge stabilization was considered as a separate anaerobic digestion of sludge in relation to the fact that during the process of anaerobic stabilization, gas from the digester (biogas) will be produced. Biogas contains approximately 65% methane to be used for combined heat and power (CCHP) to significantly reduce operating costs (OPEX) due to electricity generation.
Sludge stabilization plants contain:

- Sludge stabilization
- Sludge digestion
- Gas system from the digester
- Use of gas from the digester.

Sludge dehydration plants should include the following process units:

- Sludge dehydration
- Primary thickener
- Mechanical pre-thickening
- Normal thickening - optional
- Secondary thickener
- Mechanical dehydration of sludge
- Sludge storage area
- Pumping station for sewage sludge
- Odor control

2.3. Scope of the ESIA

This report is an ESIA document according to the requirements of KFW Bank, before the start of works. It is envisaged that the environmental impact assessment will follow national procedures, as well as be acceptable to KFW Bank.

This document represents an upgrade of the proposed projects, as well as an assessment of their possible environmental and social impacts, both beneficial and harmful. The proposed incentives and mitigation measures are listed where necessary together with an assessment of the initial responsibility for their implementation.

The main objectives of the ESIA are:

- Identify and assess the expected environmental and social impacts of the proposed project, both positive and negative;
- Identification and analysis of alternatives to the proposed project;

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- To propose measures to mitigate the negative impacts and measures to improve the positive impacts to be taken during and after the implementation of the proposed project;
- Check compliance with national regulations in the field of environmental protection, KFW Bank policy, best practices and standards in the field of WWTP treatment;
- Generation of basic data for monitoring and evaluation of how well the mitigation measures were implemented during the project duration;
- Recommendation of effective measures envisaged to mitigate negative impacts;
- EMP;

2.4. Structure of the ESIA report

The structure of ESIA report is as follows:
1. Executive Summary
2. Introduction. Presents brief introduction of the project, need and objective of the study and structure of report.
3. Policy, legal, and administrative framework. This chapter reviews applicable environmental and social regulatory framework and its relevance for Project.
4. Project description. Describes salient features of the project, technical description and activities.
5. Baseline environmental and social conditions. Outlines Environmental and Social Baseline in the study area of the project.
6. Environmental and Social impacts. Covering analysis of potential Environmental Impact due to the proposed project.
7. Project Alternatives. Reviews the alternatives with project and without project scenario.
8. Environmental and social management plan (ESMP). Presents detailed Environmental and Social Management Plan (ESMP) in accordance with KFW Bank Policies and Procedures.
9. Public consultation, stakeholder engagement and information disclosure. This chapter presents stakeholder mapping and analysis, overview of the stakeholder engagement activities undertaken during the ESIA; and summary of consultations and the output.

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3. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

3.1. Policy

In Montenegro, the Constitutional Law particularly defines environmental protection. Article 1 of the Constitution, among other things, defines Montenegro as an ecological state. Article 23 of the Constitution of Montenegro defines that “everyone has the right to a healthy environment”.

The framework of the environmental legislation of Montenegro is laid down in the Law on Environment ("Official Gazette of Montenegro”, No. 52/16). The Law regulates principles of environmental protection and sustainable development, instruments and measures for environmental protection and other issues of importance for the environment.

Major steps have been taken in Montenegro during the last decade towards alignment with the EU environmental legislation, and also toward integration of environmental considerations in other policies.

With regards to policy documents, the Montenegro prepared the main strategic documents for different areas: waters, climate change, waste, etc. The strategic documents adopted are listed in Table 1.

Table 1. *Strategic documents adopted by the Government of the Montenegro*

Strategic documents adopted by the Government of the Montenegro
National Strategy on Sustainable Development was adopted in 2016.
Municipal Wastewater Management Plan of Montenegro (2020-2035).
National Waste Management Plan was prepared and adopted in 2015.
National Strategy on biodiversity was adopted in 2016.
National Strategy on climate change was adopted in 2015.

Montenegro has ratified a number of international treaties and conventions along with the on-going process of transposing EU law into the National legal and policy framework. All treaties and conventions relevant to the Project will be considered during development of the ESIA, such as the Aarhus Convention.

The Convention on Public Participation, Access to Information and Access to Justice in Environmental Matters (Aarhus, 1998) - the Aarhus convention - is part of the national legal system, implemented in 2009. Access to justice in respect of environmental matters is governed by several laws, which are fully transposing relevant provisions of the EU legislation. This governs public access to environmental information and public participation in making decisions on environmental matters, whilst aligning with Aarhus Convention. The MSDT and NEPA regularly update their websites to contain all relevant documents for access to information. Other institutions are also active such as local authorities, the Agency for Personal Data Protection and Access to Information and the Administrative Court of Montenegro. Dissemination of the information related to the environment is also done through the Aarhus centres in municipalities Podgorica, Niksic, Pljevlja and Berane.

3.2. Legal Framework

3.2.1. National applicable Environmental and Social Legislation

The framework of the legislation in the field of the environment of Montenegro is set out in the "Law on the Environment of Montenegro" (Official Gazette of Montenegro, No. 12/96 and 52/16). This law declares that Montenegro is envisage as an ecological state and that the authorities should work to upgrade the quality of the human environment, reduce all factors that negatively affect the life and

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health of people and prevents harmful effects on humans. The law also prescribes the principles of polluters and payment users.

Also, "Law on Environmental Impact Assessment of Montenegro", (Official Gazette of Montenegro, No. 80/05, 40/10, 73/10, 40/11, 27/13, 52/16 and 75/18), defines activities that are the subject of the Environmental Impact Assessment (EIA), Preliminary assessment procedures, public participation in decision-making, procedures for assessment and verification of the and the Environmental Impact Assessment criteria for evaluation reports. The law is fully in line with the EU directives regulating this area. In addition, the, following legislation in the field of the environment are also relevant:

- Law on the Strategic Environmental Impact Assessment (SEA) ("Official Gazette of the Republic of Montenegro", No. 80/05 and "Official Gazette of Montenegro", No. 40/11, 59/11, 52/16);
- Law on the Environmental Impact Assessment (EIA) ("Official Gazette of Montenegro", No. 75/18);
- Law on Nature Protection ("Official Gazette of Montenegro", No. 54/16);
- Law on Waste Management (Official Gazette of Montenegro No. 80/05, 80/05, 64/11, 39/16), with accompanying regulations;
- Law on Air Protection ("Official Gazette of Montenegro", No. 25/10, 40/11, 43/15);
- Law on Spatial Planning and Construction of Buildings (Official Gazette No. 064/17, 44/18 and 63/18);
- Law on Liability for Environmental Damage ("Official Gazette of Montenegro", No. 27/14);
- Law on Integrated Pollution Prevention and Control – IPPC ("Official Gazette of Montenegro ", No. 80/05, 54/09, 42/15, 54/16);
- Ordinance on Allowed Quantities of Hazardous and Noxious Substances and Methods for their Examination (Land Quality) Ordinance (Official Gazette of Montenegro No. 18/97).

Water quality is governed by an extensive legal framework, while the key legislation is the Law on Waters (Official Gazette of Montenegro No.084/18). The Law regulates the legal status and integrated water, coastal land and water facilities management, conditions and methods of water activity and other significant issues of management and water resources (regulates status and the ways for managing all types of water, water resources, as well as other matters of relevance for water resources management). Water management duties are under this Law assigned to a separate state administration body within the MARD – Water Administration. Also, water management is regulated in several regulations and they regulate different aspects of water treatment:

- Regulations on the Content of the Programs for the Construction of Collector Systems and Plants for the Treatment of Municipal Wastewater ("Off. Gazette of Montenegro" No. 31/18),
- Regulation on the classification and categorization of surface and groundwater ("Off. Gazette of Montenegro", No. 2/07),
- Regulation on the method for determining the boundaries of water lands ("Off. Gazette of Montenegro", No. 25/12),
- Regulation on the method of categorization and categories of water facilities and their management and maintenance ("Off. Gazette of Montenegro", No. 15/08),
- Regulation on the manner and deadlines for determining the status of surface waters ("Off. Gazette of Montenegro", No. 25/19),
- Regulation on the manner and deadlines for determining the status of ground waters ("Off. Gazette of Montenegro", No. 52/19),
- Regulation on the manner and deadlines for implementing measures to ensure the conservation, protection and improvement of bathing water quality ("Off. Gazette of Montenegro", No. 28/19)
- Regulation on the manner and conditions for measuring the quantity of wastewater discharged into the receiver ("Off. Gazette of Montenegro", No. 24/10).

The main legislation that covers labor and working conditions issues is the Law on Safety and Health at Work ("Official Gazette of Montenegro", No. 34/14, 44/18). Supervision of implementation of the Law on Safety and Health at Work ("Official Gazette of Montenegro", No. 34/14, 44/18) and other

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applicable regulations is conducted by the Labour inspection, through the Labour inspectors for occupational safety and health at work, if the law does not establish that the supervision of such regulations in specific activities is performed by other authorities.
The Constitution of Montenegro lays down the legal basis for expropriation of land and protects property rights, only exceptionally allowing the possibility of limiting these property rights in case when it is imposed by public interest and established by the law or based on the law. According to the Law on property-legal relations, no person may be deprived of his/her property or of the rights deriving from it, except in cases concerning the public interest determined by law. In case of deprivation (complete expropriation) or restriction (partial expropriation), rightful compensation for the property not lower than its market value at the time of expropriation is guaranteed. The beneficiary of expropriation may submit the expropriation proposal only after the determination of the public interest in expropriation.

The Law on Expropriation (''Official Gazette of the Republic of Montenegro", No. 55/00, 28/06 and ''Official Gazette of Montenegro" No. 21/08, 30/17) guides the land/property management and serves as a general framework for the land/property expropriation on the territory of Montenegro. The Law provides the right to appeal at many stages of the expropriation procedure, such as administrative and judicial appeals (i.e. against the decision on public interest, the decision on expropriation, and regarding compensation), among other rights of affected citizens (those with formal legal rights).

3.2.2. EIA and ESIA process and procedures

An **Environmental Impact Assessment (EIA)** for certain projects is required to be carried out in Montenegro in accordance with the Montenegrin Law on EIA[1] and associated secondary legislation. This Law and the associated secondary legislation set out the requirements for undertaking environmental assessments of potential environmental impacts of public and private projects which are likely to have a significant impact on the environment before development consent / construction permit is granted in the form of an approval for project implementation. Hence, it is required that before development consent is granted for certain types of projects, an EIA has to be carried out. The EIA process is meant to anticipate potential environmental harm and to avoid or mitigate such harm while balancing environmental, social and economic objectives. The whole EIA process includes three specific procedures. They are the following:

1. Screening as the stage of determining whether an EIA is required;
2. Scoping as the stage of determining the scope or extent of the environmental impact assessment;
3. Review as the stage of reviewing the EIA study to see if it has been undertaken to an acceptable standard and in accordance with the legal requirements.

According to Montenegrin Legislation, the EIA Procedure is shown schematically as a flowchart in Figure 3.1 below. This procedure is in full compliance with the EU EIA Directive (2011/92/EU) and the general implementation in the world. The NEPA is the competent authority for the EIA process for projects where project development consent (e.g. construction permit) is issued by a state (national) authority. The local self-government unit responsible for environmental protection is, the competent authority for other projects for which approvals, permits and licenses are issued by local authorities.
The types of projects that require an EIA are determined by the *"Decree on determining projects for which an environmental impact assessment shall be carried out" - EIA Decree ("Official Gazette of Montenegro" No. 20/07 and 47/13)*. Under the EIA Decree, projects are classified in two groups (lists): projects listed in List 1 are all subject to compulsory EIA while for projects in List 2 the assessment contains an element of discretion, noting that an EIA procedure will, in any event, be required for projects with potentially significant environmental impacts. The public and other parties are to be consulted in all stages of the EIA procedure.
The Project is included in the List 1 of the EIA Decree within the point 11.

[1] Law on Environmental Impact Assessment of Montenegro", (Official Gazette of Montenegro, No. 80/05, 40/10, 73/10, 40/11, 27/13, 52/16 and 75/18)

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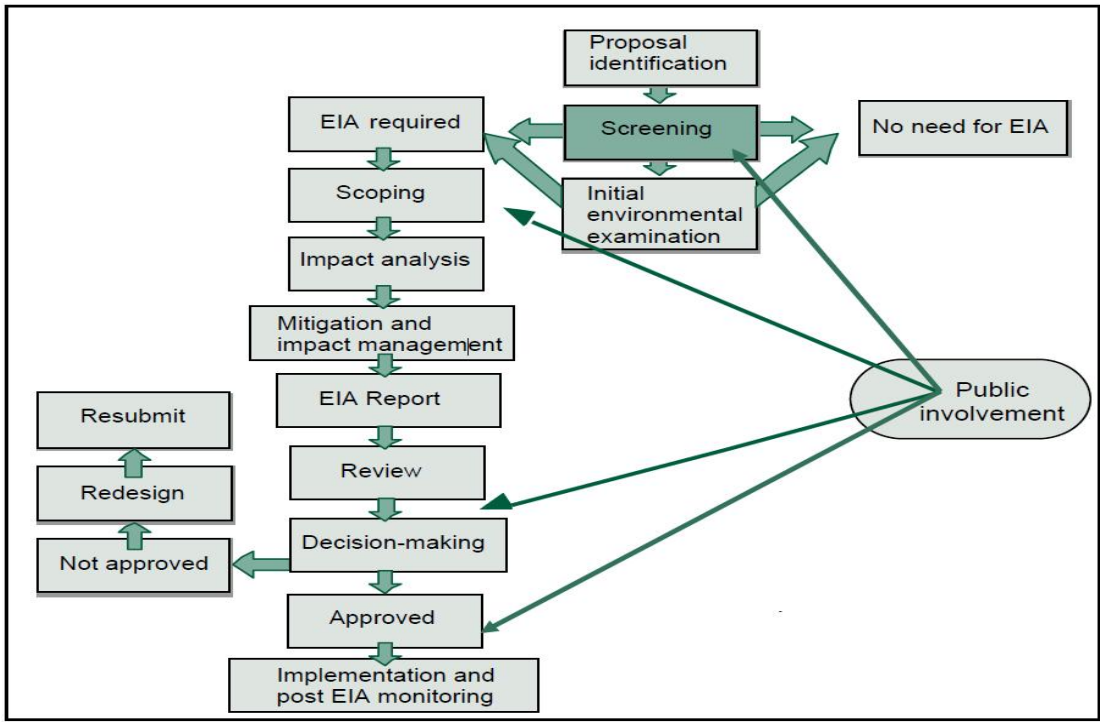


Figure 1. *EIA Procedure in Montenegro*

The benchmark for the **Environmental And Social Impact Assessment (ESIA)** will be the KfW Development Bank. KfW Bank Policy and IFC (International Finance Corporation) standards on environmental and social protection measures are the backbone of its support to sustainable poverty reduction. The aim of these protective measures is to prevent and mitigate undue damage to people and their environment. These measures provide guidelines to the Bank and the loan beneficiary in the identification, preparation and implementation of programs and projects.
These policies include the following:

- Environmental Assessment (OP 4.01)
- Natural Habitats (OP 4.04)
- Indigenous Peoples (OP 4.10)
- Physical Cultural Resources (OP 4.11)
- Involuntary Resettlement (OP 4.12)
- Forests (OP 4.36)
- Safety of Dams (OP 4.37)

OP 4.01 Environmental Assessment (EA)
The Bank requires Environmental Assessment (EA) for projects proposed for obtaining the Bank support, in order to ensure that they do not have, or mitigate potential negative environmental impacts. The EA is a process in which breadth, depth, and type of analysis depend on the nature, scale, and potential environmental impact of the proposed project. The EA evaluates a project's potential environmental risks and impacts in its area of influence; examines project alternatives; identifies ways of improving project selection, siting, planning, design, and implementation by preventing, minimizing, mitigating, or compensating for adverse environmental impacts and enhancing positive impacts; and includes the process of mitigating and managing adverse environmental impacts throughout project implementation. The EA takes into account the natural environment (air, water and land); human health and safety; social aspects; and trans-boundary and global environmental aspects. The main result of the assessment is an environmental and social management plan that defines

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measures to be adopted by the project partner or the financed enterprise to protect the environment and human health in order to prevent undesirable impacts, to reduce them to an acceptable level, or to offset them.

The OP 4.01 Environmental Assessment consists of the following basic elements:

- Screening
- Environmental assessment (EA) documentation
- Public consultation
- Disclosure
- Review and approval of EA documentation
- Conditionality in loan agreements
- Arrangements for supervision, monitoring, and reporting

The Bank classifies the proposed projects into three major categories, depending on the type, location, sensitivity, scale of the project and the nature and magnitude of its potential environmental impacts.

- Category A: The proposed project is likely to have significant adverse environmental impacts that are sensitive, diverse, or unprecedented. These impacts may affect an area which is broader than the sites or facilities subject to physical works. For category A projects, it is mandatory to analyse and appraise any negative ecological and social consequences as part of an independent environmental and social impact study (ESIS) and to draw up an environmental and social management plan (ESMP);
- Category B: Potential adverse environmental impacts of the proposed project on human population or environmentally important areas - including wetlands, forests, grasslands, or other natural habitats - are less adverse than the Category A projects. These impacts are site specific; few if any of them are irreversible; and in most cases migratory measures can be designed more readily than Category A projects. For category B projects, the need for and the scope, priorities and depth of an ESIS have to be determined on a case-by-case basis;
- Category C: The proposed project is likely to have minimal or no adverse environmental impacts. Category C projects usually do not require any additional analysis within the meaning of this Guideline or any further ESIA procedures. However, category C projects should be monitored for any relevant changes over their life cycle.

The categorisation into A, B and C projects follows the international standards of the IFC (International Finance Corporation) / World Bank and is subject to an internal verification by a non-market unit. The categorisation determines the scope and depth of the project assessment.

Depending on the project, a range of instruments can be used to meet the KfW Bank's EA requirement: environmental and social impact assessment (ESIA), regional or sectoral EA, environmental audit, hazard or risk assessment, and environmental and social management plan (ESMP). EA applies one or more of these instruments, or elements of them, as appropriate. When the project is likely to have sectoral or regional impacts, sectoral or regional EA is required. For the purposes of this Project, an ESIA shall be prepared.

The OP/BP 4.01 Environmental Assessment includes the following three annexes:

- Annex A: Definitions
- Annex B: Content of an Environmental Assessment Report for a Category A project
  - Executive summary
  - Policy, legal, and administrative framework
  - Project description.
  - Baseline data
  - Environmental impacts
  - Analysis of alternatives
  - Environmental management plan (EMP). Covers mitigation measures, monitoring, and institutional strengthening (as outlined in OP 4.01, Annex C)

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  - Appendices (list of EA report preparers—individuals and organizations, references, record of interagency and consultation meetings, tables/figure presenting the relevant data referred to or summarized in the main text, list of associated reports (e.g., resettlement plan or indigenous people's development plan)
- Annex C: Environmental Management Plan
  - Mitigation
  - Monitoring
  - Institutional measures
  - Implementation Schedule and Cost Estimates

The ESIA report and the ESMP for the Project will be prepared in accordance with Annex B and Annex C of the OP 4.01.

3.3. EU Directives

Horizontal environmental legislation of the EU was transposed into the legal system of Montenegro in 2005. At the time when the Strategy was prepared, the major share of the EU horizontal legislation transposed, included six laws and implementing acts. These pieces of legislation are as follows:

- *Directive 2001/42/EC (SEA);*

Directive 2001/42/EC on the assessment of the effects of certain plans and programmes on the environment (SEA), has been fully implemented through the Law on Strategic Environmental Assessment since 2008 at both national and local levels. Strategic environmental assessment is carried out for all plans and programmes where their implementation may have impacts on the environment. As of 2009, Montenegro is a party of the SEA Protocol.

- *Directive 2011/92/EU (EIA), which codified Directive 85/337/EEC and its amendments by Directive 97/11/EC, Directive 2003/35/EC and Directive 2009/31/EC and as amended by 2014/52/EU (EIA);*

Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment is fully implemented through the Law on Environmental Impact Assessment (EIA) and its accompanying implementing acts. Impact assessment is carried out for all new projects and for their amendments. Since 2008, the Law has been implemented at both national and local levels. Two lists of projects have been compiled – List I for which EIA is mandatory and List II for which EIA may be required. Moreover, cross-border procedure is also carried out in order to inform the other states if implementation of a project may have a significant environmental impact. Montenegro is a Party of the Espoo Convention, since 2009.

- *Directive 2003/4/EC (access to environmental information);*

Directive 2003/4/EC on public access to environmental information and repealing Council Directive 90/313/EEC is implemented through the Law on Environment and Free Access to Information at a national and local level.

- *Directive 2003/35/EC (public participation and access to justice in EIA procedures and procedures for the issuance of IPPC permits);*

Directive 2003/35/EC facilitates public participation in respect of the drawing up of certain plans and programmes relating to the environment. Regarding public participation and access to justice, Council Directives 85/337 and 96/61 have been fully transposed through the Law on Strategic Environmental Assessment and Law on Environmental Impact Assessment.

- *Directive 92/43/EEC on the Conservation of natural habitats and of wild fauna and flora ("the Habitats Directive") and Directive 2009/147/EC on the conservation of wild birds ("the Birds Directive").*

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The two principal EU Directives relating to nature conservation are the Habitats Directive and the Birds Directive. The Habitats Directive promoted a network of Special Areas of Conservation to protect the 220 habitats and approximately 1000 species listed in Annex I and II of the Directive. These are considered to be of European interest. Together with Special Protection Areas which are designated under the Birds Directive, these form a network of protected sites across the European Union called Natura 2000.

The main EU legal acts regulating water management are:
- Water Framework Directive 2000/60/EC;
- Council Directive 91/271/EEC on urban waste water treatment;
- EU Directive 2008/105/EC on environmental quality standards in the field of water policy;
- Directive 2006/11/EC of the European Parliament and the Council on pollution caused by certain hazardous substances discharged into the aquatic environment;
- Directive 2006/118/EC of the European Parliament and the Council on groundwater protection against pollution and quality impairment;
- Waste Framework Directive 2006/12/EC amended with EU Directive 2008/98/EC on waste management;

- *Water Framework Directive*

The main EU legal act regulating the water area is the Water Framework Directive 2000/60/EC (WFD). The WFD establishes main objectives and guidelines of the water management policy that establish integrated water management in the EU, and emphasizes the need for further integration of water protection and sustainable management, and other policies in the fields of energy, transport, agriculture, fisheries, regional policy and tourism, too. The directive particularly promotes cooperation and joint action at Union and local level as well as the level of information, consultation and public involvement, including the users, too.

- *Urban Waste Water Directive 91/271*

Main directive objective is to protect the aquatic environment from negative impacts of urban waste water.

- *Directive on Pollution Caused by Certain Dangerous Substances Discharged into the Aquatic Environment 2006/11*

Directive relates to the Member States obligation to undertake activities to eliminate hazardous substances listed in the Directive 7 as well as to reduce the pollution of waters with hazardous substances in accordance with the Directive provisions.
The main EU legal acts related to social issues are:
- Directive 89/654/EEC - workplace requirements, concerning the minimum safety and health requirements for the workplace (first individual directive within the meaning of Article 16 (1) of Directive 89/391/EEC);
- Directive 2003/10/EC on minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (noise);
- Directive 1989/391/EEC on the introduction of measures to encourage improvements in the safety and health of workers at work.

3.4. International/KfW Environmental and Social Standards and Guidelines

The ESIA Study will be conducted also in alignment with the following International Requirements and Guidelines:
- EU Acquis on environmental and social issues;
- Sustainability Guidelines of the KfW Development Bank October 2019;

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- IFC Performance Standards for cooperation with the private sector and their General and sector-specific Environmental, Health and Safety (EHS) Guidelines as well as the Core Labour Standards of the International Labour Organization (ILO);
- Guidelines on Incorporating Human Rights Standards and Principles, Including Gender, in Programme Proposals for Bilateral German Technical and Financial Cooperation;
- The Fundamental Conventions of the International Labour Organization (ILO) as well as IFC Performance Standard 2 on Labour and Working Conditions;
- World Bank Operational Policies: OP/BP 4.01, Environmental Assessment; OP/BP 4.02, Environmental Action Plans; OP/BP 4.04, Natural Habitats; OP 4.07, Water Resource Management; OP/BP 4.36, Forests;
- World Bank Environmental and Social Framework (ESF), which applies to all new World Bank investment project financing, and the Environmental and Social Standards (ESS);
- UN Basic Principles and Guidelines on Development-based Evictions and Displacement (namely 42, 49, 52, 54 and 60) and guidance provided within the IFC Handbook for Preparing a Resettlement Action Plan (2002) and World Bank Involuntary Resettlement Sourcebook (2004).

3.5. Gaps between the International ESIA Requirements and Montenegrin EIA Procedure

The Montenegrin requirements for the EIA procedure are quite similar to the requirements of the KfW, but there are some differences which are presented in the below Table 2.

Table 2. *Gaps between the International ESIA Requirements and Montenegrin EIA Procedure*

Subject	Montenegrin requirements	International Requirements
Screening	Categorization and screening are based on the EIA decree with the List 1 of installations and facilities requiring an EIA and List 2 of activities for which the Ministry or local authority determine whether an EIA is necessary.	Screening is based on the type, location, sensitivity, and scale of the proposed project, identifying key issues including any resettlement and cultural property concerns.
Categorization and EA documentation content	Category 1. (significant impact) Installations and facilities to be assessed for their impact on the environment requiring full EIA (List 1). The study must also incorporate the comments and suggestions of governmental and non-governmental organizations as well as the results of the public consultations. Category 2. (moderate impact) Ministry (or local authority) screens the project and decides whether an EIA is required (List 2). The law defines facilities/installations which undergo screening and criteria for screening, such as size, cumulative impact, use of natural resources, sensitivity, etc. Category 3. (Low impact or no impact)	Category A: Projects likely to have significant adverse environmental impacts that are sensitive (irreversible). Full Environmental Assessment is required, usually an ESIA. The Environmental Management Plan (EMP) is an integral part of the ESIA. Category B: Projects with environmental impacts less adverse than those of category A. These impacts are site-specific and, in most cases, mitigation measures can be designed more readily than for category A projects. Scope of Environmental Assessment (EA) is usually narrower than in Category A projects. Usually, only an ESMP is required. Category C: Projects with minimum or no adverse impact.

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	All facilities and installations below the threshold levels regulated in the EIA decree. The EIA procedure is not required.	No EA is required

Table 2. Gaps between the International ESIA Requirements and Montenegrin EIA Procedure (continued)

Subject	Montenegrin requirements	International Requirements
Public consultation and disclosure	Public consultations are the responsibility of the competent institutions. Projects from list 1: Public disclosure and public consultation will be held after EIA is submitted to the competent authority. Projects from list 2: Projects from list 2 are made publicly available after the documentation regarding the decision on EIA procedure is made available. Depending on the screening results (if decision is taken that an EIA is required), projects from the List 2 undergo public disclosure and public consultation, just like the projects from the List 1. For Projects for which an EIA is required, EIA should be disclosed 15 calendar days prior to the public consultation. The public discussion shall be organized and chaired by the Competent Authority.	The borrower is required to consult project affected groups and local NGOs about the project's environmental and social impacts and take their views into account. For Category A projects: It is necessary to hold public consultations at least twice: (1) shortly after the screening and before the terms of reference are finalized; and (2) once a draft EA study is prepared. Information on the proposed objectives, project description and potential impacts are provided for the initial public consultations. After finalizing the draft of the Environmental Assessment report, it is necessary to disclose the document, in the local language. In addition, for Category A projects, the borrower makes the EA Report draft publicly available for project-affected people. For Category B projects: It is necessary to hold public consultations at least once during the EIA procedure. Reports are to be made available to the NGOs and project-affected people. The disclosure process is complete only after the EA report is officially received by the KfW.
EA review and approval	The Competent Authority shall decide on granting the approval or rejecting the application for approval of the EIA Study, based on the report and proposals of the EIA Commission. The Competent Authority is obliged to inform the organizations and public concerned about its decision.	Before formal clearance of environmental and social aspects of the project, the KfW reviews the results of the EA (especially consultations, ESMP and institutional capacities), ensuring that the EA is consistent with the ToR.

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Mitigation and monitoring	For projects requiring an EIA, mitigation measures and monitoring are described in the EIA study, which are also included in the Environmental Permit. For other categories for which an Environmental Permit is issued, measures for protection of air, water, soil, flora and fauna, waste management etc., and monitoring, are included in the permit itself.	Mitigation measures are included in the ESMP. Obligation to carry out the ESMP and additional measures contained in the ESMP needs to be included in the tender documentation/contract.

When comparing the international safeguard requirements with the EIA legislation of Montenegro, the most important difference, which is significant for the Project, is related to the public consultation. According to the international guidelines, projects in the category "A" will require two public consultations, while they only require one according to the legislation of Montenegro. Following the international requirements, the NEPA as a borrower consults project-affected groups and local NGOs in the form and language that are understandable and accessible to the group being consulted at least twice: (i) shortly after the environmental screening; and (ii) once the draft of the EA report is prepared. The public consultation also should be provided during Project implementation (construction and operation).

3.6. Administrative Framework

3.6.1. Institutional Framework

Ministry of Sustainable Development and Tourism (MSDT) has the key role in formulation and implementation of the environmental policy in Montenegro. The Ministry performs administrative supervision over a number of institutions that are involved in environmental monitoring (Hydro-meteorological Institute, Centre for Eco-toxicological Research) and nature protection (Public Enterprise "National Parks of Montenegro").

The Nature and Environmental Protection Agency of Montenegro (NEPA), established in 2008 and operational since 2009, is an administrative authority within the MSDT and ensures implementation of the environmental legislation. Its mandate includes implementation of strategies, programs, laws and regulations in the field of environment, implementation of international treaties within its jurisdiction, environmental permitting, EIA, SEA, IPPC licensing, environmental monitoring, keeping relevant registers and databases, and reporting and coordination of reporting on the state of the environment. The NEPA is also responsible for provision of information to national and international organizations and to the public. Also, as the competent authority for designation of natural objects as protected areas, NEPA is responsible for preparation and implementation of biodiversity monitoring, preparation and maintenance of an environmental database (including biodiversity data) and issuance of all types of permits relating to nature protection.

The Ministry of Agriculture and Rural Development (MARD) has major environmental competencies through its mandate in water management, forestry, fishery, and hunting.

As the key authority, the Ministry of Labour and Social Welfare of Montenegro, among other things, performs the activities related to monitoring, studying and encouraging the development of Occupational Safety and Health (OSH), preparing regulations in the field of OSH, monitoring and implementing ratified conventions and EU Directives in the field of OSH, preparing professional basis for development of a national program for development of occupational safety and monitoring its implementation, and this is done through the Directorate for Safety at Work. Supervision of

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implementation of the Law on Safety and Health at Work ("Official Gazette of Montenegro", No. 34/14, 44/18) and other applicable regulations is conducted by the Labour inspection, through the Labour inspectors for occupational safety and health at work, if the law does not establish that the supervision of such regulations in specific activities is performed by other authorities.

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4. PROJECT DESCRIPTION

4.1. Project overview and key elements

The existing wastewater treatment plant of the city of Podgorica is 40 years old and technically outdated and critically overloaded. The plant cannot provide for a state-of-the art wastewater treatment with regard to both its design capacity and its treatment efficiency, especially considering removal of nutrients. The capacity of the plant is 55.000 PE, while the current wastewater flow and pollution load collected by the existing sewer network and transferred to the plant exceeds 100.000 PE, i.e. as close to or even more than 100 % overload. This results in the necessity to discharge partly treated and also untreated raw wastewater directly to the River Moraca and in a significant impact on the water quality of River Moraca and the downstream sensitive Skadar Lake.

In addition, the existing plant is meanwhile located within the urban extension area of Podgorica city and directly surrounded with housing and commercial areas, which are not compatible with an industrial facility of the type of a wastewater treatment plant.
Finally, existing badly designed and poorly maintained on-site sanitation facilities in unsewered areas of the city of Podgorica, installed in highly permeable underground are a constant threat for the quality of the underground water resources.
The above picture of the existing situation emphasizes the necessity to urgently improve the sanitation situation in Podgorica through:

- Construction of state-of-the-art new wastewater treatment plant providing the required treatment efficiency to adequately protect the environment;
- Extension of the sewer network in unsewered areas allowing to remove defective on-site sanitation facilities;
- Improve the condition and maintenance of on-site sanitation facilities in areas which will remain unsewered at mid or long-term.

The project encompasses following main components:

- Construction of the new wastewater treatment plant for the city of Podgorica including sewage sludge treatment and incineration (Components 1, 2 and 3);
- Construction of the main collector from the site of the existing to the site of the new WWTP, including a pipe bridge over River Moraca (Components 4 and 5);
- Extension and densification of the secondary sewer network (Component 6);
- Development of measures for the separation of internal networks, reduction of the discharged pollution load and pre-treatment of effluents discharged to the public sewer by the 13.jul-Plantaze winery (Component 7);
- Preparation of detailed design and tender documentation for extensions of main collectors in currently unsewered areas (Component 8).

The present ESIA Study report refers to Components 1,2 and 3 of the project for sewer network extensions and construction of the new wastewater treatment plant for the city of Podgorica and concerns the construction of the wastewater treatment plant (WWTP), Sewage Sludge Treatment Plant (SSTP), Sewage Sludge Incineration Plant (SSIP) and common facilities of the plant.

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Figure 2. *Location of the WWTP*

4.2. Importance of the Project

One of the significant dimensions of this Project is the protection of the groundwater regime of the Zeta plain, and thus the preservation of existing water sources on the territory of the Capital city and the reduction of the risk of their pollution. The realization of the same will directly affect the reduction of water pollution in the Moraca River. The quality of the treated water will directly affect the groundwater treatment of the Zeta plain. By protecting the river Moraca and its tributaries, Skadar Lake is protected as the largest accumulation of drinking water, and the water source "Bolje Sestre". Lake Skadar is included in the world list of protected wetlands under the Ramsar Convention, which in itself is a reason to apply all available protection mechanisms in order to respond to the international obligations.

4.3. Project location

The wastewater treatment plant will be constructed on a dedicated plot in accordance to the Detailed Urbanistic Plan (DUP) “Industrial Zone - Kombinat Aluminijuma Podgorica” (KAP) of November 2008.

The available construction site for the construction of the WWTP is located between KAP Aluminium Factory and Moraca River and has a total area of 12,82 ha, divided in two plots:

- The construction site for the WWTP as such, located between the KAP Aluminium Factory and the municipal road from Dajbabe to Botun (parcels UP 5 (lok 1) and UP 5 (lok 2) in the DUP Industrial Zone KAP), with an area of 11,15 ha;

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- The required land for the construction of the discharge pipe of the treated effluent from the WWTP to Moraca River, located between the municipal road from Dajbabe to Botun and Moraca River (parcel UP 6 in the DUP Industrial Zone KAP), with an area of 1,67 ha.

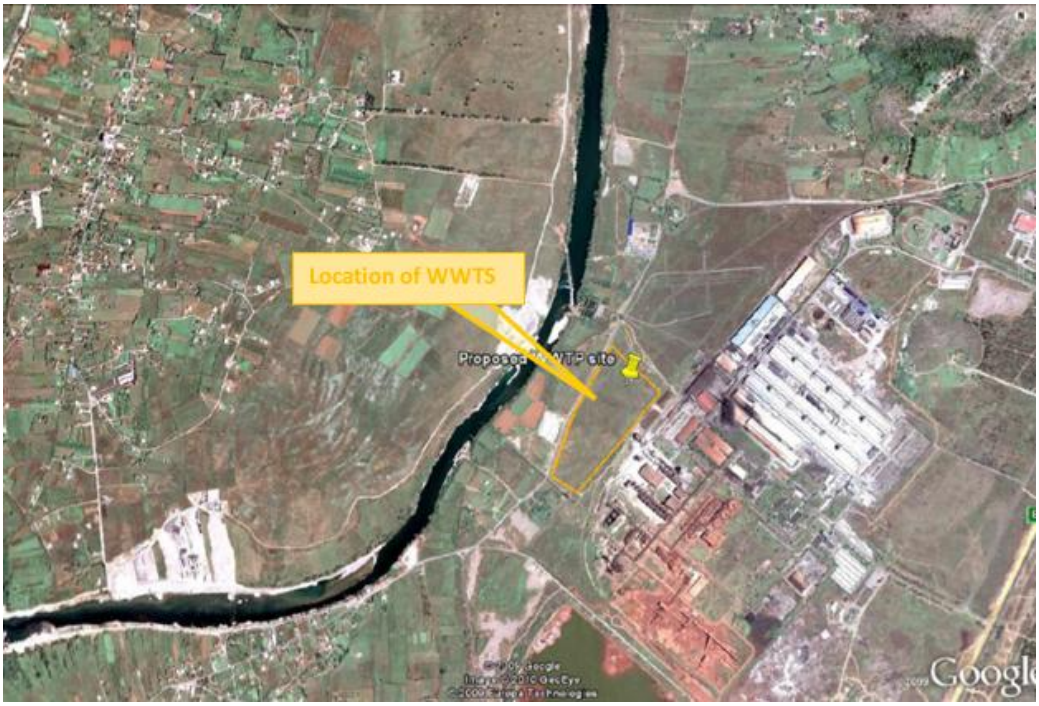


Figure 3. *View of the plot of the future WWTP*

The plot for the new WWTP is located about 300m from the nearest residential houses, which are located in the southwest. The village of Botun is located about 800m southwest.
The land of the proposed location is currently an unused meadow of no special value.





Figure 4.a and 4.b. *Location of the future WWTP*

Next to the plot there is a local road that connects the villages of Botun and Srpska with the settlements of Zelenika and Dahna. The plots on the other side of this road, towards the river Moraca are untidy and filled with various construction materials with waste.

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4.4. Project characteristics

4.4.1. Main project characteristics

Wastewater collected and evacuated from the city of Podgorica will be treated on a new wastewater treatment plant to be constructed in the area of Dajbabe and Botun on a dedicated plot in accordance to the Detailed Urbanistic Plan (DUP) "Industrial Zone –Kombinat Aluminijuma Podgorica" (KAP) of November 2008.

The plot is located between KAP Aluminium Factory and Moraca River and has a total area of 12,82 ha.

Wastewater collected by the sewer network of the city of Podgorica will be transferred from the site of the existing wastewater treatment plant to the site of the new WWTP through an approx. 5 km long DN 1.300 mm gravity sewer.
The wastewater treatment plant consists in the following facilities:

- Wastewater Treatment Plant (WWTP);
- Sewage Sludge Treatment Plant (SSTP);
- Sewage Sludge Incineration Plant (SSIP);
- Common facilities.

The applied wastewater treatment technology is the activated sludge treatment process with primary sedimentation and tertiary treatment for nitrogen and phosphorous removal as well as final disinfection. The wastewater treatment line comprises following main facilities:

- Inlet works including grit trap, coarse screen, lifting pumping station and fine screen;
- Grit and grease removal;
- Primary sedimentation;
- Aeration tanks;
- Final sedimentation tanks;
- Disinfection.

Sewage sludge produced from the wastewater treatment and extracted from the primary and final sedimentation tanks will be treated in anaerobic digesters to decompose the organic matter and produce biogas. Biogas will be used in the plant for the production of heat and electrical power through the use of Combined Heat and Power (CHP) equipment. The remaining sludge will be dewatered and incinerated in the sludge incineration plant (see below). The sewage sludge treatment line comprises following main facilities:

- Primary sludge storage tank and thickening by use of centrifuges;
- Excess sludge storage tank and thickening by use of centrifuges;
- Thickened raw sludge storage tank;
- Anaerobic digesters;
- Biogas storage and reuse for production of heat and power;
- Digested sludge storage and dewatering.

Digested and dewatered sewage sludge will finally be incinerated in a Sewage Sludge Incineration Plant (SSIP) which will be part of the wastewater treatment plant. The SSIP includes following main facilities:

- Concrete bunker for storage of dewatered sludge and reception of external sludge;
- Sludge drying system (contact dryer or belt dryer);
- Fluidised bed sewage sludge incinerator with reuse of flue gas heat for sludge drying;
- Electrostatic precipitator for flue gas cleaning and flue gas treatment;
- Supernatant storage tank and recycling pumping station.

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Common facilities of the wastewater treatment plant include principally:

- Administration building;
- Workshop and storage building;
- Transformer station medium and low distribution boards and emergency generator;
- Guard house;
- Internal roads;
- Fence and gate;
- Green areas.

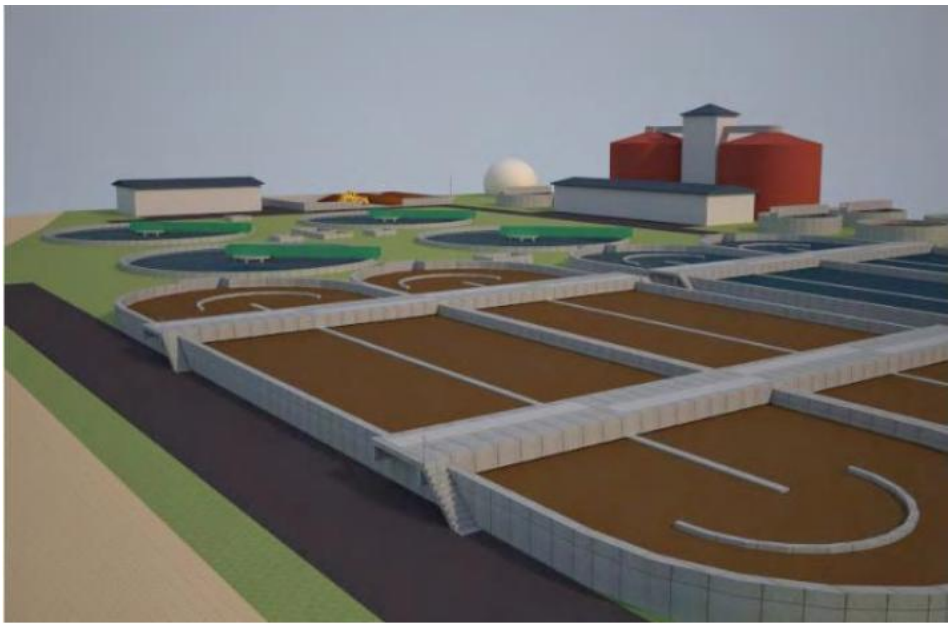


Figure 5. *3D view of the future WWTP*

4.4.2. Technical project characteristics

The Wastewater Treatment Plant is designed to treat wastewater from the Capital City Podgorica for the final design horizon 2045, with a possible intermediate design horizon 2035. The wastewater will be delivered to the plant by a new trunk main sewer (DN 1300), which will be connected at an inlet chamber with emergency overflow.

The Wastewater Treatment Plant (WWTP) comprises of primary, secondary and tertiary treatment. The secondary treatment is designed for carbon, nitrogen and phosphorous removal. The tertiary treatment comprises of micro filtration and UV disinfection.

Hydraulic loads under wet weather conditions will not differ much between the horizon 2023 and 2045. Therefore, all structures and hydraulic equipment are designed and foreseen to be implemented already at horizon 2023 for the required capacity in 2045.

For BOD and TN, the loads received in 2023 are 2/3 of the loads in 2045. At the intermediate design horizon (2035), the BOD load will be 81% and the TN load will be 90% of the loads of the final design horizon (2045). The major parameter for dimensioning is the TN load. As the TN load in 2035 will be 90% of the one in 2045, almost the full capacity will be required already in Phase I (2035). Therefore, the implementation of the WWTP for the full capacity is required already in Phase I.

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For the above-mentioned reasons, it is foreseen to design and build the WWTP already in the first implementation stage for the ultimate design horizon 2045. All infrastructure and hydraulic facilities are designed to be completed for the ultimate design horizon, incl. sludge treatment facilities and fully equipped already within the initial implementation phase.

The process design of the WWTP considers the different load scenarios for the design horizons 2023 (planned commissioning of the plant), 2035 and 2045. For 2023 extra industrial loads during the wine campaign (August – September; before implementation of the biological pre-treatment at „13. Jul-Plantaže" winery) are considered. For the design horizons 2035 and 2045 only very minor loads from discharge of effluents from "Plantaže" winery were considered as the winery has confirmed to reduce its discharged loads in accordance to the Montenegrin regulation for discharge into the public sewer by use of a biological pre-treatment at "Plantaže" winery prior to discharge of effluents.

In order to minimize operation, cost the dimensioning and division of the biological treatment into parallel process lines was optimized in such way that at start-up of the WWTP in 2023 only two lines out of three lines shall be operated. In the period between 2023 and 2035, depending on the actual extension of the wastewater collection rate, the third line will have to be taken into operation.
The overall concept of the WWTP was developed as such that the Operator will be able to deal with temporary malfunctions, breakdowns of facilities as well as regular revision and maintenance works without any drop in the treatment capacity below the design capacity and with the effluent and sludge requirements being met at all times.

For the degree of redundancy required, the design considers sufficient standby equipment and by-pass options regarding all relevant water and sludge treatment units as well as regarding the main equipment needed for power supply and plant control.

4.4.2.1. Working process of Wastewater Treatment Plant

The wastewater treatment process proposed is based on the activated sludge process and comprises the following units:

- Inlet chamber at the inlet with fecal reception station;
- Coarse screens;
- Inlet pumping station;
- Fine screens;
- Aerated grit and grease traps;
- Primary sedimentation tanks;
- Activated sludge tanks (anaerobic / anoxic / oxic) with phosphorus precipitation;
- Final sedimentation tanks;
- Disc filters;
- Channel UV system.

Main Gravity Sewer and Inlet Chamber

The wastewater will be delivered to the plant by a new trunk main sewer (DN 1300), which will be connected at an inlet chamber with emergency overflow and aerated stone pit. A septic reception facility shall be located adjacent to the inlet chamber.

Inlet Works and Mechanical Wastewater Treatment Facilities

The inlet works and mechanical wastewater treatment facilities consist of the following units.

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- *Coarse screens*

Four mechanically raked screens with a bar spacing of 20 mm shall be foreseen. They shall be installed in separate concrete channels which shall be equipped with eight penstocks so that each lane can be independently taken out of operation. The screenings on the bars shall be taken up by mechanically driven rakes and dropped on to a belt conveyor which transports it to a screening washing and screenings compacting unit. The screenings press then shall discharge the cleaned and dewatered screenings into containers.
The coarse screens shall be installed inside the building for inlet works and screens.

- *Inlet pumping station*

The inlet pumping station shall comprise of 2 pump wells, each having an area of approximately 24 m

^{2}, which can be separated by an automatically operated penstock. The inflowing wastewater after the coarse screens shall be directed either to both chambers or to only one of them by automatically operated penstocks.

- *Fine screens*

The remaining coarse material in the wastewater shall be removed in altogether four additional mechanically raked fine screens (spacing between bars: 6 mm). The fine screens can individually be taken out of operation by closing the penstocks before and after each screen. An emergency bypass channel with a manually raked coarse screen shall be provided for emergency cases.
The fine screens shall be installed inside the building of the inlet works and screens. The rakes of each screen shall drop the screenings onto a conveyor which shall transport the screenings to a screening press which itself shall discharge the pressed screenings into containers.
The building of inlet works and screens shall contain also the grit classifier where the grit shall be washed and dropped into grit containers.

- *Grit chambers with grease traps*

The grit shall be removed in two aerated grit chambers with parallel grease traps. To keep organic particles in suspension the grit chambers shall be additionally aerated. The sand at the bottom of each grit chamber shall be removed by scrapers mounted on a travelling bridge which discharge the grit into a grit sump at the head of each grit chamber. A twin travelling bridge shall be provided for the two grit chambers. Two submersible grit pumps (one pump is provided for each grit chamber) shall pump the grit from the grit sump to a grit classifier where the grit is cleaned and discharged in containers. The grit classifier shall also be housed in the building for inlet works and screens.
The blowers for the grit chambers shall be installed in a separate blower building.
The grease collected in the grease traps shall be transported to the end of the grit chambers where it shall flow over an adjustable overflow weir into a grease chamber. From there the grease and floating material shall be pumped to the raw sludge storage tank via a submersible pump (one submersible pump for each grease chamber) where it shall be mixed with the raw sludge and be fed into the digesters to increase the methane gas production. An inductive flow meter shall be provided in the pipe leading from the grit chambers to the distribution chamber at the inlet of the primary sedimentation tanks to continuously measure the incoming wastewater flow rate.

- *Primary sedimentation tanks*

Two circular primary sedimentation tanks shall be provided. The effluent of the grit chambers shall be evenly distributed to two primary sedimentation tanks in a distribution chamber. There, a wastewater sampling point shall be provided where an automatic sampler and probes for wastewater temperature, pH and conductivity are to be installed.
In the primary sedimentation tanks, the settleable mineral and organic solids shall be eliminated by gravity. The primary sedimentation tanks shall be equipped with travelling scraper bridges, with bottom sludge scraper blades and scum removal system. The settled sludge shall be evacuated by individual pipes to the primary sludge pumping station. The floating material on the water surface

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shall also be collected by skimmers mounted on the scraper bridges and shall be pumped to the primary sludge storage tank.

Biological and Chemical Wastewater Treatment Facilities

The biological and chemical wastewater treatment facilities consist of the following units.

- *Activated sludge tanks*

The effluent of the primary sedimentation tanks flows to a further distribution chamber where it shall be distributed to three activated sludge tanks.
The activated sludge tanks shall be designed for Nitrogen and Phosphorus removal and shall be set up in three treatment lanes consisting of one tank each. Every tank shall have four different compartments.
The first compartment of each tank shall be operated without aeration and no internal recirculation (anaerobic zone for biological phosphorus removal; only mixing). Under these conditions, polyphosphate-accumulating organisms (PAO) are selectively enriched within the activated sludge. These bacteria accumulate polyphosphate within their cells and the phosphorus within the cells of these bacteria is removed through final sedimentation.
In the second compartment denitrification shall take place (mixing only). Due to the lack of oxygen bacteria use oxygen bound in nitrate for BOD5 degradation.
A third compartment shall allow flexible aeration or non-aeration thus enabling denitrification or nitrification as desired. If denitrification is desired (for example in the summer) the aeration in this compartment shall be turned off and a mixer switched on. If nitrification is desired the aeration to this compartment shall be turned on.
The fourth compartment is always aerated, thus shall serve as obligatory nitrification zone. Here, autotrophic microorganisms shall oxidize ammonia to nitrate and further accumulate phosphorous into biomass.
In order to provide nitrate in the denitrification zone (second compartment) the effluent of the activated sludge tanks is recirculated to the denitrification zone (internal recirculation). The recirculation shall be performed by propeller pumps. Optionally, the effluent of the activated sludge with the nitrate can also be re-circulated to the Bio-P Zone to obtain an enlarged denitrification volume during times when Bio-P is not functioning due to low wastewater temperatures.
The third and fourth compartment will be equipped with fine bubble diffuser elements (nitrification zone). Pressurized air will be delivered by turbo blowers which shall be housed in a blower station. To control the air flow to each activated sludge tank, regulating valves shall be provided for each main delivery air pipe. The air supply shall be dependent on the dissolved oxygen concentration in each aerated zone, which shall be measured by installed DO meters. Each aerated zone shall be equipped with minimum one DO meter (minimum 3 in each oxic tank).

- *Final sedimentation tanks*

Four circular final sedimentation tanks shall be provided. The combined mixed liquor effluent of the three activated sludge tanks shall be evenly distributed to the four final sedimentation tanks in a distribution chamber.
The final sedimentation tanks shall be equipped with scraper bridges. Floating material and scum on the surfaces of the final sedimentation tanks shall be collected in skimmers and then pumped to the scum chamber.
The effluent of the final sedimentation tanks shall be conveyed to the tertiary treatment.

- *Blower station*

The required pressurized air for the aeration of the activated sludge tanks shall be produced by turbo blowers. The blowers shall be controlled by the pressure in the delivery air pipe.

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- *Return and excess sludge pumping station*

The return sludge from every final sedimentation tank shall flow to the pump sump of the return sludge pumping station. Three of four installed submersible pumps shall pump the return sludge to the first compartment of the activated sludge tanks (Bio-P) where it shall be mixed with the incoming wastewater. The return sludge pumps shall be frequency controlled.
The return sludge pipes shall be equipped with inductive flow meters to measure the return sludge flow rate.
The excess sludge shall be drawn directly off the pump sump of the return sludge pumping station via one of two submersible excess sludge pumps and pumped to the excess sludge storage tank.
The excess sludge flow to the excess sludge storage tank shall be measured by an inductive flow meter.

- *Chemical phosphorus precipitation unit*

Additional Phosphorus removal will be accomplished simultaneously in the activated sludge tanks by adding a precipitant (chemical phosphorus removal) during times when Bio-P does not reduce the phosphorus content to the required effluent concentration.
Precipitant may also be dosed into the influent of the primary sedimentation tank in order to achieve an improvement precipitation and solid-liquid separation. This may be helpful if an aeration tank has to be taken out of operation.
Chemical precipitant shall also be dosed into the thickened raw sludge collection tank for biogas desulphurization.
A double-walled storage tank with a storage capacity of at least 30 m^3 shall be provided for the chemical precipitant.
For the dosing of precipitant 8 membrane dosing pumps shall be provided. Four (3 + 1) membrane dosing pumps shall be used for the dosing of precipitant into the activated sludge tanks and two (1 + 1) for dosing into the influent of the primary sedimentation tanks. Two (1 + 1) membrane dosing pumps shall be utilized for dosing precipitant to the raw sludge mixing tank.
Both, the dosing line to the activated sludge tanks or primary sedimentation tanks and the dosing line to the raw sludge mixing tank shall be equipped with inductive flow meters for the measurement of the precipitant flow rates.

Tertiary Waste Water Treatment

In order to reduce the content of suspended solids prior to UV-disinfection disc filters with a mesh aperture of 10-20 µm shall be provided. The disc filter station shall comprise of 4-disc filter units (3 + 1) each installed in separate chambers. The effluent of the disc filters shall be disinfected by a channel mounted UV-disinfection unit and then be discharged to the Moraca River.

4.4.2.2. Working process of sludge treatment plant

The sludge treatment and biogas utilization facilities consist of the following units.

- *Primary sludge pumping station*

In the primary sludge pumping station two (2 + 1) submersible pumps shall pump the primary sludge from the primary sludge pit to the primary sludge storage tank. The primary sludge flow to the storage tank shall be measured by an inductive flow meter.

- *Primary sludge mechanical thickening*

Primary sludge shall be thickened in one of two (1 + 1) thickening centrifuges. The thickened primary sludge shall be pumped to the thickened raw sludge mixing tank by one of two (1 + 1) progressing cavity pumps.
The reject water shall flow to the reject water pumping station by gravity.

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- *Excess sludge mechanical thickening*

The excess sludge shall be thickened by one of two (1 + 1) centrifuges which shall be housed in the building for sludge treatment above the thickened raw sludge mixing tank.
The thickened excess sludge shall be discharged directly to the thickened raw sludge mixing tank by gravity flow.
For conditioning one polymer mixing station shall be provided. The polymer solution shall be pumped to the thickening centrifuges via two (2 + 1) polymer pumps.
The reject water of the centrifuges shall flow to the reject water pumping station by gravity.

- *Raw sludge mixing tank*

In order to equalize the feed of the anaerobic digesters and as a buffer tank a thickened raw sludge mixing tank shall be provided underneath the building for sludge treatment. It shall store the thickened primary and thickened excess sludge which together form the raw sludge. The mixing tank shall be equipped with mixers.
Two (2 + 1) progressing cavity pumps shall feed the thickened raw sludge semi-continuously into the digesters (for example 10 - 15 minutes on every hour).

- *Anaerobic digester*

Raw sludge shall be digested in two anaerobic digesters. The digesters shall be equipped with gas mixing lances and be insulated to reduce heat losses. Furthermore, the digesters shall also be provided with means for floating sludge withdrawal.
The heating of the digester shall be accomplished by circulating sludge from the digester through heat exchangers via 2 of 3 (2 + 1) recirculation pumps. Digested sludge shall be discharged to the digested sludge storage tank each time the digesters are fed.
As a result of the anaerobic digestion process methane gas shall be produced, which shall be utilized for heat and power generation

- *Digested sludge storage tank*

The digested sludge shall be pumped from the digested sludge storage tank to dewatering centrifuges located above the bunker of the sludge incineration plant.
For conditioning an additional polymer preparation station shall be provided. The polymer solution shall be pumped to the dewatering centrifuges by two (2 + 1) polymer pumps.
The dewatered sludge shall be directly conveyed to bunker. Supernatant shall be conveyed to the supernatant storage tank underneath the sludge treatment building.

- *Supernatant storage tank and pumping station*

The supernatant pumping station shall be equipped with two (1 + 1) submersible pumps. Due to its high concentration of ammonia nitrogen the supernatant shall be pumped to the inlet of the activated sludge tanks preferably at times with high BOD loads of the waste water.

- *Biogas utilization*

The methane gas produced in the anaerobic digesters shall be processed in gravel and ceramic filters and shall be stored in a double membrane gas storage tank from where it shall be utilized in the boiler and the CHP units for heat and electrical power generation (Combined Heat and Power generation: CHP). For desulfurization of the biogas chemical precipitant shall be dosed into the thickened raw sludge mixing tank to provide sufficient iron ions to bind hydrogen sulfide directly in the digester.

To ensure sufficient pressure in the biogas pipe to the CHP two gas blowers shall be provided, one shall be in operation the second one shall be provided as standby.

In cases methane gas cannot be utilized it shall be incinerated in a gas flare. The gas motors and the boiler shall be housed in a separate building adjacent to the sludge treatment building.

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4.4.2.3. Working process of sewage sludge incineration plant

The dewatered sludge from the dewatering centrifuges of the SSTP is fed to the collection chute of the sludge bunker. The moving floor of the collection chute pushes the sludge to the discharge conveyors. Here, a certain amount of sludge is transported to the drying system. The excess sludge amount is discharged into the bunker.

The sludge is fed to the thin-film dryer with a screw conveyor. The heat source for the drying process is the thermal oil from the boiler. The dry matter of the dried sludge is controlled to maintain a product with a consistent quality (0,35 - 0,45 kgDS/kg). The heat input can be varied by varying the thermal oil supply.
The vapour condensate is collected on the top and transported to the exhaust vapour condenser and quenched by injecting cold vapour condensate on the top. The condensate is removed by the condensate pumps and discharged to the supernatant storage tank of the SSTP. The remaining non-condensable vapour is injected into the fluidised bed furnace.

The dried sludge output of the dryer is fed to the combustion chamber at the top. The sludge is incinerated in the fluidised bed. The pre-heated air is supplied through nozzle floor at the bottom of the furnace. Flue gas and ash are transported through the freeboard and exit the furnace on the top.
The flue gas temperature has to be raised to > 850 °C for at least two seconds, and simultaneously kept below the ash melting temperature (approximately 920 °C). The combustion temperature can be controlled by:

- adjusting the air preheating;
- adjusting the combustion air flow;
- the addition of extra fuel (oil / gas);
- adjusting the dry matter of the sludge;
- adjusting of the sludge throughput; and
- by the injection of water in the furnace.

Unlike the combustion temperature, the heat output of the thermal oil boiler cannot be controlled directly, but is a result of the combustion process.
The flue gas is lead to the boiler and flows vertically though the boiler and the heat exchangers. The thermal oil flows through the heat exchangers in cross-counterflow and the flue gas is cooled down while the thermal oil is heated up. The outlet temperature of both the flue gas and the thermal oil is controlled by the thermal oil flow through the boiler. The fly ash is collected in dust collectors on the bottom of the boiler and transported to the ash silo.
The flue gas is lead to the electrostatic precipitator for the removal of the fly ash from the flue gas stream. The ash particles are collected in the ash chute and conveyed to the ash silo. This ash is suitable for later phosphorus recovery.

Activated carbon (AC) is used as adsorbent for volatile heavy metals and organic pollutants. Bicarbonate is used as the reactant for the desulfurization process. In the reactor, the bicarbonate and AC are mixed with the flue gas stream.
The resulting reaction salts are separated in the fabric filter. The flue gas flows through filter hoses. All particles are collected on the surface of the filter hoses. The filter hoses are periodically cleaned by compressed air and the residues are collected in the chute and transported to the residue silo.
The induced draft fan ensures the correct sub-atmospheric pressure in the combustion chamber and the transport of the flue gas through the whole system. The clean flue gas is lead to the environment through the stack. The stack is equipped with emission measurements to monitor the emission values.

The system technology previously described is shown schematically in the process flow diagrams in *Annex 10.3.* (*Source: Conceptual Design Wastewater Treatment Plant – Draft Version*).

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4.5. Project phases

The contract for the implementation of works for the construction of the complete Wastewater Treatment Plant including the wastewater treatment, sewage sludge treatment and sewage sludge incineration plants as well as all common and ancillary facilities will be awarded by way of International Competitive Bidding (ICB), following a two stage procedure with prequalification, in accordance to KfW Guidelines for Procurement. KfW Standard Bidding Documents will be used for tender and award of contract.
Conditions of Contract for the construction measures will be in accordance to FIDIC Conditions of Contract for Plant and Design-Built (FIDIC Yellow Book). The Contractor will be responsible for the preparation of the Preliminary Design and Final Design, the implementation of the whole construction works, the commissioning of the plant and the operation of the plant for a period of one year during which he will carry out the training of ViKs staff who will be responsible of the future operation of the plant.

The technological concept for wastewater and sewage sludge treatment as well as sewage sludge incineration presented in this Conceptual Design will be the base solution. Bidders will have to submit a proposal which is in accordance to the base solution and the set minimum requirements. Bidders can also, in addition to the base solution, submit a proposal for alternative technical solutions.

After completion of construction works, commissioning of the plant and successful tests on completion, the Contractor will be responsible for the operation of the plant for a period of one year with the staff assigned to the plant operation by ViK Podgorica.

During this period the Contractor will provide “on-the-job” training to the operation staff. After this period of one year and the successful completion of the Defects Notification Period, the plant will be handed over to ViK Podgorica who will be then solely responsible for its operation and management.

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5. BASELINE ENVIRONMENTAL AND SOCIAL CONDITIONS

5.1. Natural and environmental characteristics

5.1.1. Climate and meteorological conditions

The main factors of climatic types in the spatial coverage of the Capital Podgorica are the proximity of the Adriatic Sea and direct openness to it along the corridor line: Skadar Lake - Bojana River - Adriatic coast; altitude range from 4.6 to 2,487 m above sea level.

In relation to this position in space, in the general approach, the following can be singled out:

- sub-Mediterranean climate (shore of Skadar Lake, Zeta plain);
- altered mountainous sub-Mediterranean climate (lower positions of Lješanska nahija, Komani, Bandići, Piperi, Bratonožići, Kuči, Malesija 100 - 400 m above sea level);
- submontane climate (positions between 400 and 800 m above sea level)
- mountain climate (between 800 and 1,300 m above sea level);
- high mountain climate between 1,300 and 2,487 meters above sea level.

However, this vertical climatic zonation is significantly modified by the existing orographic features, so at the same altitude in relation to the relief forms and exposure we have a whole variety of microclimates.
The climate of the capital city of Podgorica is classified as a Mediterranean climate with warm and dry summers and moderately cold winters. Although the city is located about 50 km from the Adriatic Sea, the proximity of the Dinaric Alps in the north changes its climate. The average annual rainfall is 1,544 mm (60.8 in). The proximity of the Adriatic Sea and the influence of the mountainous hinterland results in the appearance of a changed Mediterranean type of climate with its specific characteristics, warm and hot summers and mild and rainy winters. Climatic conditions for the area of Podgorica were modified by Rumija and Sutorman as the first barrier by the sea, then Kamenik and Žijevo as the second mountain range of the Dinaric direction. The third barrier is Crna planina and Maglič and the fourth barrier in the far north is the "bouquet of Komovi".
The temperature exceeds 25 ° C in about 135 days a year. The period of average daily temperatures above 0 ° C lasts over 320 days a year, and above 15 ° C about 180 days. In Podgorica, the average annual temperature is 15.5 ° C with an average minimum of 5 ° C in January and an average maximum of 26.7 ° C in July. Podgorica is one of the warmest cities in Europe. The average annual number of tropical days (maximum temperatures above 30 ° C) here is 50 to 70 days. Podgorica is especially known for its extremely warm summers: temperatures above 40 ° C are common in July and August.
The highest recorded temperature was 44.8 ° C on August 16, 2007.
The number of rainy days is about 115, and those with a strong wind around 60. Periodic but strong north wind has an impact on the climate in winter.
The city with its structure and diversity of human activities is changing the environment and natural climatic condition. As a result, a multitude of microclimatic units are created, and the city itself gets a characteristic local climate.

The average relative humidity for Podgorica is 63.6%. The basic meteorological data from the meteorological station Podgorica issued by the Hydrometeorological Institute are as follows:
Snow is a rare occurrence in Podgorica, as it rarely falls more than a few days a year.

In the area of Podgorica, of the numerous winds blowing directions, two are mainly carriers of weather conditions (Wind Rose, Figure 6). These are the north and south, which blow mainly in the period September - April. The average number of days with wind is about 60, which has a special impact on the climate of Podgorica, affecting the subjective experience of temperature, making it two to three degrees lower. The strength of the north wind increases, almost proportionally, from the far north to the far south. Southerly winds are less frequent and less strong and usually bring precipitation.

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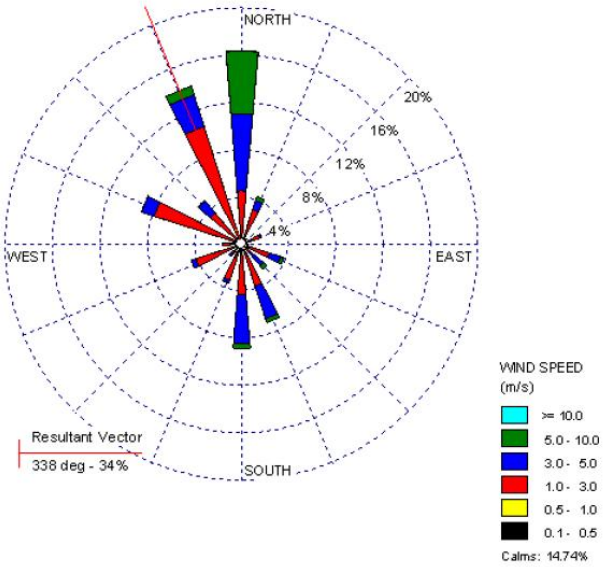


Figure 6. *Wind Rose in Podgorica*

From the aspect of air pollution, meteorological conditions are very important, which fortunately also affect the reduction of the concentration of pollutants in the air. Thus e.g. precipitation purifies the air and removes many pollutants.

The contribution of wind is also in the content of general air quality indicators. For example, the emission of smoke in the city is very pronounced, and its dynamics is accompanied by the content of sulfur dioxide.

Dominant directions, and of course wind speed, can be corrected by measurement data at the planned micro location, due to the exceptional variability of this meteorological factor in space and time. However, the route of the project in question is dominated by strong north winds, which should be especially taken into account.

In the area of Podgorica, silences are represented by 15%. The dominant winds are from the northern (30%) and southern (10%) quadrants. The resulting wind is from north. Velocities of 3-5 m/s and 5-10 m/s are represented directly from the north.

5.1.2. Seismological characteristics

From the microseismic point of view, the territory of the Capital City of Podgorica is located within a space with a very pronounced seismic activity. From the point of view of seismic in this area, there is an intense coupling of forces, and the occasional phases of increased tension affect the differential ascent or descent of the blocks.
Figure 2 shows a map of seismic regionalization of the territory of Montenegro (B. Glavatović et al. 1982) with zones of expected maximum earthquake intensities, expressed in MCS scale, while Figure 3 shows a map of seismic hazard of Montenegro and its surroundings (expected maximum horizontal acceleration of the soil in parts of gravity) within a return period of 475 years (EUROCOD 8) with a probability of realization of 70%.

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According to the map of seismic microregionization, the considered area belongs to the zone with the basic degree of seismic intensity of VIII° MCS.
According to the Map of seismic micro-regionalization, the area of Podgorica belongs to seismogeological zones from B3 to C3, which indicates a significant difference in soil acceleration, ie the intensity of the earthquake on the surface of the terrain. Based on the obtained average maximum soil accelerations expected in the specified seismogeological zones, for the stated return periods of time, seismic parameters for design were determined. The assumption was adopted that the facilities have a normal depreciation period of 50 years and a period of exploitation of 100 years, as well as the fact that the projected seismic forces relevant to their stability occur with the same probability of 63% with which earthquakes occur that in certain return periods of time cause certain maximum ground accelerations.

Expected maximum horizontal acceleration a^{o}_{max}(%g) and the expected maximum earthquake intensity I_{max} (EMS98) within a return period of 50 years, with a probability of realization of 63% is shown in Table 3.

Table 3. *Expected maximum horizontal acceleration and the expected maximum earthquake intensity*

Seizmički parametar	**Tip zemljotresa za povratni period od 50g-zona B_2**	**Tip zemljotresa za povratni period od 50g- zona C_3**
I_{max} (EMS98)	**7,30 – 7,35**	
a^{o}_{max} (%g)	**0,14**	**0,22**
Ks	**0,035-0,037**	**0,055**



Figure 7. *Map of seismic regionalization of Montenegro*

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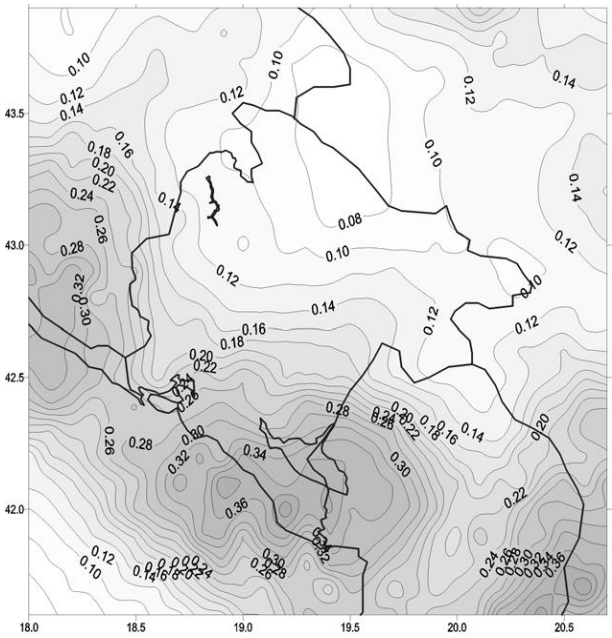


Figure 8. *map of seismic hazard of Montenegro and its surroundings (expected maximum horizontal acceleration of the soil in parts of gravity) within a return period of 475 years (EUROCOD 8) with a probability of realization of 70%.*

5.1.3. Geology and hydrogeology

Geological characteristics

The terrain on which the construction of the WWTP is planned is built by sedimentary rocks of the Upper Cretaceous and Quaternary.
The Upper Cretaceous is represented by stratified limestones that form the floor of Quaternary sediments and Dajbabska gora in the north and Srpska gora in the south.
Quaternary sediments are represented by sands, gravels, larger pebbles with and without various clays. Red clays occur along the edges of these hills, and often in the slope of these granular sediments on the limestone slope. Granular sediments are bound here and there by a carbonate binder to form true conglomerates.

The limestones of the surrounding hills of the WWTP site and the bottom below the granular sediments (Quaternary-fluvioglacial) were wrinkled and intersected with cracks, fissures and faults by geotectonic stresses changing the spatial settlement of layers and elements of folding and fracture structures in shorter strokes. This can be clearly seen in Dajbabska gora.

The terrain of the WWTP site belongs to the Zeta plain. WWTP and KAP with their facilities is on flat ground with elevations from about 33 m above sea level to about 20 m above sea level and with a slope from north to south with an altitude difference of 13 m, on a stretch about 2.5 km long.

A mound called Zmijan rises in the circle of KAP with an elevation of 51.5 m above sea level (about 20 m above the surrounding flat terrain). In the north is Dajbabska gora with an elevation of 159 m above sea level, and in the south Srpska gora with an elevation of 97 m above sea level.

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Hydrogeological features of the terrain

Cretaceous limestones are separated by interlayer surfaces by numerous faults (cracks, fissures, faults) caused by geotectonic stresses. In addition, during the Paleogene and Neogene, as well as the Quaternary, these rocks were exposed to the effect of karstification, expanding the discontinuities in the rock mass into caverns of variable dimensions and spatial settlement. All this makes the limestone rock masses of the slopes of Quaternary (glaciofluvial) granular sediments and hills that erupt through these sediments (Dajbabska gora, Zmijan and Srpska Gora) above the plain level very porous. In short, limestone rock masses in the field are characterized by a combined crack-cavernous porosity. This porosity makes the terrains that build limestone very permeable, which have the function of hydrogeological collectors and reservoirs for free groundwater.

Quaternary-glaciofluvial granular sediments (which flood the limestone mountains in the slope of the plain) are characterized by intergranular porosity, making the terrains they build very permeable with a filtration coefficient of $1x10^{0}$cm/s to $1x10^{-3}$cm/s. The thickness of these granular sediments is up to 70 m.
Precipitation (rain, rarely snow) sinks practically where it falls, feeding with waters a compacted aquifer, and in the lower horizons a broken-karst aquifer.
This aquifer is fed by water also from the watercourse of the river Morača, which touches the terrains of KAP on the west side.

The terrain of the plain north of KAP, south of Dajbabska gora, is at an elevation of about 40 m above sea level, and immediately south of Srpska Gora is about 25 m above sea level, while in the circle of KAP it is at about 30 m above sea level. The compacted aquifer is pointed from the Morača watercourse towards the southeast, and then slowly turns to the south, taking this direction as dominant already in the plain east of the Adriatic road. The data are presented on the basis of surveys for the days of 30.09.1970 and 8.08.1990.

In the plain south of Dajbabska gora, the depth to the groundwater level is about 20 m, in the circle of KAP about 15 m, and south of Srpska gora about 10 m. All this is based on the available data that do not give, nor can they give, a true picture of the average groundwater regime for a multi-year period.

5.1.4. Water

The territory of Podgorica is one of the water richest areas in Montenegro.
The richness of water bodies is the main characteristic of the Capital Podgorica. They consist of six rivers and numerous springs, wells and aquifers.

The hydrological system of the capital Podgorica belongs to the Adriatic Sea basin. The main surface watercourses include the Morača River with its tributaries:

- Zeta (main tributary, the mouth is upstream from the urban center);
- Ribnica (the mouth is in the city);
- Sitnica (the estuary is downstream from the urban center);
- Cijevna (the mouth is downstream from the city).

The Morača River is the largest river in the city, it is 70 m wide in the lower part of the city and forms a canyon 20 m deep along its course through the city. Its left tributaries are the rivers Ribnica and Cijevna, and its right tributaries are the rivers Zeta, Mareza and Sitnica.

The Morača River and the Ribnica River flow through the town, while the Zeta, Cijevna, Sitnica and Mareza rivers flow nearby.
The Morača River and the Ribnica River pass through the town in a north-south and east-west direction.

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The Morača basin discharges water into Skadar Lake, which is the largest lake in the Balkans; the great swamp is an integral part of the hydrological ecosystem of the lake.

Main hydrological parameters of Morača:
- Q absolute minimum: 5.5 m^3/s
- Q average: 140 m^3/s
- Q absolute maximum 900 m^3/s

The average annual flows of the two main tributaries - Zeta and Cijevna - are 73 and 25 m^3/s at the hydrological stations Danilovgrad and Trgaj (respectively), while Sitnica and Ribnica have a much lower flow and regularly dry up during the summer.

The average annual flow of the Morača River at the Podgorica hydrological stations is about 140 m^3/s, and the volume is about 4.415 million m^3. The highest monthly flow for the Podgorica station is in April and December, while in July and August the flow drops to the lowest values of less than 30 m^3/s.

The water level of the river drops drastically during the summer period, and during extremely dry years, even the Morača River dries up in the downstream parts (at the site around Bioč).
The waters of Morača to Bioč are completely clean, and water supply from those positions is possible in the future. Morača, for the most part, feeds groundwater in the Zeta plain, so from that aspect it is extremely important for the existence and development of Podgorica.

Water quality of the Morača river

Morača is sampled in 6 places and according to the classification of its water should belong to A1SK1 class upstream from Duklja - upper stream (Pernica and Zlatica) and A2CK2 class downstream from Duklja to the mouth of Skadar Lake (city beach Momišići, below the inflow of the City's Collector water - middle stream and Grbavci and Vukovci - lower stream).

In the upper course of the river Morača, the water quality exceeds the required credit rating according to some indicators: outside its class, ie in A2 or A3 class, at both measuring points, the physical-chemical parameters were: temperature (A2-A2), ammonium ion (A3C -A3C), phosphates (A2-A3), nitrites (A3C-C), TOC (A2-A3) and detergents (A3-A3); and only at the measuring point Pernica did the ionic Ca / Mg ratio appear in the A3 class, and at Zlatica the microbiological quality was outside its class - that is, the number of fecal bacteria in the A2 class, and the ionic Ca / Mg ratio was outside all classes (VK). Of certain classes, 71.9% belonged to the prescribed A1 class in Pernica, and 68.8% in Zlatica and 3.1% of classes were outside all classes - VK. Microbiological quality on Pernica was in the required A1 class, and on Zlatica it had a shift to A2 class.
In the area of the city, the waters of the city beach Momišići showed better quality than all measuring points on Morača, which is the impact of the inflowing waters of Zeta, which have better water quality and higher water level compared to Morača itself. Of the certain classes of this measuring point, 78.1% were in their class, and no case was VK (outside all classes).

Below the City Collector, as expected, the water quality of Morača is in the worst condition.
In its class there were 50.0% of classes, while VK (outside all classes) was 40.6% of classes in the following contents: ionic ratio Ca / Mg, BOD5, ammonium ion, phosphates, nitrites, TOC and microbiological indicators - the number of coliform and fecal bacteria (class bathing water and fish life), while the remaining 6.2% of classes were in A3 quality class - detergents and the number of colic and fecal bacteria (drinking water class).
Downstream from the impact of this greatest pollution, the situation is changing, thanks to the characteristics of Morača - cold water, fast flow, sandy bottom and the amount of water, as well as the influence of meteorological conditions. In the required class in Grbavci there were 53.1% of classes and 31.3% of VK. In Vukovci, the situation was significantly better than in Grbavci, 62.4% of classes

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were in the required class and 18.8% of VK. The reduction of pollution was reflected through the reduction of the content of: phosphate, BOD5, TOC and coliform bacteria.

Groundwater quality of the Zeta plain

The waters and aquifers of the Zeta plain are sampled in 6 places and are classified in the most demanding A class, because the water of some wells is still used today for drinking without any treatment. Well waters in only 35.0% of classes were in the required class, ie in many cases they were outside the prescribed class - 65.0% of cases, of which 9.2% belonged to VK by content: ionic ratio Ca / Mg, TOC, phosphate and nitrate. Pollutants, parameters, their content and spatial distribution are mostly the same as in previous years, and the most chemically polluted wells were wells in Srpska, Balijače, Mahala, Vranje, Gostilje and Drešaj, and joined by a well in Farmaci.

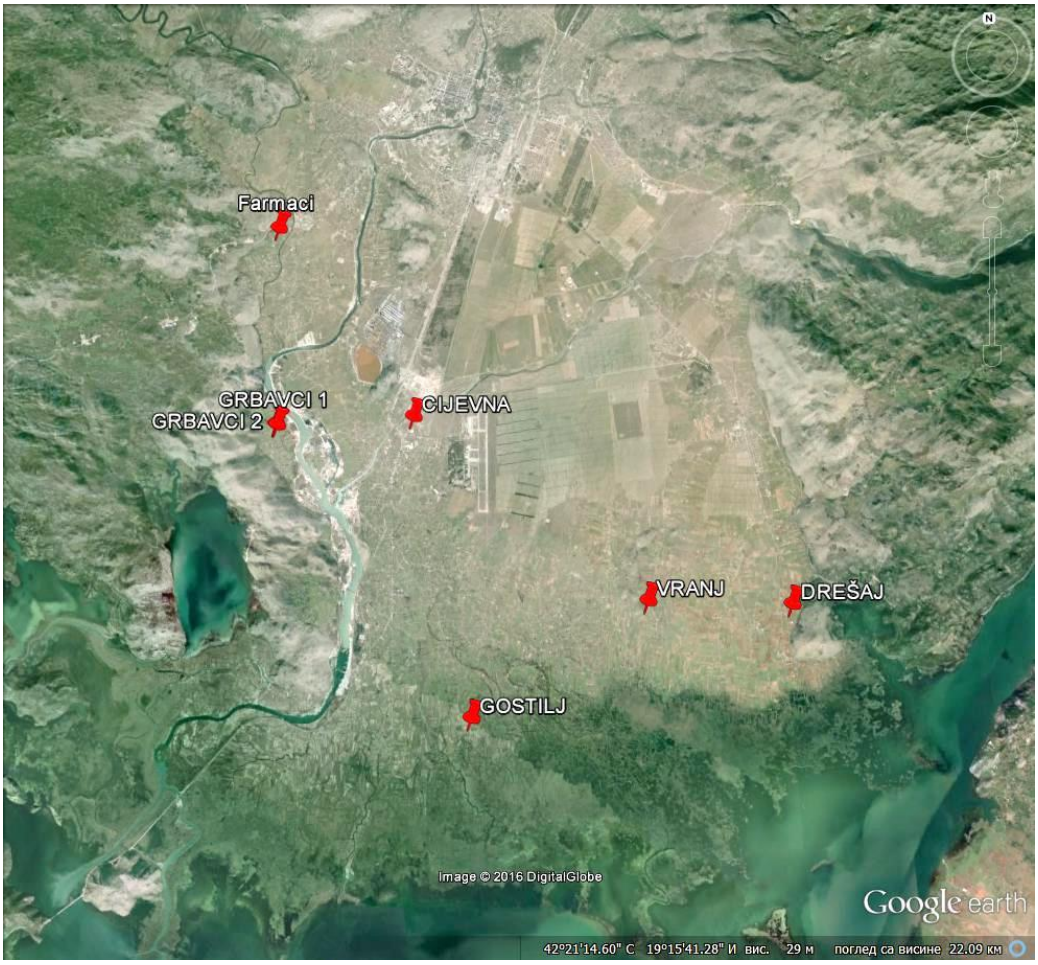


Figure 9. *Wells for monitoring groundwater quality in the Zeta plain*

The water temperature ranged from 13.2 to 20.1 ° C in the April-November measurement period. Most uniform temperature water had a well Cijevna 0.8 ° C and the highest variation was at the Grbavci well, 4.2 ° C. The waters had satisfactory organoleptic properties - no color and no characteristic odor.

Of particular concern is the nitrate content at the wells Vranj, Gostilj and Drešaj, where their contents have high values and reach up to 56.7 mg/l, 32.6 and 19.8 mg/l respectively. This is about the influence of artificial fertilizers - saltpetre on groundwater, because the potassium content is increased to 6.4 mgK / l - Gostilj, or 10.1 mgK / l - Vranj.

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Microbiological pollution with faecal bacteria of groundwater was shown in wells in Farmaci, Grbavci, Drešaj and Cijevna, A2 class. Only the quality of the well in Vranje from this aspect belonged to the required A class, but it is chemically polluted.

5.1.5. Waste management

Waste management on the territory of the Capital Podgorica is solved by the construction of the regional sanitary landfill "Livade" and the construction of a regional recycling center. Municipal waste on the territory of the Capital Podgorica is collected in the existing containers for collecting municipal waste (1.1 m^3), underground containers, containers for selective waste collection, recycling yards and containers with a volume of 5 m^3 used in some rural areas.

The company "Čistoća" d.o.o. Podgorica performs the following activities: waste collection, collection of non-hazardous waste, maintenance and cleaning of public areas, collection, transport and disposal of municipal waste for the needs of service users, collection and sale of secondary raw materials.

The company "Deponija" doo Podgorica performs reception, secondary selection and disposal of municipal waste, maintains the landfill, recycles metal and non-metal waste and residue, wholesales waste and scrap, collects and trades secondary raw materials and other activities of public interest.
Based on the above data, it is clear that all municipal waste generated at the WWTP site is temporarily disposed of in containers and then transported by the company "Čistoća" to the regional landfill "Livade".

During the analysis of the site for the construction of the new WWTP, it was determined that in one part of it, due to the proximity of KAP, there are different types of waste, due to which a part of the WWTP site was contaminated. It is about asbestos, plastic waste and other various residues, as well as the influence of fluorine, PAH and the like. In order to prevent further spread of pollution (fluorine, PAH, asbestos, plastic waste and residues) surface waste must be removed from the entire construction area, but also from the contaminated area in the north of the site. Collected waste should be disposed of in accordance with local legislation and in coordination with local authorities, e.g. at the municipal landfill. The amount of waste generated is estimated at approximately 100 m^3, of which approximately 10 m^3 of asbestos cement, melt slag, etc.

Due to a certain amount of contaminated land, the quantities of which should be determined through the preparation of a Feasibility Study, as well as the above-mentioned quantities of waste, special attention should be paid to solving this problem. All quantities of hazardous types of waste materials should be handed over to a company that has a permit from the Agency for Nature and Environmental Protection to take this sort of waste.

In order to adequately manage waste materials at the site of the new WWTP, it is necessary to make a Hazardous Waste Management Plan and a Non-Hazardous Waste Management Plan.

5.1.6. Air quality

Control and monitoring of air quality in Montenegro is carried out for assessment, planning and management of air quality. The analysis of the obtained results serves as a basis for proposing measures to improve and enhance air quality.
Implementation of the Air Quality Monitoring Program was performed in accordance with the Rulebook on the manner and conditions of air quality monitoring ("Official Gazette of Montenegro", No. 021/11), which prescribes the manner of air quality monitoring and data collection, as well as reference measurement methods, criteria for achieving data quality, data quality assurance and their validation.

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In accordance with the Decree on the establishment of a network of measuring points for air quality monitoring ("Official Gazette of Montenegro", No. 44/10, 13/11, 64/18), the territory of Montenegro is divided into three zones, which are determined by a preliminary quality assessment of air in relation to the limits of pollutant assessment based on available data on pollutant concentrations and modeling of existing data. The boundaries of the air quality zones coincide with the external administrative boundaries of the municipalities that are part of these zones. The area of Podgorica belongs to the Central Air Quality Zone.

Pursuant to Article 7 of the Law on Air Protection ("Official Gazette of Montenegro", No. 025/10, 043/15), the Air Quality Monitoring Program was implemented by D.O.O. "Center for Eco-Toxicological Research".

In the fourth quarter of 2018, the amended Decree on the establishment of a network of measuring points for air quality monitoring entered into force ("Official Gazette of Montenegro", No. 044/10, 013/11, 064/18 of 04.10.2018). This Decree prescribes the repositioning of measuring points which, on the basis of previous measurement results, have been determined to meet the conditions for relocation to a new location, as well as the redefining of air quality zones.
The concentration of the following parameters was measured: sulfur dioxide (SO_2), nitrogen monoxide (NO), nitrogen dioxide (NO_2), total nitrogen oxides (NOx), carbon monoxide (CO), methane (CH_4), non-methane hydrocarbons(NMHC), total hydrocarbons (THC), PM_{10} particles, ground-level ozone (O_3), benzene, toluene, ethylbenzene, o-m-p xylene (BTX).The assessment of air quality was performed in accordance with the Decree on determining the types of pollutants, limit values and other air quality standards ("Official Gazette of Montenegro", No. 045/08, 025/12).

Air quality results in Podgorica in 2018

At the measuring station in Podgorica, the average annual concentration of nitrogen (IV) oxide was 18.63 μg/m^3, which is below the limit value of 40 μg/m^3. There was no overrun of one-hour values.
At the measuring point Podgorica-Nova Varoš, the average daily concentrations of PM_{10} exceeded the prescribed limit value (50 μg/m^3) for 75 days. The allowed number of overdrafts is 35 days during the year. The annual average concentration was at the limit of the prescribed limit value (40 μg/m^3) and was 40.3 μg/m^3.

The maximum eight-hour average annual concentrations of carbon monoxide in Podgorica during 2018 were below the prescribed limit value of 10 mg/m^3.

The average annual concentration of benzo (a) pyrene in Podgorica was above the prescribed target value.

The average annual values of lead, cadmium, arsenic and nickel content in the suspended PM_{10} particles at the measuring station Podgorica-Nova Varoš were below the prescribed limit and target values.

5.1.7. Noise

Pursuant to the Decision on Determining Acoustic Zones on the Territory of the Capital of Podgorica ("Official Gazette of Montenegro-Municipal Regulations", No. 27/15), the area where the construction of WWTP Podgorica is envisaged belongs to the industrial zone, which indicates that on the border of this zone the noise must not exceed the limit values of the noise level in the zone with which it borders. The zone bordering the industrial zone belongs to the Quiet Zone in the agglomeration, where the permissible noise level during the day and evening is 40 dBA, and during the night 35 dBA.
The operation of the new WWTP with all planned facilities must meet these boundary criteria.

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Noise monitoring results in Podgorica for 2018

On the territory of the Capital of Podgorica, noise levels were measured at two locations: Stari Aerodrom, Bulevar Pera Ćetkovića no. 175, common residential building, I floor and I Proleterske brigade no. 33, mini bypass, individual residential building, 1st floor, in the interval of day (Lday) 07-19 h, evening (Levening) 19-23 h and night period (Lnight) 23-07 h.

The noise level in the first cycle was measured on the mini bypass, I Proleterske no. 33 in the period from 11-19. July 2018, and at the location of the Old Airport, Bulevar Pera Ćetkovića no. 175 on 19-26. July 2018.
The noise level in the second cycle was measured at the Stari Aerodrom, Bulevar Pera Ćetkovića no. 175, in the period from 01-06. November 2018 and at the location of the mini bypass, I Proleterske no. 33, 11-18. January 2019.

The values of the noise level indicators for day, evening and night exceed the limit values of the noise level in both the first and second cycle of measurements.
The values of the day, evening, night and total noise level indicators are higher in the second (winter) measurement cycle than in the first (summer) measurement cycle.
The average annual measured values of the day, evening and night noise level indicators exceed the limit value.
Only the evening noise level indicator in the first summer measurement cycle does not exceed the noise level limit values, while in the second winter cycle, all noise level indicators exceed the limit values.
Day, evening and night noise level indicators are lower in the first than in the second measurement cycle. The average annual measured values of all noise level indicators exceed the limit values.

5.1.8. Biodiversity

Flora

Thanks to the favorable microclimatic conditions, the area of the municipality of the capital Podgorica has an almost uninterrupted vegetation period. Based on the literature data, we can say that the wider environment of this area is characterized by a relatively diverse fund of plant species that mostly belong to the Mediterranean and sub-Mediterranean floral element.
The great diversity of the vascular flora of this area can be explained by the fact that the heterogeneous urban environment, which by itself implies the heterogeneity of habitats, enables the growth and survival of species with different survival strategies. This area is located in the vegetation zone of Oriental hornbeam (*Carpinion orientalis*, order *Quercetalia pubescentis*) in which a large diversity of plant communities has been recorded. In addition to indigenous plants, the vegetation cover of the city area of Podgorica consists of numerous non-indigenous species that dominate in some locations.
Ecological-phytogeographical study of the flora of the urban area of Podgorica showed that this area is inhabited by over 1200 species and subspecies, which represents more than a third of the vascular flora of Montenegro (Stešević, 2009). The families *Poaceae* (grasses), *Asteraceae* (sunflower family) and *Fabaceae* (bean family) are the most represented. Among grasses, some species are very common, sometimes with numerous populations such as *Eleusine indica, E. tristachya, Sporobolus poiretii* and *Paspalumdilatatum. Aster squamatus, Helianthus tuberosus, Conyza bonariensis, Crepis sancta* and others have a high frequency of occurrence. Among bean family, *Lathyrus cicera, Lotus corniculatus, Medicago orbicularis, M. grandiflora, M. sativa, M. rigidula*, several species of the genera *Trifolium* and *Vicia dominate*.
The location of the project is located in the industrial part of the city, surrounded by a park (left side of the main road Podgorica - Golubovci), which mostly builds Aleppo pine (*Pinus halepensis*) and cypress (*Cupressus sempervirens*). The degraded appearance of the park is the result of felling, fire and unfavorable weather conditions (due to the age or poor condition of individual trees, a large number of trees, most often pine trees, are destroyed during the winter months). In the increasingly

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open areas within the park, common and very widespread plants grow, mostly grasses. In addition to grasses, other wild plants grow, such as *Vicia sp., Fumariaofficinalis, Capsella bursa-pastoris, Lamium sp., Cirsium sp., Bellisperennis, Taraxacumofficinale, Centaurea sp., Euphorbia sp., Convolvulus arvensis, Cichorium. sp., Veronica persica, Geranium sp., Chenopodium sp.* etc.
The subject location is a flat surface, a spacious meadow where the flora is quite uniform and represented by herbaceous plants, among which the dominant grasses are Cynodon dactylon, Dactylis sp., Avena sp. (wild oats), Bromus sp ., Poa sp. and others. In addition to grasses, other herbaceous, annual plants that prefer this type of habitat grow here: Tordylium apulum, Matricaria chamomilla (chamomile), Althaea sp. (mallow), Achillea millefolium (ragweed), Euphorbia sp. (spurge), Fumaria officinalis, Auchusa sp., Medicago sp., Vicia sp. (vetches), Trifolium sp. (clover), Lamium sp., Papaverrhoeas, Plantago sp. (plantains), Ranunculus sp., Veronica sp., Taraxacumofficinalis (dandelion), Parsella bursa-pastoris (Shepherd's Purse), Geranium sp. (Bigroot Geranium), ... In the part towards the coast of Morača, there are woody species such as willow (Salix sp.), Hackberrie (Celtisaustralis), Vitexagnus-castus, then wild pomegranate (Punicagranatum), rose hip (Rosacanina) (Fig. 11), fig (Ficuscarica), thorn (Paliurusspina-christi) and others.



Figure 10. *The subject surface is flat and dominated by grasses*



Figure 11. *Among the shrub species that grow on the coast of Morača is the rose hip (Rosa canina)*

By visiting the site in question, it was determined that endangered, rare, endemic and protected plant species do not grow on it ("Official Gazette of the Republic of Montenegro, No. 76/2006").

Fauna

A review of the available professional and scientific literature shows that the subject area has not been researched in detail when it comes to its fauna, so it is not possible to realistically talk about its diversity (individual scientific papers, master's and doctoral theses are available, which mainly deal with certain groups of animals, e.g. only one genus, studies).

The fauna of the urban area of Podgorica consists of common urban mammal species such as bats (Chiroptera) (all recorded species are legally protected in Montenegro). In the wider area of the capital Podgorica live large game, such as wild boar, roe deer and chamois, and from smaller mammals foxes, martens, badgers, rabbits, squirrels. Of the reptiles, the most common are lizards (Lacerta muralis, Podarcis sp., ...), less common are turtles (Testudo hermanii) and snakes (like Aesculapian snake); of amphibian's frogs are present (e.g. toad, Bufo bufo). Among the numerous invertebrates, insects are the most numerous.
Somewhat more data refer to the ornithofauna of the area in question (Morača with its surroundings). In this part, 115 bird species were registered (surveys were conducted in 2008, without winter and early spring aspect), with the probability of occurrence of at least 15 more species that were not

recorded during these surveys, and are located in neighboring canyons (Mrtvica, Mala Rijeka, Cijevna). In the lower course of the Morača River, which gravitates to the area in question, due to intensive exploitation of gravel and stones during the warm months, "small lakes" are formed in which captured animals are ideal food for birds, such as little egret (Egretta garzetta) and Gray Heron (Ardea cinerea), Kentish plover (Charadrius alexandrinus) - the most important nesting bird of Morača, pygmy cormorant (Phalacrocorax pygmeus), great cormorant (Phalacrocorax carbo), common kingfisher (Alcedo attis), common whitethroat (Sylvia communis), European bee-eater (Merops) and others(Saveljić, 2009). All these bird species are protected by the law of Montenegro.
The closest watercourse to the location in question, the Morača River, has a torrent-flood character in this part. In this river, from the source to the mouth, live salmonid fish species: marble trout (Salmo marmoratus), brown trout (Salmo trutta), Balkan trout (Salmo dentex) (Mrdak, 2011), as well as California trout (Oncorhynchus mykiss) as introduced Species; of the other genera, common chub (leuciscus cephalus), Prussian silver carp (Carassius auratus gibelio), perch (Perca fluviatilis), eel (Anguilla anguilla) and others are present. However, trout " require" a high amount of soluble oxygen throughout the year and a water temperature not exceeding 20 °C, as well as a multitude of available food (a significant place in the diet of fish are larvae of Ephemeroptera, Simuliidae, Hironomida, Hydrachnidiae, ... ie river fauna bottom). Downstream of Dahna, the density of bottom fauna settlements is extremely low as a result of disturbances in the structure of bottom fauna settlements caused by constant habitat disturbance due to intensive gravel exploitation in this part of the stream. During the summer, due to very high summer temperatures in the Zeta-Bjelopavlićka plain, but also due to the small flow in those months, the water temperature of the Morača River reaches as much as 25°C, and the oxygen level drops below 5 mg / l, which is extremely unfavorable for trout species. During the summer months, in the lower reaches of this river (as well as the Zeta River), trout survive thanks to karst hydrology phenomena: there are many underwater springs that spring from the side of the river, under cut banks or from the bottom of ravines and pits and are abundant throughout whole year, even during the summer. In these places, there are local ecological conditions that correspond to trout species: the water temperature does not exceed 20 °C, and the level of dissolved oxygen is far higher than in other parts of the watercourse.
The subject area does not have the status of a protected natural asset. The presence of rare, sparse, endemic and endangered plant and animal species listed in the "Official Gazette of the Republic of Montenegro", no. 36/77 and 2/89 and “Official Gazette of the Republic of Montenegro”, No. 76/2006 is not evidented. Also, in the location that is the subject of this assessment, there are no habitats and species that the Berne Convention defines as a priority in protection, and of interest to the EU.

5.1.9. Previous environmental surveys („Zero“ state measurements)

In order to comply with National legislation and the EU, the obligation of the Investor is to determine the existing state of the environmental segments, before the start of construction of a new WWTP. Investor "Vodovod i kanalizacija" Ltd. Podgorica foresaw and at the tender selected organizations that will take samples for the analysis of soil, sediments and groundwater at the location in question. Samples were taken and analyzes of soil, sediment and groundwater of the new WWTP site were performed.

Soil quality

In accordance with the signed contract between Fichtner Water & Transportation GmbH - Germany and the Center for Ecotoxicological Testing Podgorica - Montenegro (CETI), the CETI team performed sampling and analysis of soil from the location of the future wastewater treatment plant, in order to assess possible pollution from an adjacent KAP plant. Sampling of soil samples was performed from 41 boreholes.

The quality of land in Montenegro is regulated by the "Rulebook on permitted quantities of hazardous and harmful substances in the soil and methods for its testing" (Official Gazette of the Republic of Montenegro, 18/97).

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The results of the tested samples showed that in one part of the site there are increased concentrations of chromium, nickel, fluorine and PAHs, which does not meet the requirements of the Rulebook on permitted quantities of hazardous and harmful substances in soil and methods for its testing. “, No. 18/97).

There are no regulations for the maximum permitted concentrations of pollutants in sediment in Montenegro, and the results of the analysis of sediment samples were observed in relation to the recommendations of Dutch and Italian standards. The results of physical and chemical tests have shown that it is necessary to predict the remediation of soil, sediments and groundwater in the part of the site of the new WWTP, where increased concentrations of hazardous and harmful substances have been determined.

The location that is the subject of testing is located west of the PAK plants: Electrolysis and Anotec, and the impact of these production plants is evident throughout the site both in terms of fluoride content (influence of Electrolysis) and in terms of PAH (Anotec) content.

The impact of disposed waste / mineral oils as well as the combustion process has resulted in an additional increase in PAH content at certain micro (individual) sites and a significant mineral oil content. Thus, for example, in the vicinity of borehole 23, on an area of about 40 m2, the remains of burned wood waste are evident, which has further increased the PAH content.

In most boreholes as representatives of a certain area (except borehole 4), the PAH content decreases with increasing depth. The content of TPH, however, increases with depth, which is a consequence of different density, porosity, structure, permeability of the soil: clay alternates with sand and gravel.

When it comes to TPH, the content in some boreholes or soil/gravel samples is several times higher than the maximum allowed concentration of 750 mg/kg, which is the maximum allowed level in Italian legislation.

The PAH and TPH content in boreholes (B3, B4, B11, B14, B15, B25 and B28) by depth is such that the PAH content is above the Italian standard of 100 mg/kg for industrial soil only on the surface layer of B3 borehole, while the TPH content is different in depths in the said boreholes.

The TPH content does not exceed the intervention level of the Dutch standard of 5000 mg/kg in any of the boreholes, but it is enough above the "target" level (50 mg/kg) to recommend further research in that case.

Figure 12 shows the distribution of fluoride concentration in the soil surface layer. Lines of equal concentration are based on the 2017 survey (red dots). In addition, the results of the research for 2019 are shown in blue.

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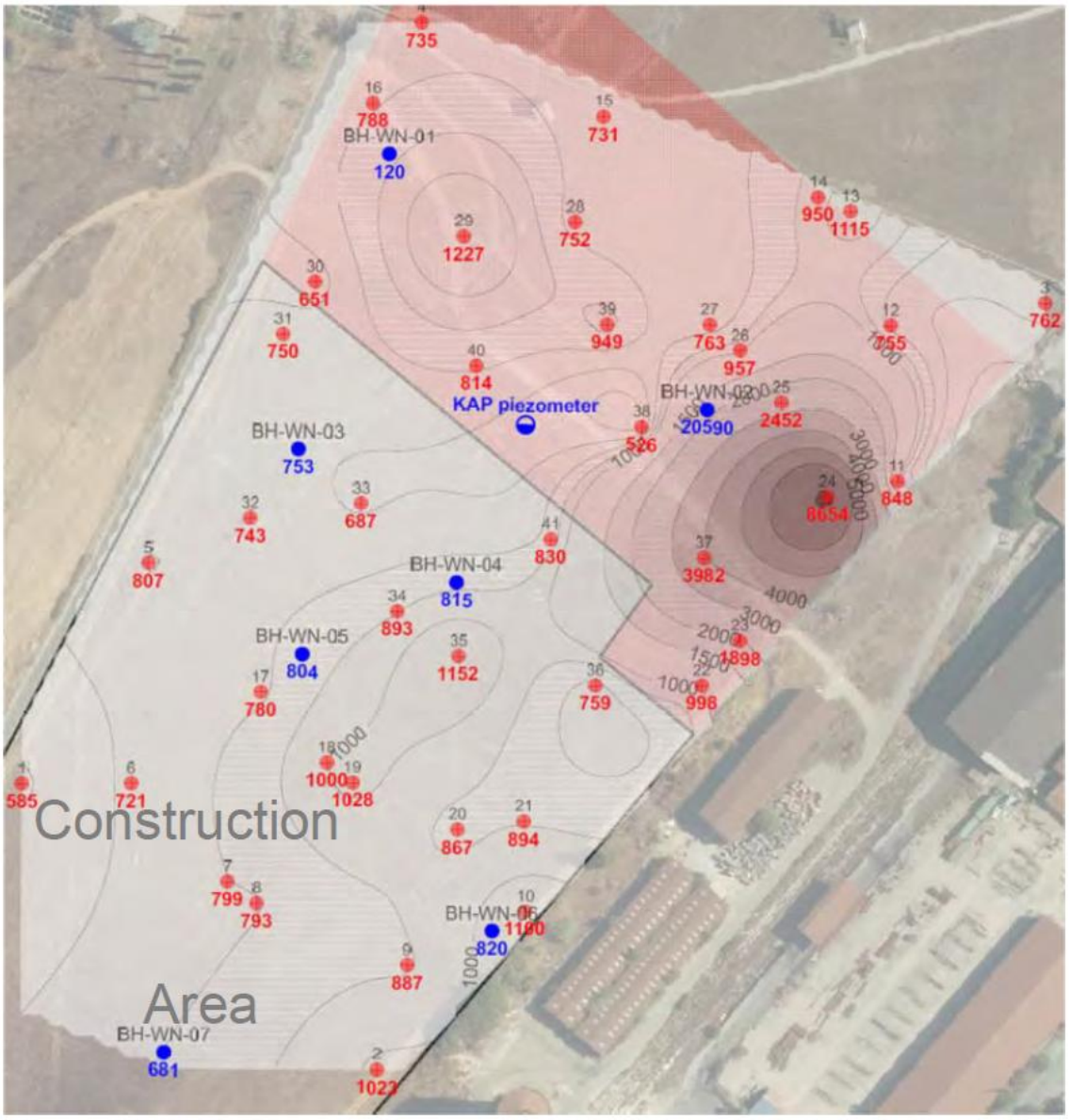


Figure 12. *Location of future WWTP: fluoride concentration in mg / kg in the surface layer. Results from 2017 in the form of lines of the same concentration and red dots and blue dots results from 2019.*

Lines of equal concentration, measured in 2017, show a strong increase in concentrations to the northeast of the site. On the remaining surface, and thus on the entire surface for the construction of the new WWTP, a significantly increased concentration of fluorine in the range of 600-1,000 mg / kg was measured.

The test results in 2019 confirm this distribution with high concentrations in the northeastern well BH-VN-02 and slightly increased values in all other places.
Figure 13 shows the distribution of PAH concentration in the surface layer. Lines of equal concentration are based on the test results from 2017 (red dots). The test results for 2019 are shown in blue.

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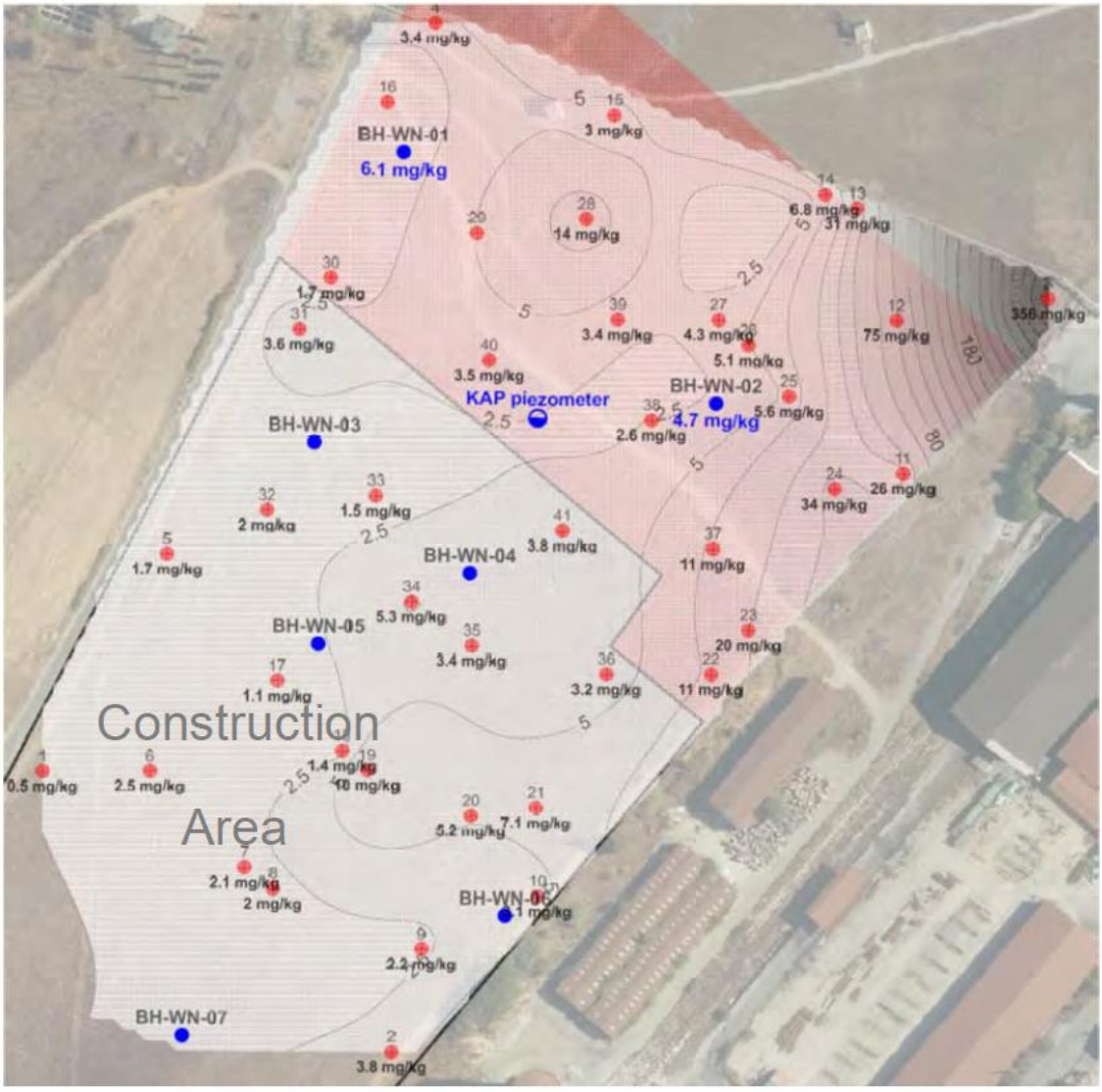


Figure 13. *Location of future WWTP: PAH concentration in mg / kg in the surface layer. Results from 2017 in the form of lines of the same concentration and red dots and blue dots results from 2019.*

Lines of equal PAH concentration, measured in 2017, show increasing concentrations toward the northeast of the site. Significantly higher concentrations are limited to the point in the northeast. Even at a short distance from this point, the values decrease rapidly. Moderately higher concentrations were measured in the entire construction area in 2017. The results on boreholes BH-VN-01 and BH-VN-02 determined in 2019 confirm this distribution.

Figure 14 shows the distribution of TPH concentration in the surface layer. Lines of equal concentration are based on the results of the 2017 survey. The 2019 survey did not examine near-surface samples for TPH.

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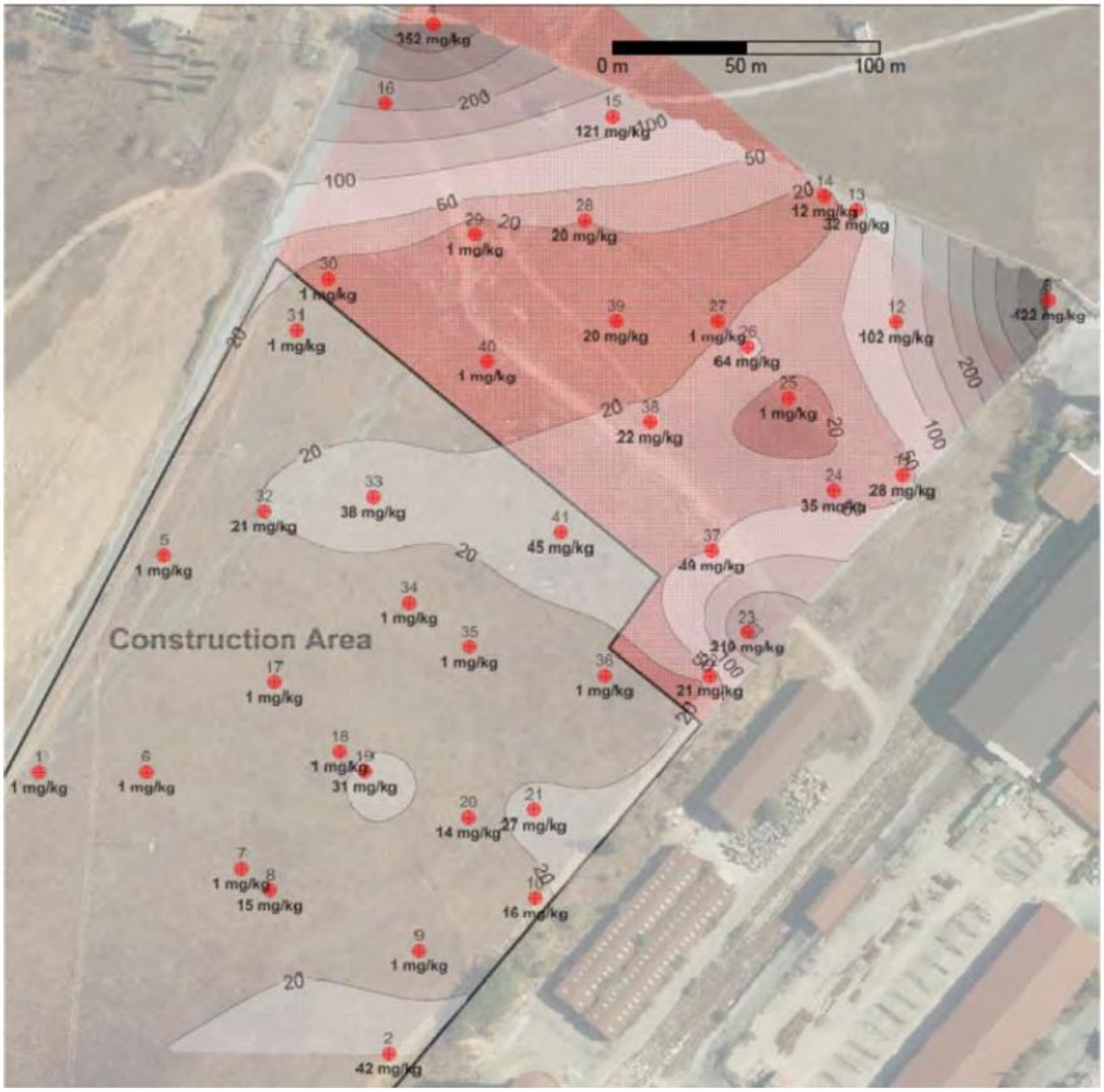


Figure 14. *Future WWTP location: TPH concentration in mg / kg in the surface layer. Results from 2017 in the form of lines of the same concentration and red dots*

The concentration of TPH is again significantly higher in the northeastern and northern zones, while at the WWTP construction site it is imperceptible. Tests for 2017 showed increased hydrocarbon values, especially in the deeper layers of the soil.

Figure 15 shows the distribution of the maximum concentration of TPH in the deeper soil layers of 2.0 - 5.0 m.

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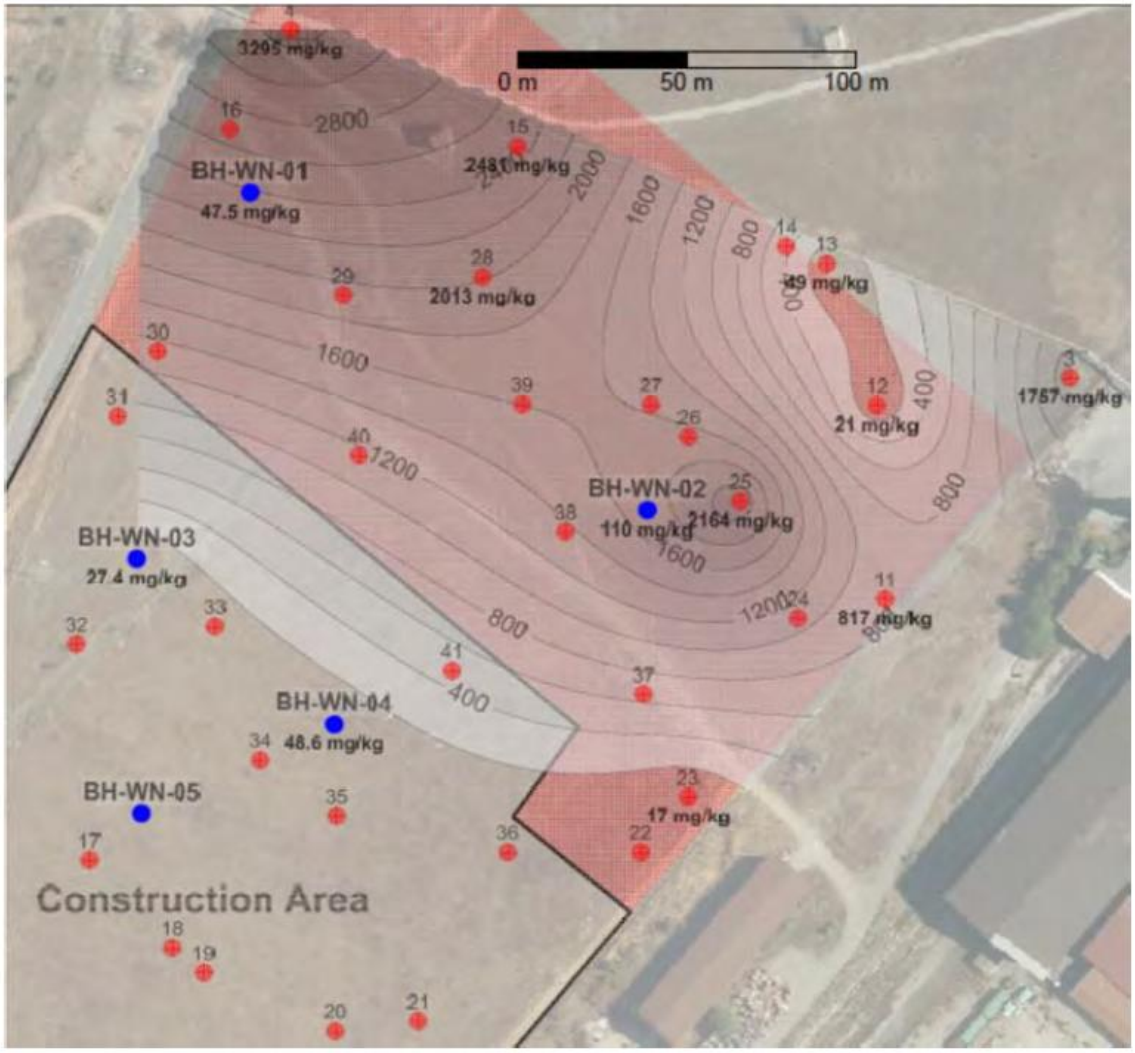


Figure 15. *Location of future WWTP: TPH concentration. Maximum in deeper soil layers (2.0 - 5.0 m) in mg / kg. Results from 2017 in the form of line of the same concentration and red dots and blue dots from the results from 2019.*

The 2017 results show three hotspots (criticalpoints) of increased TPH concentrations in the deeper soil layer in boreholes 3, 4 and 25. The findings in boreholes 3 and 4 correspond to increased concentrations in the surface layers (Figure 14), while the concentration in the surface layer is rather low in borehole 25.

In 2019, the newly determined TPH concentrations in the deep soil layers were significantly lower than the interpolated values of the 2017 survey. Within the construction area all concentrations measured in 2017 and 2019 were imperceptible.

In 2019, points with increased values for TPH in 2017 were also tested on PCBs, which sometimes appear with TPH. No increased PCB concentrations were observed.

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Groundwater quality

The results of groundwater sampling on the KAP's piezometer show that the examined parameters are completely imperceptible. Only the fluoride values and the value of the electrical conductivity are slightly increased.

The water sample from the KAP's piezometer (No. 101/04) corresponds to the quality of class A1 according to the Rulebook on classification and categorization of surface and groundwater (Decree on classification and categorization of surface and groundwater) ("Official Gazette of Montenegro", No. 02/07) only due to the value of electrical conductivity in relation to the prescribed value.The concentrations of all other parameters measured in groundwater correspond to water quality A0.

5.2. Social baseline

According to the last Census (2011), population of Montenegro was 620.079, while the most recent population estimate indicates that population size in 2019 was 622.028, which represents an increase of 0.31% since 2011.
This project is being implemented in Podgorica, the capital of Montenegro. According to data from the latest census (2011), population size of Podgorica is 187.085, while its population density is 129 people/km^2. Population of Podgorica represents 29.99% of the total Montenegrin population (Census 2011). Population size of Podgorica increased by 1.16% in the period from 2011 until 2019[2], which is an indicator of the trend of growth of economic activity in the Capital. An overview of the population dynamics in Podgorica and Montenegro, during the period from 2011 until 2019, is shown in table below.

Table 4. *Population of Podgorica and Montenegro in 2011 and* 2019 (Source: MONSTAT)

	Population 2011	**Population 2019**	**2011 vs. 2019 (%)**	**Share in total population 2011 (%)**	**Share in total population 2019 (%)**
Podgorica	187.085	189.260	1.16	30.17	30.42
Montenegro	**620.079**	**622.028**	**0.31**	**100**	**100**

5.2.1. Demographics

Settlements which are located closest to the project area are Srpska and Botun. According to the most recent available data (Census 2011), the number of people living in Srpska was 886, or 252 households, while the population size of Botun was 696, i.e. 180 households.

Structure of population in Botun and Srpska shows higher representation of men in both settlements (51.07% in Botun and 52.84% in Srpska), while majority of population 10 years old and older is literate. A detailed overview of the population structure is shown in Table 5 below.

[2] Estimated population size of Podgorica in 2019 was 189.260 (Statistical Office of Montenegro, MONSTAT)

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Table 5. *Demographic characteristics of population in settlements*

Category		Botun	% (settlement population)	Srpska	% (settlement population)
Population		697		880	
Gender	Female	341	48.92	415	47.15
	Male	356	51.07	465	52.84
Literacy[3]	Literate	590	98	753	97.41
	Illiterate	12	2	20	2.58

Although there is no official data about the population in the project area, site visit was carried out and it was determined that this area is characterized by a low number of households, whereby there is a high number of dilapidated and/or abandoned residential objects. Photos from site visit are show below and they are indicative of the residential structure and landscape in the project area.



Figure 16. *Dilapidated house in proximity to the project area*

[3] Refers to population 10 years old and above.

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Figure 17. *Populated house in the wider project area*



Figure 18. *Landscape in the project area*

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Figure 19. *Position of the project area in reference to houses*



Figure 20. *Project location 1 (main facility)*

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Figure 21. *Project location 2 (auxiliary facilities)*

5.2.2. Land use

This project is being implemented in the area which is defined as primarily industrial, whereby the bordering settlements are located in the wider project area. Namely, the WWTP and all the pertaining facilities are going to be built on land plots which are owned by "KAP", the Capital of Podgorica and the Government of Montenegro (UP 5 and UP6), as shown in Project Description. Total land surface which is going to be taken for the purpose of construction of the project facilities is 128.198m^2. The project area is regulated by the Detailed Spatial Plan "KAP", which defines the following types of land use: *industry and production; central activities; surface and landscape management*[4].

Considering the fact that this area is defined for industrial purposes, and that the land at which the facilities are going to be built is owned by "KAP" and the Capital Podgorica, land acquisition/expropriation is not going to be carried out among private individuals. Thus, private individuals are not going to be affected by acquisition and/or occupation of their private land plots.

5.2.3. Agriculture

Agriculture is not represented in the project area, considering the fact that the subject space is primarily used for industrial purposes. Additionally, considering the fact that there are no populated residential objects in the immediate project area, it may be concluded that agriculture is not represented in the project area.

[4] ID DUP Industrial Zone "KAP", Podgorica, p.29

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5.2.4. Economy and employment

Podgorica represents the central point of economic activity in Montenegro, which may be recognized in the fact that it had the highest share of active business entities in 2019 (36.2%, i.e. 12.565) in comparison to all other municipalities. However, when it comes to the project area, it is predominantly characterized by industrial production, which primarily relies on production of metal (aluminum). On the other hand, sector of business activity which has the highest representation in Montenegro is *retail and wholesale, and repair of vehicles and motorcycles*. The number of this type of companies in 2019 was 10.602, which represented 30.6% of companies in Montenegro.

Wider project area is characterized by a number of companies which have storage facilities along the main road which leads towards the Airport and the southern region. Thus, this shows that the wider project area represents a significant strategic location for large companies which are engaged in storage and distribution of goods and materials and repair of motor vehicles.

When it comes to employment in the settlements located in proximity to the project area, data shows that the share of unemployed people is 13.66% in Botun, and 14.45% in Srpska. Additionally, data shows that there is a high share of retired people and housewives in the two settlements (21.40% retired people in Botun and 15.89% in Srpska). A detailed overview of the population structure according to business activity is shown in Table 6.

Table 6. *Economic activity of population in Botun and Srpska*

Category		Botun	% (settlement population)	Srpska	% (settlement population)
Employment	Unemployed	76	13.66	100	14.45
	Employed	163	29.31	219	31.65
	Retired	119	21.40	110	15.89
	Student	44	7.91	66	9.54
	Housewife	152	27.34	195	28.18
	No response	2	0.36	2	0.29
	Total	556		692	

5.2.5. Livelihoods

This project did not require a socio-economic survey for the purpose of establishing the social and demographic baseline, thus there is no data about livelihoods of people living in the settlements which are located in the wider project area. However, it is assumed that majority of people are employed locally, i.e. in large companies which operate along the main road and/or in the urban area of Podgorica.

5.2.6. Infrastructure

Power supply
The project area is defined by the Detailed Spatial Plan "KAP", according to which this area is equipped with various power supply objects which have different types of voltage: 110kV, 35kV, 10kV and 1kV. Households in the wider project area are connected to the power supply system.

Specifically, then it comes to the project area, it is equipped with the following systems:
- Overhead power line, 35kV.

Water supply
The only public water supply system in the wider project area which is regulated by the Public Enterprise Water Supply and Sewage is the water pipeline along the railway Belgrade-Bar. Another

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project which is being implemented as part of the wider programme of activities related to water supply and water treatment is aimed at providing public water supply to all the households in the wider project area.

Telecommunication
The wider project area, which is defined by the Detailed Spatial Plan "KAP" is equipped with the telecommunication system "RSS KAP", which is located in the premises of the "KAP" HQ. This system provides direct connections to the users and its capacity is sufficient for all the existing and future users in the area covered by the subject spatial plan. Additionally, construction of a new telecommunication system is planned in this area, in order to provide preconditions for connecting individual objects which are planned to be built in the area.

Public transportation
Public transportation system is regulated by the Capital Podgorica and it relies on bus traffic. The bus line which is operational in the wider project area is Podgorica-Dajbabe-Botun, and it connects the residents of the local settlements to the wider rural and urban areas in Podgorica. This bus line operates 13 times per day, while there is bus traffic on Sundays. Additionally, this bus line is operational less frequently during the period when schools do not work, whereby it operates 8 times per day during these periods.

5.2.7. Education

There are no educational facilities in the immediate project area. However, the closest school is located in settlement Srpska (Elementary School "Vladika Danilo", 42°22'28.6"N 19°13'25.2"E), at the distance of 1.966m[5] from the project area.

5.2.8. Community Health and Safety

Considering the fact that socio-economic survey was not required for this project, there is no official data regarding community health and safety. The closest public health institution is Golubovci Health Centre 42°19'38.8"N 19°13'17.8"E, which is located at the distance of 7.107m from the project area. Locations of community facilities in the wider project area are shown in figure below.

[5] Distances shown in this document represent the closes aerial distance from the project area

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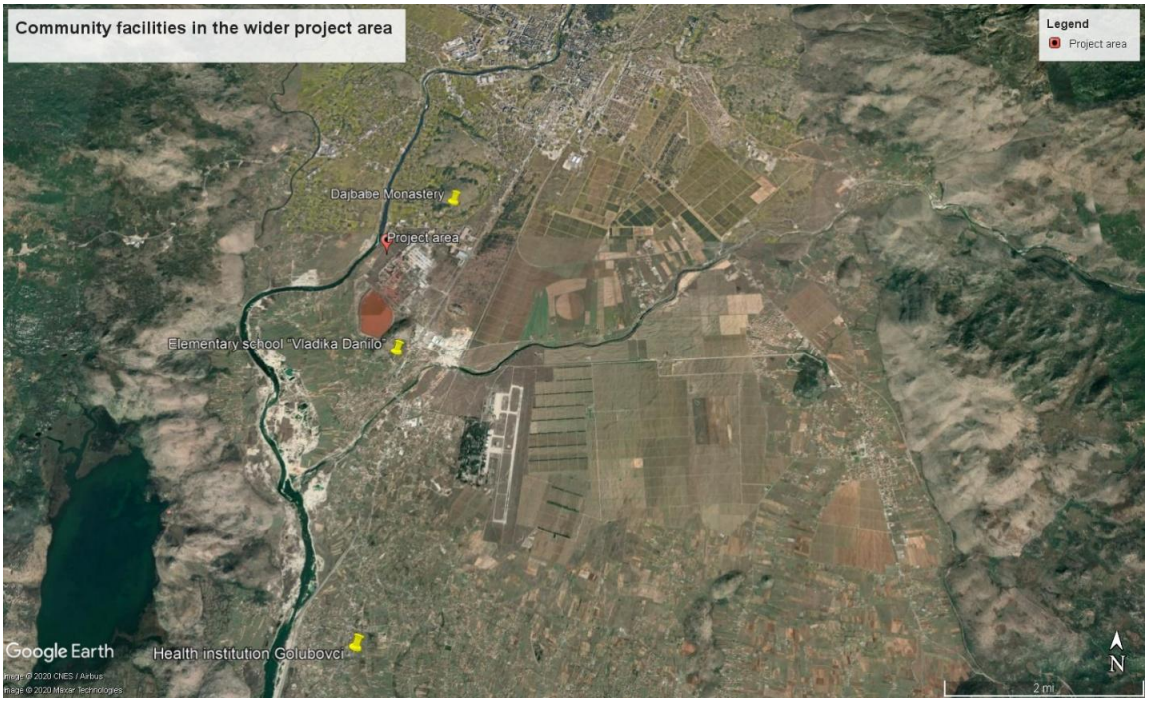


Figure 22. *Community objects in the wider project area*

5.2.9. Poverty and Vulnerable groups

Data about poverty in Montenegro is published on the national level, and the most recent data was provided by the Statistical Office of Montenegro in 2017. According to data, absolute poverty line in Montenegro was 192.42 EUR (single households).
Official statistical data about poverty and vulnerable groups does not exist on the level of settlements, and since socio-economic survey was not carried out for the purpose of this project, there is no data about poverty and vulnerable groups in the project area.

5.2.10. Cultural heritage

Podgorica is characterized by a significant number of cultural and historical monuments and resources. However, there are no cultural monuments and/or resources in the project area.
Cultural monument which is located closest to the project area is Dajbabe Monastery, which is located at the distance of 940m from the project area. This monastery is classified as an II category cultural resource, according to the Law on Protection of Cultural resources ("Official Gazette of Montenegro", 49/10). This monastery is also equipped with domestic quarters, which are used by the monks.

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6. ENVIRONMENTAL AND SOCIAL IMPACTS

6.1. Impact assessment approach and methodology

The Law on Environmental Impact Assessment ("Official Gazette of Montenegro", No. 75/18) regulates the manner and procedure of impact assessment for projects that may have a significant impact on the environment, preparation and evaluation of studies on environmental impact assessment and other issues relevant to environmental impact assessment. The law is fully in line with EU guidelines, which define this area.

Environmental impact assessment is a procedure that includes: preparation of studies on environmental impact assessment, participation of interested bodies and organizations and the public, procedure of assessment of studies and decision-making on giving or refusing to give consent, as well as explanation of significant project impacts on the environment on which the decision is based, taking into account the results of the public consultation.

This Law, through environmental impact assessment, determines, in each individual case, the direct or indirect impacts of the planned project on the population and human health; biodiversity, in particular protected species of plants, animals and fungi and their habitats; land, water, air, climate and landscape; material goods and cultural heritage; as well as the interrelationships of the aforementioned elements.

The subject of impact assessment are projects that are planned and carried out, which can significantly affect the environment or human health. Impact assessment is performed for projects in the field of industry, mining, energy, transport, tourism, agriculture, forestry, water management, utilities and projects planned in the protected natural asset and the site of immovable cultural property.
Impact assessment is not performed for projects intended exclusively for the purpose of defense, ie elimination of the consequences of natural disasters and natural disasters.

The holder of a project for which the preparation of a study is obligatory or of a project for which a decision has been made on the need to prepare a study, cannot start the project, ie obtain approval to perform activities without consent on the study or a decision that no study is required.
When the impact assessment procedure includes the implementation of the acceptability assessment procedure, the acceptability assessment procedure is carried out within the impact assessment procedure in accordance with the law governing nature protection.
When the impact assessment procedure is carried out within other procedures in accordance with special regulations, these procedures are carried out in a harmonized manner.
The study and consent to the study, or the decision that it is not necessary to prepare a study, is an integral part of the documentation required to obtain a building permit, or application for construction, approval or consent to start the project.

6.2. Potential area of influence

The location where the construction of the wastewater treatment plant in Podgorica is planned is located in the southern part of the Capital, in the immediate vicinity of the Aluminum Plant from Podgorica and belongs to the planning document DUP Industrial Zone KAP.

According to the DUP of the industrial zone of KPA, which covers an area of 483.68 hectares, and which was adopted in 2009, the new WWTP is located next to the KAP facilities, and borders its processing plants, water supply wells, canal for wastewater, as well as with the road to the settlements of Dajbaba / Zelenika and Botun.

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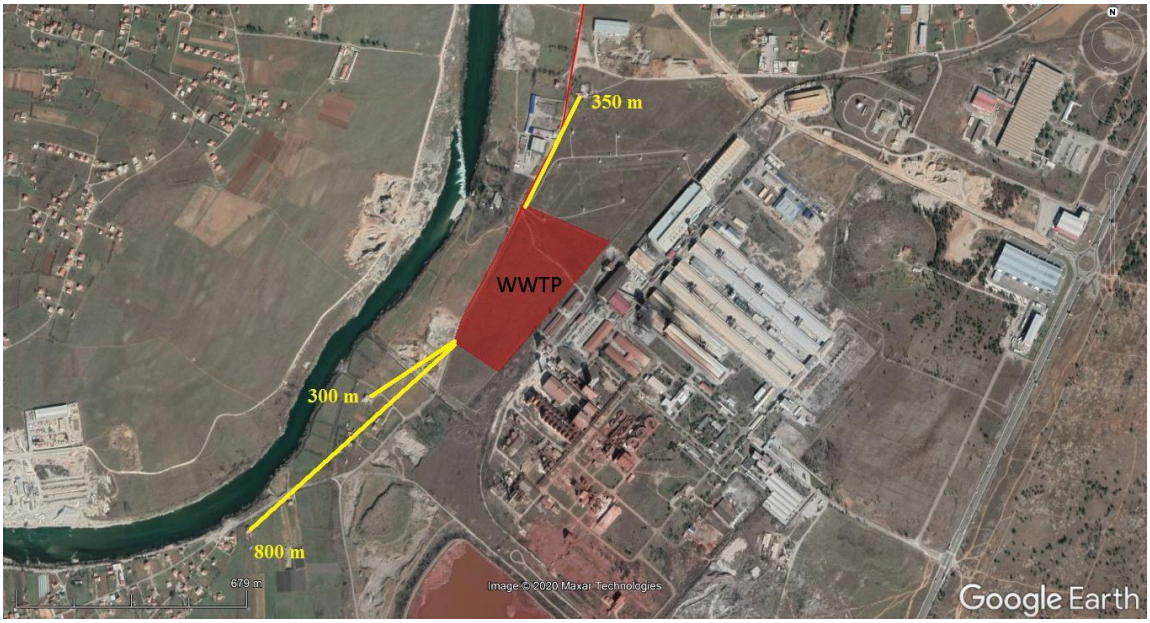


Figure 23. *Location of the new WWTP*

The selected location for the new WWTP is 11.1 hectares, on the left bank of the Morača River, which is about 150 m away.

The plot is owned by the Capital of Podgorica and Aluminum plant Podgorica (KAP).
The plot for the new WWTP is located about 300 m from the nearest residential building. The village of Botun is located about 800 m southwest.
The land of the proposed location is currently an unused meadow of no special value.

Next to the plot, there is a local road that connects the villages of Botun and Srpska with the settlements of Zelenika and Dahna.
The plots on the other side of this road, towards the river Morača, are unarranged and filled with various construction materials (waste).

The closest settlements to the future WWTP are the villages of Botun and Srpska. According to the 2011 List, Botun was inhabited by 696 inhabitants, in a total of 180 households, while Srpska was inhabited by 886 inhabitants in 252 households.

The realization of the project is planned on the cadastral parcels no.: 1094/3, 1094/4, 1094/5, 1094/6, 1111/2, 1111/19, 1111/20, 1111/45, 1384/9, 1384/10, 1384/7, 2914, 2915, 2916/1, 2917/1, 2918, 2919/1, 2920, 29/17, 1390/7, 2916/2, 2917/2 CM(cadastral municipality) Dajbabe, 23/2, 24, 25, 27/8, 28/2, 29/2, 1078/4, 23/7, 23/4, 15/3, 1/3, 2/3 CM Botun.

6.3. Environmental impacts

6.3.1. Air quality

The presented data on air quality and climatic conditions have shown that the physical-chemical composition and climate of the wider area of this facility are influenced by the movements of air masses from further geographical areas.
The air quality of the project area, in addition to the above, is also influenced by the functioning of the Aluminum Plant from Podgorica.

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Impact during construction

During the construction of the WWTP, earthworks will be performed, and thus the emission of pollutants into the air will occur, due to the operation of construction machines.
During the excavation phase and during the preparation of the land for concrete and asphalt works, construction machines will be engaged: excavators, loading shovels and trucks for transporting the excavated material, as well as automixers for concrete. As a propellant, the listed machines use diesel fuel, and its consumption is 0.2 kg / kWh.
The average values of exhaust gases from heavy diesel vehicles are given differently in the literature, depending on the applied model (COPERT model, CORINAIR methodology, ...), and in this case we presented the EPA coefficients (US EPA, 2008).
The following table gives data on the emission of pollutants per 1000 liters / fuel that is burned during the operation of construction machinery.

Table 7. *Pollutant emissions*

Equipment type	CO	NO_x	CO_2	VOC_s
Bulldozer	14.73	34.29	3.74	1.58
Truck	14.73	34.29	3.73	1.58
Loader	11.79	38.5	3.74	5.17
excavator	10.16	30.99	3.7	1.7
Grader	6.55	30.41	3.73	1.53

Given the scope of construction works and the proximity of KAP, the execution of the project cannot cause negative effects on the environment (primarily air).

During the excavation, the excavated soil will be moistened, in order to prevent the emission of dust.
Influence during functioning

During the operation of the plant, air pollution can occur with substances that are sprayed or evaporated from wastewater, and with the emission of droplets from aeration pools. The intensity of unpleasant odors depends on the amount of released substances, water and air temperature, as well as the direction and strength of the wind flow.
During the operation of the WWTP, the occurance of unpleasant odors is possible. Unpleasant odors can be emitted from different parts of the WWTP: from grates, sand traps, thickening and dewatering of sludge, etc. Air polluted with unpleasant odors will be collected in a controlled manner and taken to a biofilter, where it will be purified. The odor control system as a compact unit contains wet, vertical cross humus filters, a horizontal fan with suction pipes and a water spray system for installation on a concrete base box. Biological air purification in an organic filter (humus filter) with natural micro flora is the most modern and economical way of eliminating odors and purifying air of low or undefined concentration. The biofiltration process is based on the natural decomposition of air pollutants into harmless products.

Impact in case of accident

Impact on air pollution can occur in case of uncontrolled spillage of wastewater on the ground during an earthquake, or intentional damage to the system.
Also, an accident situation can occur due to a biogas explosion. The basic combustible component of biogas is methane, which is an explosive gas. It is a known fact that all fuels have the property of explosiveness in certain conditions, so biogas is no exception. Methane and air form an explosive mixture in those cases when there is at least 5% and at most 15% of methane in the air. These are both the lower and upper limits of the explosiveness of a mixture of methane and air. There are no explosives outside these limits.

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It can be assumed that the stated limits also apply to biogas as for methane.
Compared to other gaseous and liquid fuels, biogas is relatively highly resistant to explosive (detonating) combustion. The evidence for this claim is:

- high temperature of self-ignition of biogas, ie methane,
- high methane number.

The following table shows the values of self-ignition temperatures of some commonly used gaseous and liquid fuels, where it can be seen that methane has the highest self-ignition temperature at a pressure of 1 bar.

Table 8. *Auto-ignition temperatures of the most commonly used gaseous and liquid fuels at p = 1 bar*

Gaseous fuels	Temp. self-ignition (° C)	Liquid fuels	Temp. self-ignition (° C)
Bhutan	480	Diesel fuel	300-350
Propane	500	Petrol	480-550
Hydrogen	510	Lubricating oil	420-480
Methane	645	Ethyl alcohol	450

Thus, it can be concluded that methane, as the most important fuel component of biogas, is reliable when it comes to auto-ignition temperature.

Every combustible gas is in danger of fire and explosion, so it is necessary to know and apply the basic safety rules when working with it. The application of such rules means taking the necessary measures for the safe operation and consumption of each gaseous fuel.

6.3.2. Geology, soils and contaminated land

There are no geological sites in the mentioned area with the remains of faunal or floristic material that would be endangered by the planned intervention.

According to the data given in the description of the planned project, no negative impact on the land is expected by the planned process.
Potential impacts on land quality are also divided into three phases.

Impact during construction

The site for the proposed WWTP is located in the immediate vicinity of land contaminated with heavy metals, PCBs, red sludge. It is recommended that an assessment of contaminated soil be performed prior to any site work. The construction of the WWTP offers an opportunity for land rehabilitation, which is considered a positive impact.
The proposed WWTP site is not at risk of flooding by the Morača River, so flood protection is not necessary.
The physical impacts on the land, with the construction of the wastewater treatment plant, will be significant, given that extensive earthworks will be carried out.
Due to the performance of works on the preparation of the terrain, there will be an increased generation of dust which, in case of unfavorable weather conditions (wind), can contribute to air pollution directly in the environment of the construction site.
Soil contamination can occur in the case of disposal of construction materials and excess excavated material on land that is not designated and prepared as a landfill, and due to uncontrolled leakage of fuel and lubricants from construction machinery and vehicles. This impact is limited in time, ie until the moment of project construction.
During the construction phase, construction waste will be generated, which in accordance with the Rulebook on waste classification and waste catalog (Official Gazette of Montenegro, No. 59/13) has a

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waste group 17: construction waste and demolition waste (including excavated land from contaminated sites). Also, smaller quantities of other types of waste will be generated.

Impact during exploitation

The operation of the wastewater treatment plant will not deposit chemical and other substances that could affect soil pollution, given that the Project Holder is obliged to act in accordance with the solutions and proposals given in the technical documentation (description of the work process).
The project in question will use the entire area of land on the site for the needs of functioning, but that will not have significant consequences.
There are no mineral resources on the site, so there is no impact of the project on them.

In case of an accident

In case of oil or fuel spillage from working machines during the construction of the facilities, soil contamination could occur. In that case, it is necessary to treat the contaminated soil as hazardous waste (17 05 03 * - soil and stone containing hazardous substances).
Inadequate waste treatment during the construction and operation of the project can lead to soil contamination.
In the event of an accident during operation, the quality of the land may be endangered if wastewater is spilled on (into) the land (pool cracking, etc.). In order to prevent an accident, the operation of the wastewater treatment plant must be regularly monitored.

6.3.3. Surface and ground water resources

According to the spatial planning documentation, and taking into account the provisions of EU Directive 91/271 / EEC, the project / recipient area is not considered a sensitive recipient.
After treatment, the water will be discharged into the Morača River, which flows into Skadar Lake (National Park), and yet for this reason the Effluent criteria for sensitive areas have been applied from the Directive.

Impact during construction
During the execution of works, if the tests determine that the land is not contaminated, in order to build a WWTP, the project will not have an impact on groundwater and surface water.
Contamination of Morača water can possibly occur due to possible leakage of fuel and lubricants from construction machines for earthworks. Pollution can also occur due to the leaching of bulk and loose material from the construction site surface during precipitation, which would result in their removal to the river.

Influence during functioning
The conditions proposed by the project that the effluent should meet for future WWTPs are shown in the following table.

Table 9. *Proposed conditions to be met by the effluent for future WWTP Podgorica*

Parameter	Unit	Conditions prescribed for effluent
Biological oxygen consumption after 5 days (BOD5)	mg O_2/l	< 25
Chemical oxygen demand (COD)	mg O_2/l	< 125
Total suspended matter (TSS)	mg/l	< 35
Total nitrogen (TN)	mg N/l	<10
Total phosphorus (TP)	mg P/l	<1

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The parameters listed in the table are in accordance with the Rulebook on quality and sanitary conditions for wastewater discharge into the recipient and public sewerage, the manner and procedure of testing wastewater quality, the minimum number of tests and the content of reports on determined wastewater quality ("Official Gazette of Montenegro", No. 45/08, 09/10, 26/12, 52/12 and 59/13) and the European UWWD Directive (91/271 / EEC).
Although quantitative analyzes of the project's impact on groundwater quality could not be done, it is clear that the project will have a positive impact on their quality.
Improving the sewage system, including controlling septic tanks and building a sewer system, will significantly reduce shallow groundwater pollution by eliminating water infiltration from sewage into groundwater. Then, by reducing the levels of pollution in watercourses, the condition of shallow aquifers will also be improved.
Given that the WWTP will be built downstream from the wells from which the KAP is supplied (location next to the northern and northeastern rim of the WWTP plot) and that groundwater moves from the north and northwest to the south and southeast, there will be no significant impact on groundwater.

In accordance with the current regulations, the new WWTP will achieve a high degree of removal of organic pollution (BOD5 and COD), as well as phosphorus, nitrate, ammonia, etc., so that there will be no significant decline in the water quality of the Morača River at the outlet.
Therefore, it can be stated that from the point of view of physical and chemical pollution, the water quality of the Morača River will be significantly better in relation to the current situation, because the fecal waters of the Capital will be treated in the prescribed manner. This finding is mainly related to the improvement of water quality downstream of the existing wastewater treatment plant. This will not be the case regarding microorganisms. Typical wastewater contains about 107 fecal coliform bacteria per 100 ml of water. After purification in a new WWTP, the number of fecal coliform bacteria in the water will be reduced to approximately 105/100 ml. The treated wastewater will then be discharged into the Morača River, where it is diluted with river water so that the number of bacteria will be even smaller. However, fecal coliforms (and pathogens) will still be present in significant numbers in river water. Class A2 water quality, therefore, is very likely not to be achieved at the point of discharge with respect to the conditions prescribed for bacteriological quality.
Pathogens pose a potential health hazard to downstream water users. This can especially negatively affect the following 3 localities:

- water intake on Malo Blato for drinking water supply of the Montenegrin coast (karst water source Bolje sestre);
- various water supply wells in the Zeta plain;
- Skadar Lake (National Park and recreational use).

Water intake on Gornje Malo blato

Gornje Malo blato is a karst lake located west of the river Morača. For several years, one of its underground water sources (Bolje sestre) has been used to supply water to the Montenegrin coast.
The water of the Morača River has been polluted for many years, so the potential hydraulic connection between the river and the Bolje sestre water source was one of the most important reasons for concern at the beginning of this project. Consequently, a number of studies have been conducted to assess the risk of pollution for water intake (ESIA for WS Malo Blato, 2006: p. 41/42):

- analysis of physico-chemical and microbiological quality of water;
- measuring the flow of water at the water source;
- tracer tests;
- underwater survey of the Bolje sestre water source and the Morača river abyss;
- geophysical site survey;
- geoelectric exploration of the Morača river alluvium;
- hydrogeological research.

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The aim of the study was to determine the catchment area of the water source, define possible pollution factors and prescribe protection measures. Based on various studies conducted, the following conclusions were reached:

- The water quality of Gornje Malo Blato / Bolje sestre water source is extremely good.
- The Bolje sestre water source does not receive surface water directly from the Morača River. It is supplied with groundwater which partly originates from the narrow underground watercourse between Grbavac and Kolozuba, and partly from karst water sources.

According to these results, the risk of contamination of the Bolje sestre water source with surface water from the Morača River can be excluded.

Groundwater and wells in the Zeta plain

At various locations in the Zeta plain, groundwater is extracted from the alluvial aquifer to obtain drinking water. The alluvial aquifer from the Quaternary is directly connected to the Morača River, so that polluted water from the river could affect the quality of groundwater and water supply.
However, all wells that are being used to supply water to Podgorica and other villages in the Zeta Plain are located in the eastern part of the plain, at a considerable distance from the Morača River. The directions of groundwater flow are not precisely known, but it is unlikely that water from the Morača River will affect water quality in wells.
Pathogens are thought to die out during the underground passage after 50 days at the latest. For this reason, in water supply, a distance corresponding to an underground passage of 50 days is used to demarcate the groundwater sanitary protection zone. The shortest distances from the Morača River to the well are approximately the following (following picture):

- Ćemovsko polje (well): 2,5 km
- Dinoša (well): 6 km
- Milješ (well): 7 km
- Vuksan Lekići (well): 9 km

The theoretical flow time between different wells and the river ranges from 116 days (Ćemovsko polje) to 416 days (Dečić), so the presence of pathogens originating from the Morača River in the wells is very unlikely.
It is possible that in other places in the Zeta plain there are some private (shallow) wells used for irrigation and even local private water supply. If they are located at a distance of one kilometer or more from the river, the risk of water pollution from Morača is negligible.

Skadar lake

Skadar Lake is a National Park with a large number of protected species (birds, fish, plants, etc.). The lake also has significant tourist value. Surface water from Morača with a high concentration of pathogens could affect the value of the lake for nature and tourists.
The previous text shows that the number of fecal and total coliforms decreases by approximately a factor of 100 between the discharge site in Podgorica (Gradski kolektor) and the mouth of the Morača River in Vranjina, where the number of coliforms in the water is in the same range as in the lake center. Therefore, it is concluded that there is no significant risk for Skadar Lake in terms of microbiological contamination.
Based on the above, it can be concluded that the water of the Morača River contains significant amounts of fecal coliform bacteria and pathogens (local number up to several thousand fecal and coliform bacteria), as well as significant concentrations of ammonia, nitrate, nitrite, BOD5 and phosphate. Class A2 water quality is partially not achieved downstream of Podgorica.
With the operation of the new WWTP in Podgorica, the concentrations of many pollutants will be reduced. However, as far as fecal coliforms are concerned, it is possible that class A2 water quality will not be achieved in the river at the point of discharge. However, it can be shown that the presence

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of coliform bacteria and pathogens in the river does not pose a significant risk to the water intake in Gornje Malo Blato (drinking water supply of the Montenegrin coast), various water supply wells in the Zeta plain and water quality of Skadar Lake. The number of bacteria in the water of the Morača River will decrease rapidly after the discharge site and will then be significantly below the limit value for class A2.
Since there is no risk to health, disinfection of treated effluents before discharge into the Morača River is not considered necessary.

Potential contamination hazards

The main potential danger to groundwater in Podgorica is a defective or locally even non-existent sewage system in Podgorica. Nearly 60,000 residents living in individual houses do not have access to sewage services. About 6,000 people living in apartment buildings are also without sewerage services. In principle, in Podgorica, 40% of the population is not connected to the sewerage network. Most of all individual houses that are not connected to the sewage system have septic tanks. Septic tanks are often not properly constructed and do not meet the required water permeability requirements.
The risk of pollution is classified as high for areas of the city where no sewerage network has been built so far. The situation is especially critical near the water protection zones near the Zagorič and Ćemovsko Polje springs. Due to the growth of the city, both the springs and their protection zones are now within the city limits and, although not shown on the map, informal settlements have been built on both sites that are only partially connected to the sewerage network (primary sewerage network only) within the protected zone 2. In these two places, the risk of pollution is classified as very high.
Another potential danger from pollution is intensive agricultural activity in the Zeta plain. The following map shows that almost the entire plain is used for agriculture, especially vineyards. Potential contaminants include nitrates and pesticides. The risk is preliminarily assessed as moderate to high, but more water quality data are needed for a detailed assessment of the situation.

Impact in case of accident

Impact on water quality can occur in the case of uncontrolled discharge of wastewater on / into the land and river Morača during earthquakes, war destruction, and intentional damage to the system.
It is also possible for the device or its individual parts to stop working due to various breakdowns, interruptions in the electricity supply, fires and the like, which would cause pollution of the Morača River.
In case of downtime, urgent intervention is necessary in order to eliminate the problem. This downtime can occur due to its irregular maintenance, and therefore it is necessary to build a regular maintenance procedure.
Accidents and incidents at the WWTP are occasionally possible, and their consequences are short-term and moderate in severity, so the risk to the environment in this case was assessed as acceptable.

In the event of an accident, downtimes in wastewater treatment, and uncontrolled discharge of untreated water into the Morača River, there is a possibility of impact on transboundary water pollution, given that Morača flows into Skadar Lake, which belongs to Montenegro and Albania.

6.3.4. Noise and vibration

Impact during construction

Given that there is no precise data on construction machinery that will be used for the works, it can be assumed that the noise level emitted on the construction site during the works will exceed the level of permissible noise for the population. The use of machinery and equipment as a source of noise is covered by the system of measures to protect the population from noise, which are contained in the relevant regulations.

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The maximum emitted noise level that can be expected on the construction site is about 100dBA. Taking into account the distance of the nearest buildings intended for housing (300m), we can say with certainty that the works on the construction of the WWTP will not significantly cause an increase in noise levels that can negatively affect the population.
By calculating the noise attenuation, we conclude that in the most unfavorable case there will be an increase in noise levels by 12dB compared to the level prescribed by the Decision on the determination of acoustic zones in the Capital of Podgorica ("Official Gazette of Montenegro - Municipal Regulations", No. 027/15 of 05.08 .2015): Quiet zone in the agglomeration, permissible noise level where the limit noise levels during the day and evening are 40dBA, and during the night 35dBA, (works are performed in daily conditions).
Lokalno stanovništvo će biti ugroženo usled povećanog saobraćaja koji će se odvijati tokom izgradnje PPOV i buke koja nastaje usled njega.
U toku izvođenja projekta na lokaciji će biti prisutna pojava vibracija usljed rada građevinskih mašina i kretanja kamiona. Lokalno stanovništvo ne može biti ugroženo usled vibracija.

During functioning

During wastewater treatment procedures at the wastewater treatment plant, higher noise levels may occur during the operation of the compressor station and other systems at the WWTP. The expected noise level is around 65-70dBA, which is a level that, even in the cumulative impact, cannot negatively affect the nearest residential buildings (distance 300m).
Given the characteristics of the proposed WWTP and pumping stations, the presence of KAP, traffic, and the number of residents who would be bothered by noise, it is considered that this will not be a significant problem. It is therefore concluded that noise is unlikely to be a significant nuisance.

6.3.5. Terrestrial and Aquatic Biodiversity

There are no rare and endangered wild plant and animal species and their habitats in the narrower locality of the WWTP. There are also no protected natural assets near the site. The WWTP position is in the industrial zone. The location is on a grassy area next to the KAP border, which is inhabited by small mammals, reptiles, birds, insects, etc.
In the area of WWTP construction, there will be a permanent loss of the cover humus part of the soil, and thus a loss of habitat for some plant and animal species.
There are no protected species in the mentioned area, both flora and fauna.

The nearest internationally significant protected natural location is Skadar Lake (Ramsar site). Due to the reduction of the amount of untreated wastewater discharged into the river Morača, which flows into the lake, the organic load of the lake will be reduced, which will reduce the impact on the eutrophication of the lake.

6.3.6. Landscape and Visual (Aesthetics)

The construction of the object in question, ie the envisaged architectural and construction solution of the object will not significantly change the landscape of the space where the project is planned. The reason for this claim lies in the fact that the project is planned in the industrial zone, in the immediate vicinity of the Aluminum Plant in Podgorica.

- The location of the proposed WWTP can be seen from:
- the road connecting the villages of Srpska and Botun with Dahna (the road that stretches between KAP and the Morača River) and
- the KAP (it will be partially sheltered by low vegetation).

This area can be assessed as of little value from a landscape point of view. The construction of buffer zones with appropriate landscaping will further improve the visual impact of the new WWTP.

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6.3.7. Waste

During the construction of the WWTP, smaller quantities of the following types of waste are expected:
- 17 01 concrete, bricks, tiles and ceramics
  - 17 01 01 concrete
- 17 02 Wood, glass and plastic:
  - 17 02 01 wood
  - 17 02 02 glass
  - 17 02 03 plastic
- 17 04 Metals (including their alloys):
  - 17 04 05 iron and steel
  - 17 04 07 mixed metals

Earth from excavation of the foundation of the building:
- 17 05 land (including land from contaminated sites), stone and excavated sludge waste:
  - 17 05 03 * earth and stone containing dangerous substances
  - 17 05 04 earth and stones other than 17 05 03 *.

The Rulebook on Construction Waste Management, Manner and Procedure of Construction Waste Processing, Conditions and Manner of Disposal of Cement Asbestos Construction Waste (Official Gazette of Montenegro, No. 50/12) regulates construction waste treatment, manner and procedure of construction waste processing, conditions and the manner of disposal of cement asbestos construction waste and the conditions to be met by the construction waste processing plant.
Present construction workers will also generate municipal waste (waste group 20). And due to the work of construction machinery, waste will be generated - waste from oil and liquid fuel residues (waste group 13) and finally more waste packaging of construction materials, equipment, raw materials and energy sources (waste group 15).

Table 10. *Groups and names of waste that will be generated during construction works*

Waste catalog	**Name of waste**	**Location - source of waste generation**
17 04 05	Iron and steel	Disassembly of metal parts
17 04 07	Mixed metals	
17 05 03*	Earth and stone containing dangerous substances;	Excavation of the ground for the foundations of new facilities on site if the composition or chemical analysis determines that they contain hazardous substances: in case of accidents it will be contaminated with: oil, bituminous mixtures, or other waste or hazardous chemicals.
17 05 04	Earth and stones other than 17 05 03 *	
17 01 01	Concrete	Demolition of concrete foundations
13 02 13 01 13 08	Waste motor oils, transmission oils and lubricants (A)	Work of construction machinery.
13 07*	Waste hydraulic oils (A)	Oiled waste collected at the site.
15 01 15 01 01 15 01 02 15 01 03 15 01 04 15 01 05 15 01 06 15 01 07 15 01 10*	Packaging: Paper and cardboard packaging Plastic wrapping Wooden packaging Metal packaging Composite packaging Mixed packaging Glass packaging Packaging containing residues of	Packaging of construction materials, equipment, raw materials and energy.

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15 01 11*	hazardous substances or contaminated with hazardous substances, (M) Metal packaging containing dangerous solid porous matrix (eg asbestos), including empty pressure bottles, (M)	

** Hazardous waste*

The label (M) next to hazardous waste indicates that the waste is considered hazardous only in the following cases:

- when it has one or more of the hazardous properties H1, H2, H9, H12, H13, H14 or H15,
- or its flash point is <55°C,
- or the concentration of hazardous substances is above the permitted limit value on the basis of which waste is classified as hazardous waste in accordance with Annex 4 of the Rulebook on waste classification and waste catalog.

Label (A) next to hazardous waste indicates that the waste is considered hazardous regardless of the concentration limit value of hazardous substances on the basis of which the waste is classified as hazardous waste in accordance with Annex 4 of this Rulebook.

In case of oil or fuel spillage from working machines during the construction of facilities and due to inadequate waste treatment during the construction and operation of the project, soil contamination may occur. Due to the stated impact and generation of hazardous waste, it is necessary to develop a Waste Management Plan for waste generated during the construction and operation of the WWTP.

6.3.8. Climate change

There is a general consensus that one of the main effects of climate change is less predictability of climate. Greater variability of precipitation is likely to occur hand in hand with more frequent extreme events (storms, floods, droughts).

The results of climate projections (Third National Report of Montenegro on Climate Change) indicate that by 2040, the annual temperature in the entire country will increase up to 1.5-2 ° C. By 2070, the average annual temperature will rise up to 3 ° C, while the projected increase to 2100 is up to 5.5 ° C. The average annual rainfall is expected to decrease, especially during the summer months, as well as the increase in precipitation in the winter months in some parts of the country. By 2070, the average annual rainfall is expected to decrease by 20% over the entire territory.
Montenegro is particularly exposed and vulnerable to climate hazards such as droughts, floods, forest fires and heat waves. Climate projections show that these climate extremes will become more frequent and pronounced in the future.
Forecasted indicators of floods and droughts are slightly reduced.
In any case, it must be borne in mind that "climate" is extremely complex and future research will undoubtedly reveal new theories and models, so that the presented results of climate models may be obsolete in a few years. This emphasizes the need to monitor meteorological, hydrological and hydrogeological conditions, in order to have a more reliable database in the future.

6.4. Social impact

Considering the fact that land acquisition and/or resettlement is not going to be carried out for the purpose of implementation of this project, social impacts are expected to be limited. Social impacts which may be expected are mostly related to the construction phase, when the local communities may be exposed to higher volumes of traffic, limited noise and dust emissions. These impacts and corresponding prevention and mitigation measures will be further elaborated on in ESMP.

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Local population is dispersed in the wider project area and there are not many residential objects in the immediate project area. The closest populated residential object is located at the distance of 200m from the border of the project area. However, it is important to mention that the area which is closest to the project area is characterized by dilapidated residential objects and low value of visual environment. Pictures below show location of some of the residential objects which are located close to the project area, both abandoned and populated objects, whereby these photos are indicative of the surroundings at which the project is going to be implemented.

6.4.1. Local and National economy

Montenegrin GDP in 2019 was 4.907.9 thous. EUR in 2019[6], while tourism is recognized as one of the most prominent sectors of economic activity. Namely, contribution of the sector of tourism to Montenegrin GDP in 2019 was 10.4%. When it comes to economy in the project area, it is primarily focused on industrial production, storage and distribution of goods and materials.

Construction of the project facilities is going to provide residents of the Capital with a new system which is going to enable improvement of their living conditions in the long term. Impacts on local economy may be recognized in the fact that construction is going to be carried out in the area which is surrounded by populated settlements; thus, the construction phase may lead to opening of new job opportunities, both temporary and permanent (during operation). Employment opportunities which may be created during the construction phase may mostly lead to opening temporary job positions (e.g. construction, operation of machinery, etc.), whereby the work force may be employed both from the local settlements and from the wider area of Podgorica. When it comes to the operation phase, job opportunities may be linked to operation and maintenance of the installed facilities, which will be done in close cooperation with the Public Enterprise Water and Sewage Company.

6.4.2. Community demographics

As it has previously been mentioned, physical resettlement is not going to be carried out for the purpose of this project, thus implementation of the project is not going to have a direct impact on either internal or external migration in the project area. On the other hand, the facilities which are going to be built will be aimed at satisfying the needs of the entire population of Podgorica in the long term, and the facility itself is located in a remote area so that any potential disturbance of local communities would be avoided. Construction and operation of the facilities are not expected to have a direct impact on community demographics, considering the fact that the facilities are not going to attract migration in or out of the project area, since the facilities which are going to be built are going to provide the same standards and quality of living conditions to the entire population of Podgorica.

6.4.3. Infrastructure and services

Local road which connects several settlements in the wider project area is located next to the land plots which are going to be used for construction of the project facilities. This road is currently being used by both the local communities and the local businesses. All the local communities in the area have other main and alternative roads which are regularly used for local travelling, thus construction of the project facilities is not going to have a significant impact on connectivity of local and wider communities. However, a new road is being built close to the project area, and this road is going to provide another connection for all the local and wider communities.

6.4.4. Social cohesion

Local communities tend to show more propensity towards cooperation and cohesion, and local knowledge shows that local communities in the wider project area cooperate efficiently in all matters

[6] Annual Macroeconomic Report, Central Bank of Montenegro, p.7

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related to their shared interests. Provision of local connections and maintenance of safe conditions in the local communities is essential for ensuring social cohesion and mutual understanding among all members of the local population. Considering the fact that disturbance of local roads and habits is not expected, social cohesion is not going to be jeopardized by the project.

6.4.5. Land use and livelihoods

Land use in the project area is characterized by industrial and storage purposes, whereby the land which is going to be occupied for the purpose of construction of project facilities is owned by KAP, the Government of Montenegro and the Capital Podgorica, thus there are not going to be any impacts on land use due to project implementation.

As it has previously been mentioned, there is no baseline data regarding livelihoods of the local population. However, it is assumed that majority of people who live in the wider project area work in the companies which are located along the main road, or in companies located in the urban area of Podgorica, thus project implementation is not going to cause any disturbance in terms of existing livelihoods. However, the project may cause a positive impact on livelihoods of local population, in the event of local employment during the construction and operation phase.

6.4.6. Health and Safety

Considering the fact that there is no baseline information about community health and safety, it is not going to be possible to quantify project impacts in this regard. Impacts which may be expected in this regard are related to impacts of noise, dust, pollution, due to which people's health and wellbeing may be temporarily affected during construction. These impacts are expected during construction and they may occur during movement of heavy machinery and equipment, land excavation, transportation of soil and other dispersive material, etc. Impacts on community safety may be caused by moving traffic, but traffic will be controlled and managed by appropriate signalization, so as to avoid any potential undesirable scenarios in the project area. However, considering the fact that populated areas are located at a significant distance from the project area, these impacts are considered to be negligible.

6.4.7. Archaeological and Cultural Heritage

There are no archaeological nor cultural heritage sites in the project area, so the Project is not going to cause any impacts in this regard.

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7. PROJECT ALTERNATIVES

7.1. Methodology for evaluation of Alternatives

Location

The subject location is clearly determined for the construction of a new municipal wastewater treatment plant for the city of Podgorica in the adopted and valid DUP "Industrial Zone - Aluminum Plant Podgorica".

Production processes or technologies

A two-stage procedure was adopted to assess potential wastewater treatment options, and to select the preferred approach.
In the first phase, an analytical review of alternative treatments and proposed treatment technology options from previous studies was conducted to determine the most economical solution for wastewater treatment. The analytical review was performed in relation to a number of criteria that include the operational characteristics and probable costs (capital and operating) of the system of the required treatment capacity and treatment efficiency.
In the second phase of the evaluation, two possible variants of the activated sludge process with anaerobic sludge digestion were selected for the conceptual design of the WWTP Podgorica, simultaneous denitrification or previously applied denitrification (A2 / O) with advanced biological phosphorus removal (EBPR).

Results of the first phase of the analytical review

The consultant confirms the analysis of options conducted by WYG, which recommended as the most feasible technological solution, a single-phase conventional activated sludge process (CAS) for BNR (biological nutrient removal) - without advanced treatment options - and a process of conventional anaerobic sludge decomposition (without sludge disintegration) using digester gas (CHP / CCHP), sludge thickening and sludge dehydration.
The consultant will follow the WYG proposal for an updated Feasibility Study but will also consider additional project variations of the biological wastewater treatment process, ie. piston flow bioreactor (nitrification) with previously applied denitrification (and Bio-P for EBPR) or simultaneous / intermittent denitrification.

The basic process options are as follows:

- Wastewater treatment: Conventional activated sludge treatment (CAS) for biological wastewater treatment, BNR with EBPR + CPR
- Sludge treatment: Anaerobic digestion of sludge
- Gas purification and reuse: Digester gas storage and purification with energy recovery via CCHP (trigeneration = CHP + refrigeration production)
- Sludge dehydration: Thickening and dehydration of sludge with flocculation
- Odor treatment: Bio-filter for plants for mechanical treatment and dehydration of sludge

The second phase of option evaluation

The result of the first phase of the assessment confirmed the recommendation from the WYG study (2011) and clearly identified the CAS process with separate anaerobic sludge digestion as the most feasible solution to the process. The contracting authority's comments on the interim report were, as appropriate, clarified and considered for the second phase of the evaluation.

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Based on the framework design calculations for the example of the projected capacity of 200,000 PE, an additional assessment of possible process variants for the selected treatment process technology was performed in order to confirm the results of the first phase of the assessment.
Conventional activated sludge treatment (CAS) offers several commonly used process variants for the biological treatment process, such as:

- bioreactor with piston flow (nitrification with pulse aeration) with previously applied denitrification (both Bio-P for EBPR and CPR);
- complete mixing for simultaneous or intermittent denitrification (separate mixing / aeration) and Bio-P for EBPR and CPR;
- sequential batch reactor (SBR) for intermittent denitrification (separate mixing / aeration) and Bio-P for EBPR and CPR;
- membrane bioreactor for advanced wastewater treatment.

Sludge processing within separate anaerobic sludge digestion (parallel or serial) with mechanical dehydration of sludge will be focused on optimized gas production from the digester for maximum energy recovery with optimized operating costs (OPEX), taking into account process variants for:

- thickening of excess sludge (WAS); combined thickening together with primary sludge (PS);
- Mechanical thickening of excess sludge (WAS) with separate gravitational thickening of primary sludge.

Regarding sludge dehydration, variants for the dehydration system could be assessed in relation to energy consumption, by considering:

- centrifuges and screw presses;
- Belt filter presses.

Selected purification process options

Based on the two-phase evaluation of process options and variants, the following process technologies were determined for consideration:

- Basic solution: simultaneous or intermittent denitrification (complete mixing) with EBPR (Bio-P) + CPR, digestion and dehydration of sludge, reuse of gas from the digester for energy recovery.
- Alternative solution: A2 / O process (piston flow with previously applied denitrification) with EBPR (Bio-P) + CPR, with digestion and dehydration of sludge, reuse of gas from the digester for energy recovery.

Simultaneous denitrification was chosen as the basic solution having in mind a simpler and more stable process of biological purification.

The basic solution - simultaneous denitrification
Simultaneous denitrification with EBPR (Bio-P) + CPR with separate sludge digestion and dehydration with reuse of gas from the energy recovery digester as a variant of the conventional activated sludge (CAS) process, was chosen as the basic solution having in mind a simpler and more stable biological purification process(relative to A2 / O).

An alternative solution - piston flow with previously applied denitrification
The A2 / O process (piston flow with previously applied denitrification) with EBPR (Bio-P) + CPR with separate digestion and dehydration of sludge with reuse of gas from the digester for energy recovery was considered as a variant and potential modification of the process for future WWTP upgrade.

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Sludge treatment

One of the by-products of wastewater treatment is sludge, which must be treated and, in some way, either utilized or disposed of. Sludge disposal is also a problem in the existing WWTP, and in the future it will become even more worrying as the amount of treated wastewater will increase by about 3 times. All evaluated treatment processes produce stabilized sludge and all WWTPs have mechanical sludge dehydration to obtain "solid" sludge with a dry matter content of 20 to 30%. At full designed capacity and assuming a dry matter content of 30%, the proposed activated sludge treatment plant will produce about 48 tons of dehydrated sludge per day. This amount can be smaller because it is proportional to the served population, ie. will depend on the degree of construction of the collector and the connection to the network.

Standard options considered for the use or removal of sludge are:

- Agriculture and forestry / silviculture
- Rehabilitation or restoration of land
- Composting
- Landfill disposal
- Incineration
- Energy recovery
- Gasification
- Alternative technologies

Each of these options has its advantages and disadvantages and there are environmental risks associated with each of these options. Amounts of dehydrated sludge in Podgorica may mean that options such as incineration, gasification and energy production may be considered in the future but these are not considered to be feasible options at the moment. However, the potential of feasible options must be considered in the context of providing a safe and cost-effective short-term and long-term outcome for the WWTP sludge problem.

7.2. Alternative 1 – 'do nothing scenario'

This alternative means doing nothing. The current negative impacts in the area of inadequate capacity and treatment of the existing wastewater treatment plant in Podgorica will continuously pose a risk to the environment and the population.

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8. ENVIRONMENTAL MANAGEMENT PLAN (EMP)

The purpose of the Environmental Management Plan (EMP) is to reduce the negative impacts of the project on the environment to an acceptable level, while respecting prevention, control and monitoring measures. Namely, the Environmental Management Plan prescribes compliance with the rules according to which all aspects of work are performed in accordance with applicable legislation, conditions of permits and good practice, as well as the application of measures to reduce negative environmental impacts. The plan seeks to implement appropriate procedures for environmental control and protection during the execution of works.
The EMP consists of a Mitigation Plan and a Monitoring Plan and is based on the type of environmental impact, their scope and duration.

8.1. Mitigation management plan

Within the Mitigation Plan, significant environmental impacts are listed with mitigation measures to be applied during the design, construction and operation of the WWTP. The Plan also sets out responsibilities for plan implementation and supervision. The costs of mitigation measures should be included in the cost of works.
The Contractor is obliged to implement measures to mitigate the impact on the environment, to include them in the total costs, to work in accordance with national laws, European Union standards and the requirements of the lender.

The following table shows the Impact Mitigation Plan and is designed as a checklist to ensure the implementation of relevant mitigation measures at the appropriate stages of the project.

PHASE	IMPACT	MITIGATION MEASURES	RESPONSIBILITY OF INSTITUTIONS	
			Implementation	Supervision
Designing	Noise During construction, noise is emitted by machines on the construction site, vehicles for transport of materials and equipment	Be sure to do a noise protection project on the construction site to avoid impacts on the local population.	Designer	NEPA
Designing	Landscape Improper appearance of the device and the space around the WWTP affects the appearance of the surrounding space	Develop a project for recultivation of the space around the device	Designer	NEPA

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PHASE	IMPACT	MITIGATION MEASURES	RESPONSIBILITY OF INSTITUTIONS	
			Implementation	Supervision
Designing	Air Unpleasant odors (ammonia, amines, hydrogen sulfide, mercaptans, hydrocarbons, organic acids) may appear on the wastewater treatment plant location	Sludge dehydration plants will be connected to the odor control system in order to prevent and reduce the release of unpleasant odors, ie to avoid impacts on the local population.	Designer	NEPA
Designing	Waste Waste sludge will be removed from the device	Until the construction of the sludge incineration plant, it is necessary to provide space for the disposal of stabilized and dehydrated sludge	Designer	NEPA
Construction	Vegetation During construction, surface degradation of soil and aboveground flora is possible	During construction, protect all trees and plants that do not need to be cut down or removed	Contractor	-Supervising engineer -Environmental inspection
Construction	Population	Perform works in daily conditions, taking into account the protection of the surrounding population from noise. Construction time will be limited to daytime working hours (07:00 to 17:00)	Contractor	-Supervising engineer -Environmental inspection
Construction	Occupational/ Workers Health and Safety	The project owner and the contractor are jointly responsible with regards to workers' health and safety. This would include both management measures and reporting and investigating any incidents, i.e. implement international HSE standards in all contracts. With regards to workers' health and safety, contractor will identify potential risks before commencement of works. The emergency response provisions will include a Site Safety Plan, which will also indicate a contact person	Contractor	-Supervising engineer -Labor inspection

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PHASE	IMPACT	MITIGATION MEASURES	RESPONSIBILITY OF INSTITUTIONS	
			Implementation	Supervision
		available in the event of an accident. Site Safety Plan is submitted to the Project Owner (or Supervision Consultant) for approval. Contractor will ensure the following in terms of workers'/occupational health and safety: - Drugs and alcohol are not used on site. - Contractor is to include a provision for safe working environment and safety measures and personal protective equipment (PPE) for all workers in their Site Safety Plan, including gloves, hard hats, goggles, ear protection and safety footwear. - Site Safety Plan is to include a provision for first aid to be administered on site and a trained person must be engaged in line with the Law on Occupational Health and Safety (''Official Gazette of MNE'', No. 034/14). - Contractor shall provide potable water supply to its workers, toilets and water supply for washing. - Safety Labour Management Plan (SLMP) is required to ensure health and safety provisions - Contractor shall perform all project activities in line with the SLMP and all Montenegrin laws and by-laws regarding health and safety. All necessary precautions will be taken regarding traffic safety in cooperation with relevant authority/administration in order to minimize impact on traffic resulting from the		

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PHASE	IMPACT	MITIGATION MEASURES	RESPONSIBILITY OF INSTITUTIONS	
			Implementation	Supervision
		vehicles to be used for construction activities.		
Construction	Landscape Improper appearance of the device and the space around the WWTP affects the appearance of the surrounding space	After the construction is completed, arrange the surrounding area according to the landscaping project	Contractor	-Supervising engineer -Environmental inspection
Construction	Emergency situations (e.g. accidents)	- An Emergency Action Plan will be developed - The Emergency Action Plan will be implemented in any case of emergency	Contractor	-Supervising engineer
Construction	Environmental accidents	All metal parts must be made of stainless metal and protected from possible environmental influences	Contractor	-Supervising engineer -Environmental inspection
Functioning	Air Unpleasant odors (ammonia, amines, hydrogen sulfide, mercaptans, hydrocarbons, organic acids) may appear on the wastewater treatment plant location	Maintain the odor control system in good condition in order to prevent and reduce the release of unpleasant odors, ie to avoid impacts on the local population.	User of WWTP	-Project carrier -Environmental inspection
Functioning	Surface waters Due to the discharge of treated wastewater into the Morača River, an acceptable impact on its quality is expected	Untreated wastewater must not be discharged into the Morača River	User of WWTP	-Project carrier -Environmental inspection

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8.2. Monitoring plan

The monitoring plan shall specify the parameters to be monitored for each environmental component, including the locations where the tests are performed. The monitoring plan also states the applicable standards (methods) and responsibilities in terms of implementation and monitoring.
In addition to the critical locations defined during the design phase, environmental monitoring will also be performed on the construction site and in any other part of the work zone that is determined to be relevant during the execution of the works.

The following table shows the monitoring activities and responsibilities for the implementation of the proposed mitigation measures, in the relevant phases of the project.

PHASE	PARAMETER	LOCATION	METHOD	RESPONSIBILITY OF INSTITUTIONS	
				Implementation	Supervision
Zero state	Water quality: pH, temp., BOD_5, COD, dissolved oxygen, ammonia, nitrates, nitrites, total nitrogen and phosphorus, mineral oils, total coliform bacteria and fecal coliform bacteria	Morača River, downstream from the WWTP location	Standard methods for water analysis	Project carrier	-Project carrier -Environmental inspection
Zero state	Noise: noise level	Near individual buildings	Standard methods of noise measurement	Project carrier	-Project carrier -Environmental inspection
Zero state	Air: air quality	Near individual buildings	Standard methods for air analysis	Project carrier	-Project carrier -Environmental inspection
Construction	Air quality	On the construction site	Standard methods for air analysis	Contractor	-Project carrier -Environmental inspection
Construction	Noise	Near the individual buildings and on the construction site	Standard methods of noise measurement	Contractor	-Project carrier -Environmental inspection
Construction	Waste	On the construction site	Waste management in accordance with the Law, the obligation is to	Contractor	-Project carrier -Environmental inspection

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PHASE	PARAMETER	LOCATION	METHOD	RESPONSIBILITY OF INSTITUTIONS	
				Implementation	Supervision
			develop a Waste Management Plan		
Construction	Safety at Work	On the construction site	Continuous checks to ensure that adequate protective equipment is used	Contractor	-Project carrier -Environmental inspection
Functioning	Water quality: pH, temp., BOD5, COD, dissolved oxygen, ammonia, nitrates, nitrites, total nitrogen and phosphorus, mineral oils, total coliform bacteria and fecal coliform bacteria	Morača River, downstream from the WWTP location	Standard methods for water analysis	User of WWTP	-Project carrier -Environmental inspection
Functioning	Air: air quality	Near individual buildings	Standard methods for air analysis	User of WWTP	-Project carrier -Environmental inspection
Functioning	Noise	Near individual buildings	Standard methods of noise measurement	User of WWTP	-Project carrier -Environmental inspection
Functioning	Waste sludge from WWTP	WWTP location	Waste management in accordance with the Law, the obligation is to develop a Waste Management Plan	User of WWTP	-Project carrier -Environmental inspection

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9. PUBLIC CONSULTATION, STAKEHOLDER ENGAGEMENT AND INFORMATION DISCLOSURE

Efficient public consultation process is required in order to meet all the standards and requirements of the local communities and other interested stakeholders, i.e. in order to ensure acceptance of the project by the relevant stakeholders. Specific aspects of stakeholder engagement process are shown in the following sections.

9.1. Public consultation and project design

Public has been engaged in the process of development of the Preliminary Design in the form of unofficial meetings which were held between representatives of the relevant local communities and Public Enterprise Water and Sewage. Inputs and comments provided at these meetings were used as some of the guiding principles for development of the Preliminary Design. Consequently, the local communities are going to be communicated with and engaged with on an ongoing basis during finalization of the Main Design, as well as during construction and operation.

9.2. Previous public consultation activities

Public Enterprise Water and Sewage has been communicating with the local communities on an ongoing basis during all the previous project phases, whereby these meeting was primarily based on unofficial communication, e.g. meetings at the project site, local community offices.

9.3. Grievance mechanism

Grievance mechanism will be established by the Public Enterprise Water and Sewage, whereby this mechanism will be operational during both the construction and operation phase. The grievance mechanism will enable all the interested stakeholder to contact the project developer and raise any concerns and/or comments/complaints regarding environmental, social and any other aspects related to project activities.

The stakeholders will have the opportunity to submit their grievances via phone, email and/or mail. Due to the current and ongoing circumstances related to COVID-19 pandemic, the stakeholders shall not be encouraged to submit their grievances in person. Once an official grievance is made, the Project Developer shall provide an official confirmation of receipt within 7 working days, whereby they will have 30 days to provide a response. In case the grievance submitter is not satisfied with the response provided, they may file an official complaint to the Project Developer, upon which they will have 15 days to resolve the issue efficiently.

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10.APPENDIXES

10.1. Multidisciplinary team

Prof. dr Darko Vuksanović
MSc Dragan Radonjić, graduated engineer of Chemical technology
Ivana Raičević, Environmental Specialist
Milan Maraš, spec. of chemical technology
Miljana Vuković, Spec. of Biology
Milica Stanišić, Civil Engineer
Maida Muratović, Environmental Specialist
Marija Sinđić, Social Expert

10.2. References – list of written materials used in study preparation

10.2.1. Policy, legal, and administrative framework

National legislation:

- Law on Environment ("Official Gazette of Montenegro", No. 52/16);
- Law on Environmental Impact Assessment of Montenegro, (Official Gazette of Montenegro, No. 80/05, 40/10, 73/10, 40/11, 27/13, 52/16 and 75/18);
- Law on the Strategic Environmental Impact Assessment (SEA) ("Official Gazette of the Republic of Montenegro", No. 80/05 and "Official Gazette of Montenegro", No. 40/11, 59/11, 52/16);
- Law on Nature Protection ("Official Gazette of Montenegro", No. 54/16);
- Law on Waste Management (Official Gazette of Montenegro No. 80/05, 80/05, 64/11, 39/16), with accompanying regulations;
- Law on Air Protection ("Official Gazette of Montenegro", No. 25/10, 40/11, 43/15);
- Law on Spatial Planning and Construction of Buildings (Official Gazette No. 064/17, 44/18 and 63/18);
- Law on Liability for Environmental Damage ("Official Gazette of Montenegro", No. 27/14);
- Law on Integrated Pollution Prevention and Control – IPPC ("Official Gazette of Montenegro ", No. 80/05, 54/09, 42/15, 54/16);
- Ordinance on Allowed Quantities of Hazardous and Noxious Substances and Methods for their Examination (Land Quality) Ordinance (Official Gazette of Montenegro No. 18/97);
- Law on Waters (Official Gazette of Montenegro No.084/18);
- Regulations on the Content of the Programs for the Construction of Collector Systems and Plants for the Treatment of Municipal Wastewater ("Off. Gazette of Montenegro" No. 31/18);
- Decree on determining projects for which an environmental impact assessment shall be carried out" - EIA Decree ("Official Gazette of Montenegro" No. 20/07 and 47/13);
- Regulation on the classification and categorization of surface and groundwater ("Off. Gazette of Montenegro", No. 2/07);
- Regulation on the method for determining the boundaries of water lands ("Off. Gazette of Montenegro", No. 25/12);
- Regulation on the method of categorization and categories of water facilities and their management and maintenance ("Off. Gazette of Montenegro", No. 15/08);
- Regulation on the manner and deadlines for determining the status of surface waters ("Off. Gazette of Montenegro", No. 25/19);
- Regulation on the manner and deadlines for determining the status of ground waters ("Off. Gazette of Montenegro", No. 52/19);
- Regulation on the manner and deadlines for implementing measures to ensure the conservation, protection and improvement of bathing water quality ("Off. Gazette of Montenegro", No. 28/19);
- Regulation on the manner and conditions for measuring the quantity of wastewater discharged into the receiver ("Off. Gazette of Montenegro", No. 24/10);

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- Law on Safety and Health at Work ("Official Gazette of Montenegro", No. 34/14, 44/18);
- Law on Expropriation (''Official Gazette of the Republic of Montenegro", No. 55/00, 28/06 and ''Official Gazette of Montenegro" No. 21/08, 30/17).

Directive:
- EU EIA Directive (2011/92/EU)
- Directive 2001/42/EC (SEA);
- Directive 2011/92/EU (EIA), which codified Directive 85/337/EEC and its amendments by Directive 97/11/EC, Directive 2003/35/EC and Directive 2009/31/EC and as amended by 2014/52/EU (EIA);
- Directive 2003/4/EC
- Council Directives 85/337 and 96/61
- Directive 92/43/EEC on the Conservation of natural habitats and of wild fauna and flora ("the Habitats Directive")
- Directive 2009/147/EC on the conservation of wild birds ("the Birds Directive").
- Water Framework Directive 2000/60/EC;
- Council Directive 91/271/EEC on urban waste water treatment;
- EU Directive 2008/105/EC on environmental quality standards in the field of water policy;
- Directive 2006/11/EC of the European Parliament and the Council on pollution caused by certain hazardous substances discharged into the aquatic environment;
- Directive 2006/118/EC of the European Parliament and the Council on groundwater protection against pollution and quality impairment;
- Waste Framework Directive 2006/12/EC amended with EU Directive 2008/98/EC on waste management;
- Directive on Pollution Caused by Certain Dangerous Substances Discharged into the Aquatic Environment 2006/11
- Directive 89/654/EEC - workplace requirements, concerning the minimum safety and health requirements for the workplace (first individual directive within the meaning of Article 16 (1) of Directive 89/391/EEC);
- Directive 2003/10/EC
- Directive 1989/391/EEC

International/KfW Environmental and Social Standards and Guidelines:
- EU Acquis on environmental and social issues;
- Sustainability Guidelines of the KfW Development Bank October 2019;
- IFC Performance Standards for cooperation with the private sector and their General and sector-specific Environmental, Health and Safety (EHS) Guidelines as well as the Core Labour Standards of the International Labour Organization (ILO);
- Guidelines on Incorporating Human Rights Standards and Principles, Including Gender, in Programme Proposals for Bilateral German Technical and Financial Cooperation;
- The Fundamental Conventions of the International Labour Organization (ILO) as well as IFC Performance Standard 2 on Labour and Working Conditions;
- World Bank Operational Policies: OP/BP 4.01, Environmental Assessment; OP/BP 4.02, Environmental Action Plans; OP/BP 4.04, Natural Habitats; OP 4.07, Water Resource Management; OP/BP 4.36, Forests;
- World Bank Environmental and Social Framework (ESF), which applies to all new World Bank investment project financing, and the Environmental and Social Standards (ESS).

10.2.2. Plans, programs, studies and projects

- Conceptual Design Wastewater Treatment Plant – Draft version, 2020.
- Environmental Impact Assessment for the wastewater treatment plant in Podgorica, 2016.

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- Amendments and additions to the DSP "Industrial area KAP" Podgorica, Ministry of Sustainable Development and Tourism, 2019
- Annual Macroeconomic Report, CBCG, 2019
- Population estimate, Statistical Office of Montenegro, MONSTAT, 2019
- Census 2011, Statistical Office of Montenegro, MONSTAT, 2011
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10.3. Project Maps - Construction site - Cadastral Map

Graphic attachments are at the end of the document.

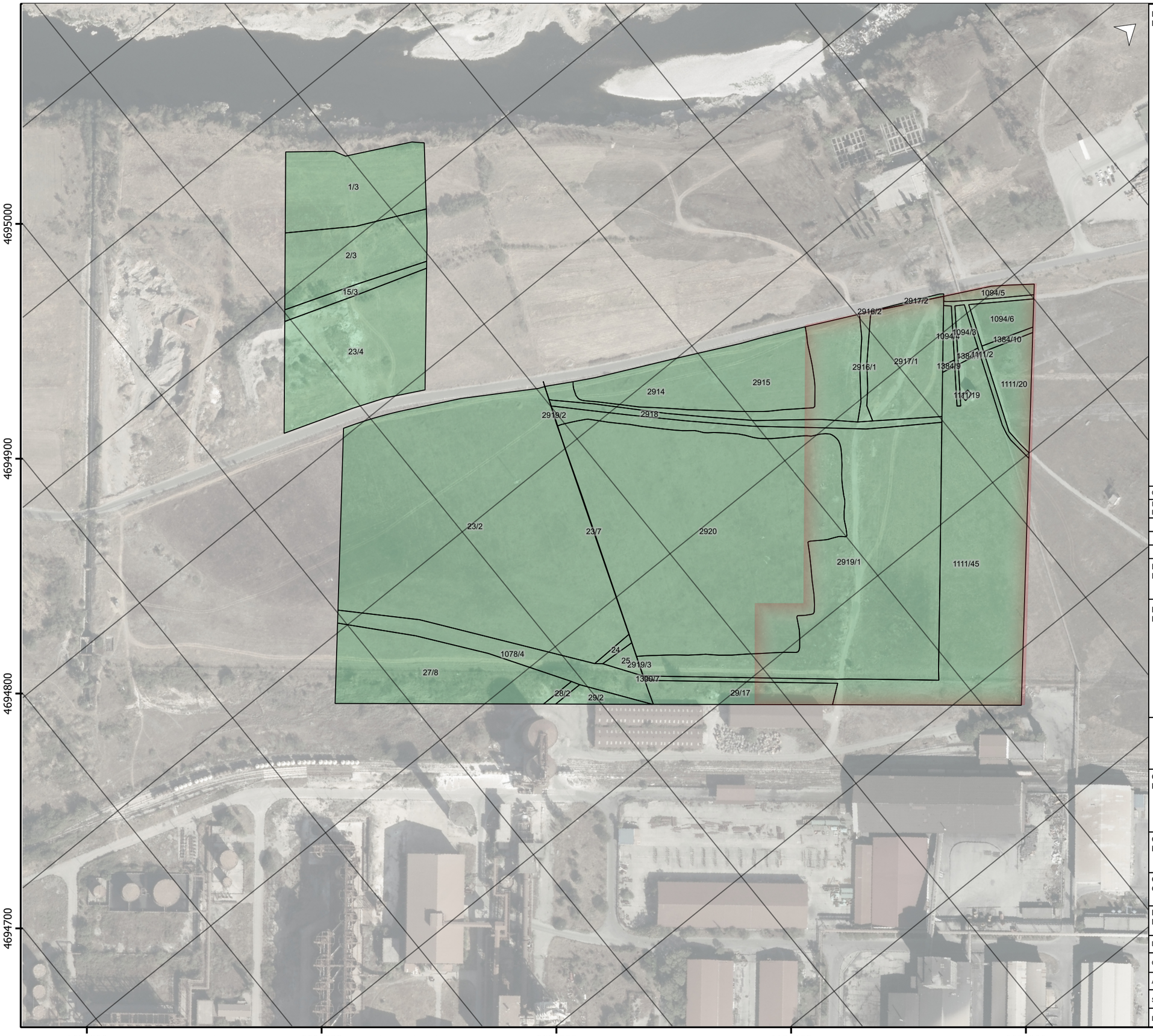
10.4. Record of interagency and consultation meetings

Official public consultation meetings have not been held with representatives of the local communities.

10.5. List of associated reports

In line with the abovementioned, there are no official records of public consultation meetings.

MEDIX d.o.o. PODGORICA SLOVAČKA 27
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Ž.R.: 530-1679-20



LEGEND:
LEGENDA:

Cadastral parcels of the WWTP construction site

Potentially contaminated

0 25 50 m

Coordinate Reference System / Referenti Koordinatni Sistem: USER:100000

Index Broj	Description of amendment Opis izmjene	Date Datum	Name Ime

Financed by: Finansijer: KFW, Western Balkans Investment Framework WBIF

Project: Projekat: **DESIGN, CONSTRUCTION AND APPROVAL OF DESIGN PARAMETERS, TECHNOLOGY AND CAPACITIES OF WASTEWATER TREATMENT PLANT, SLUDGE TREATMENT AND INCINERATION PLANT AND SEWER EXTENSIONS**
PROJEKTOVANJE, IZGRADNJA I ODOBRENJE PROJEKTNIH PARAMETARA, TEHNOLOGIJE I KAPACITETA POSTROJENJA ZA PREČIŠĆAVANJE OTPADNIH VODA, POSTROJENJE ZA OBRADU I SPALJIVANJE MULJA I PROŠIRENJE KANALIZACIJE

Consulting Services for the Preparation of Final Design, Elaboration of Tender Documents and Construction Supervision
Konsultantske usluge za pripremu Glavnog projekta, izradu tenderske dokumentacije i Građevinski nadzor

Client: Klijent: **MONTENEGRO**
CRNA GORA

VODOVOD I KANALIZACIJA (VIK) D.O.O. PODGORICA

Consultants: Konsultant: FICHTNER WATER & TRANSPORTATION *In association with u saradnji sa* CONSULT d.o.o., wandschneider + gutjahr ingenieurgesellschaft mbh

Object: Objekat: New WWTP Podgorica
Nova PPOV lokacija

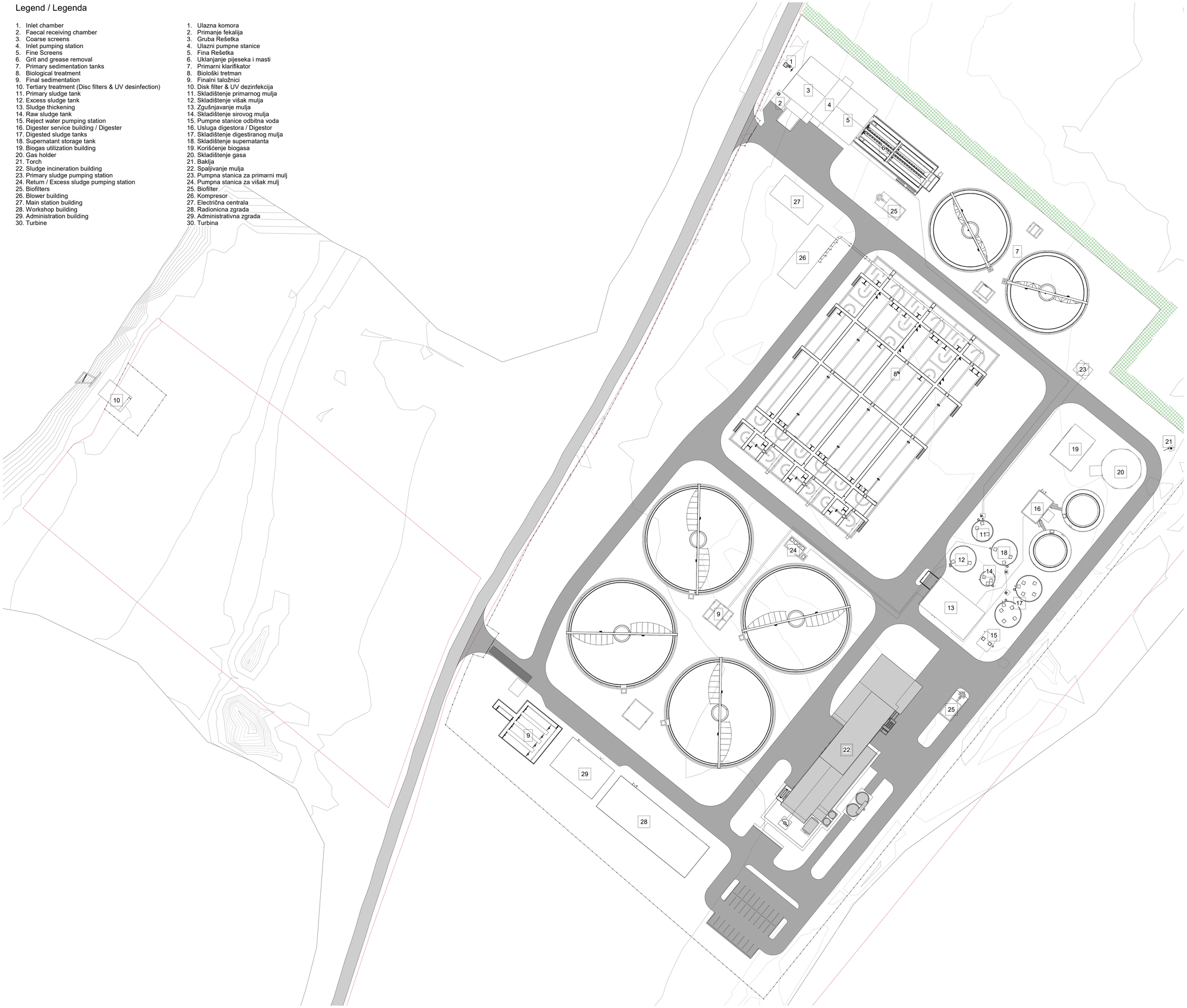
Drawing title: Naziv crteža: **Construction site - Cadastral Map**

Drawn by / Projektovao:	**Jürnjakob Dugge**	
Checked by / Kontrolisao:	**Jürnjakob Dugge**	
Approved by / Odobrio:	**Stéphane Meistermann**	
Scale / Razmjera:	**1:2500**	Drawing no. / Crtež br: **A-0-00-LP-02**
Date / Datum:	**29.01.2020**	

Legend / Legenda

1. Inlet chamber
2. Faecal receiving chamber
3. Coarse screens
4. Inlet pumping station
5. Fine Screens
6. Grit and grease removal
7. Primary sedimentation tanks
8. Biological treatment
9. Final sedimentation
10. Tertiary treatment (Disc filters & UV desinfection)
11. Primary sludge tank
12. Excess sludge tank
13. Sludge thickening
14. Raw sludge tank
15. Reject water pumping station
16. Digester service building / Digester
17. Digested sludge tanks
18. Supernatant storage tank
19. Biogas utilization building
20. Gas holder
21. Torch
22. Sludge incineration building
23. Primary sludge pumping station
24. Return / Excess sludge pumping station
25. Biofilters
26. Blower building
27. Main station building
28. Workshop building
29. Administration building
30. Turbine

1. Ulazna komora
2. Primanje fekalija
3. Gruba Rešetka
4. Ulazni pumpne stanice
5. Fina Rešetka
6. Uklanjanje pijeseka i masti
7. Primarni klarifikator
8. Biološki tretman
9. Finalni taložnici
10. Disk filter & UV dezinfekcija
11. Skladištenje primarnog mulja
12. Skladištenje višak mulja
13. Zgušnjavanje mulja
14. Skladištenje sirovog mulja
15. Pumpne stanice odbitna voda
16. Usluga digestora / Digestor
17. Skladištenje digestiranog mulja
18. Skladištenje supernatanta
19. Korišćenje biogasa
20. Skladištenje gasa
21. Baklja
22. Spaljivanje mulja
23. Pumpna stanica za primarni mulj
24. Pumpna stanica za višak mulj
25. Biofilter
26. Kompresor
27. Električna centrala
28. Radionicna zgrada
29. Administrativna zgrada
30. Turbina



DESCRIPTION OF COLORS AND LINE TYPES
OPIS BOJA I LINIJE

Property Line	Linija imovine
Fence	Ograda
Small DN pipes	Cevi malog prečnika
Contaminated area	Kontaminirana zona
Existing road	Postojeći put
Designed roads and parking areas	Planirani putevi i parkirališta
Traffic Scale	Vaga za vozila

Coordinate Reference System: / Referentni koordinatni sistem: MGI-1901 Balkans zone 6
Vertical Reference System: / Vertikalni koordinatni sistem:

Index / Broj	Description of amendment / Opis izmjene	Date / Datum	Name / Ime

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CRNA GORA
VODOKANAL I KANALIZACIJA DOO PODGORICA

Funding Agency: / Investitor:
KfW, Western Balkans Investment Framework WBIF

Consultant: / Konsultant:
FICHTNER WATER & TRANSPORTATION
In association with / u saradnji sa
WA CONSULT Ltd.
wandschneider + partjahr ingenieurgesellschaft mbh

Project: / Projekat:
DESIGN, CONSTRUCTION AND APPROVAL OF DESIGN PARAMETERS, TECHNOLOGY AND CAPACITIES OF WASTEWATER TREATMENT PLANT, SLUDGE TREATMENT AND INCINERATION PLANT AND SEWER EXTENSIONS
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Preparation of Final Design, Tender Documents and Construction supervision
Priprema Glavnog projekta, tenderske dokumentacije i nadzor nad radovima

Measure: / Mjera:
WASTEWATER TREATMENT PLANT
POSTROJENJE ZA PRERADU OTPADNIH VODA

Drawing Title: / Naziv crteža:
GENERAL LAYOUT
GENERALNI PLAN

Drawn by: / Projektovao:	Levon Vardanyan	
Checked by: / Kontrolisao:	Rüdiger Böckle	
Approved by: / Odobrio:	Stéphane Meistermann	
Scale: / Razmjera:	1 : 500	Drawing no.: / Crtež br.:
Date: / Datum:	January 2020	**A-0-00-LP-03**

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WWTP
PPOV

Bypass
Coarse Screen 1 *Gruba rešetka 1*
Coarse Screen 2 *Gruba rešetka 2*
Coarse Screen 3 *Gruba rešetka 3*
Coarse Screen 4 *Gruba rešetka 4*
Inlet Pumping Station *Ulazni dio pumpne stanice*
Septic Reception *Septički prijemni tank*
Compactor *Kompaktor*
Bypass
Fine Screen 1 *Fina rešetka 1*
Fine Screen 2 *Fina rešetka 2*
Fine Screen 3 *Fina rešetka 3*
Fine Screen 4 *Fina rešetka 4*
Compactor *Kompaktor*
Blower Station *Kompresori*
Distribution Chamber *Distributivna komora*
Grit and Grease Removal 1 *Uklanjanje pijeska i masti 1*
Grit and Grease Removal 2 *Uklanjanje pijeska i masti 2*
Grit Classifier *Klasifikator pijeska/šljunka*
Precipitant Dosing *Doziranje precipitanta*
$FeCl_3$
Distribution Chamber *Distributivna komora*
Bypass
Primary Sedimentation Tank 1 *Primarni klarifikator 1*
Primary Sedimentation Tank 2 *Primarni klarifikator 2*
Primary Sludge Pumping Station *Pumpna stanica za primarni mulj*
Bypass
Distribution Chamber *Distributivna komora*
Blower Station *Kompresori*
Bypass
Biological Treatment 1 *Biološki tretman 1*
Biological Treatment 2 *Biološki tretman 2*
Biological Treatment 3 *Biološki tretman 3*
Distribution Chamber *Distributivna komora*
Final Sedimentation Tank 1 *Finalni taložnici 1*
Final Sedimentation Tank 2 *Finalni taložnici 2*
Final Sedimentation Tank 3 *Finalni taložnici 3*
Final Sedimentation Tank 4 *Finalni taložnici 4*
Return / Excess Sludge Pumping Station *Pumpna stanica*
Distribution Chamber *Distributivna komora*
Backwash water *Voda za ispiranje filtera*
Bypass
Disc Filter 1 *Disk filter 1*
Disc Filter 2 *Disk filter 2*
Disc Filter 3 *Disk filter 3*
Disc Filter 4 *Disk filter 4*
Bypass
UV *UV dezinfekcija*
Service Water Pumping Station *Pumpna stanica za tehničku vodu*
Turbine *Turbina*

SSTP
PTKM

Primary Sludge Storage *Skladištenje primarnog mulja*
Primary Sludge Thickening *Zgušnjavanje primarnog mulja*
Polymer *Polimer*
Polymer Generation *Proizvodnja polimera*
Raw Sludge Storage *Skladištenje sirovog mulja*
Excess Sludge Thickening *Zgušnjavanje višak mulja*
Polymer *Polimer*
Polymer Generation *Proizvodnja polimera*
Excess Sludge Storage *Skladištenje višak mulja*
Polymer Generation *Proizvodnja polimera*
Polymer *Polimer*
Supernatant Storage *Skladištenje supernatanta*
Digester 1 *Digestor 1*
Digester 2 *Digestor 2*
Digested Sludge Storage *Skladištenje digestiranog mulja*
Dewatering *Odvodnjavanje*
Gas Storage *Skladištenje gasa*
CHP 1 *CHP 1*
CHP 2 *CHP 2*
Flare *Baklje*
Boiler *Bojler*

SSIP
PSKM

Incineration *Spaljivanje*

- Wastewater *Vodovod*
- Service water *Tehnicka voda*
- Sludge *Mulj*
- Screenings and grit *Pijesak*
- Scum *Skrama*
- Air *Vazduh*
- Gas *Gasa*
- Chemicals *Hemikalija*

Start of operation 2022 *Puštanje u rad 2022. god.*
Start of operation 2035 *Puštanje u rad 2035. god.*
Standby *Rezervno*

Coordinate Reference System: MGI-1901 / Referentni koordinatni sistem: Balkans zone 6
Vertical Reference System: / Vertikalni koordinatni sistem:

Index Broj	Description of amendment Opis izmjene	Date Datum	Name Ime

Client: / Klijent:
MONTENEGRO
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Funding Agency: / Investitor:
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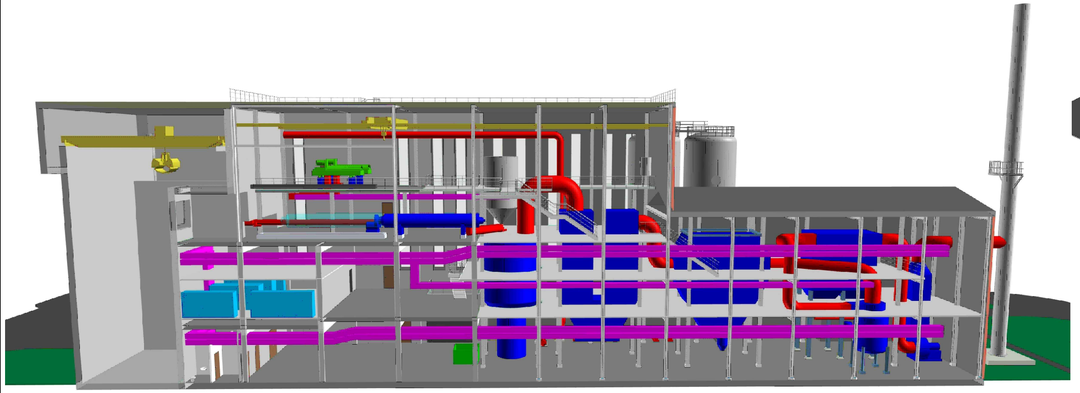
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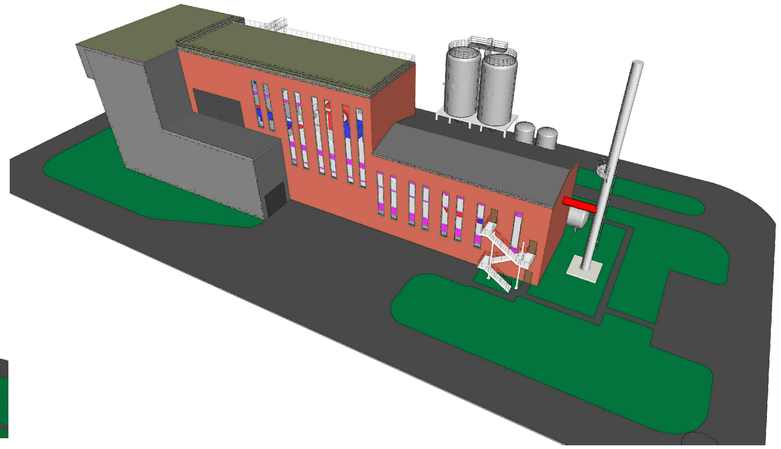
Measure: / Mjera:
WWTP/SSTP
PPOV/PTKM

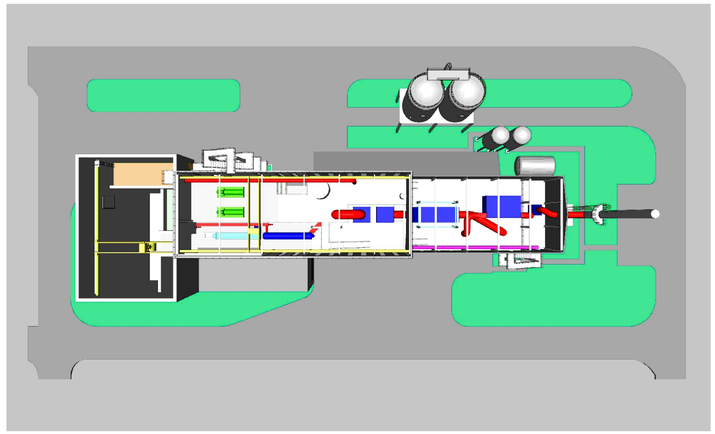
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Block flow diagram
Dijagram blokova toka

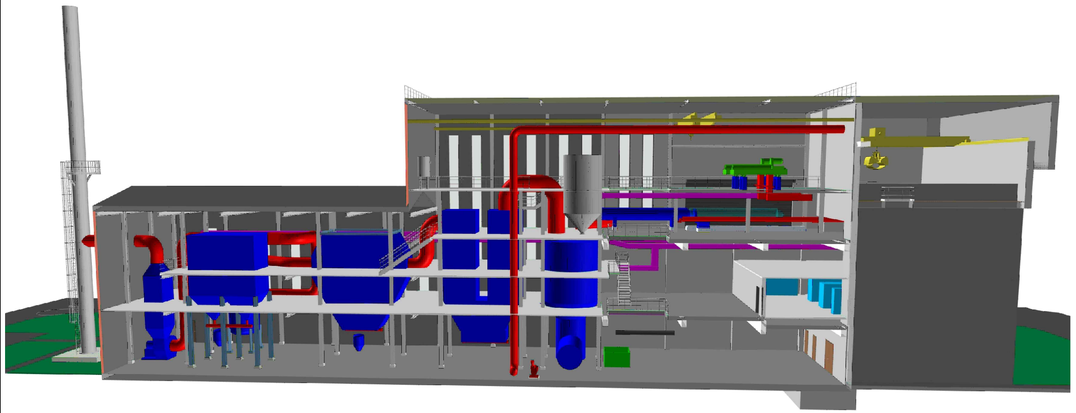
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Checked by: / Kontrolisao:	Rüdiger Böckle	
Approved by: / Odobrio:	Stéphane Meistermann	
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Date: / Datum:	29.01.2020	

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Legend

1 fluidised bed furnace
2 thermal oil boiler
3 electrostatic precipitator
4 reactor
5 fabric filter
6 induced draft fan
7 stack
8 thin film dryer
9 centrifuges
10 reception of external sewage sludge
11 sludge reception bunker
12 sludge storage bunker
13 sludge bunker crane
14 boiler house crane
15 start-up / auxiliary burner
16 bed material separation
17 ash and residue conveyor system
18 air preheater
19 start-up burner air fan
20 combustion air fan
21 primary system pumps
22 secondary system pumps
23 water cooler
24 thermal oil storage tank
25 thermal oil expansion vessel
26 cable trays
27 control room
28 transformer box
29 sanitary rooms
30 stair tower
31 crane opening
32 activated carbon silo
33 bicarbonate silo
34 ash silo
35 FGT residue silo
36 sand silo
37 collection chute

Coordinate Reference System: MGI-1901 / Referentni koordinatni sistem: Balkans zone 6
Vertical Reference System: / Vertikalni koordinatni sistem:

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Funding Agency: Investitor:
KFW Western Balkans Investment Framework WBIF

Consultant: Konsultant:
FICHTNER WATER & TRANSPORTATION in association with u saradnji sa
WA CONSULT d.o.o. Design - Consulting and Engineering
wandscheider + gutjahr ingenieurgesellschaft mbh

Project: Projekat:
DESIGN, CONSTRUCTION AND APPROVAL OF DESIGN PARAMETERS, TECHNOLOGY AND CAPACITIES OF WASTEWATER TREATMENT PLANT, SLUDGE TREATMENT AND INCINERATION PLANT AND SEWER EXTENSIONS
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Measure: Mjera:
WASTEWATER TREATMENT PLANT
POSTROJENJE ZA SPALJIVANJE KANALIZANIONOG MULJA

Drawing Title: Naziv crteža:
3D

Drawn by: / Projektovao:	Ricky Gostia		
Checked by: / Kontrolisao:	Benjamin Oest		
Approved by: / Odobrio:	Martin Gutjahr		
Scale: / Razmjera:	NTS	Drawing no. / Crtež br.:	M-3-00-SV-01
Date: / Datum:	JANUARY 2020		

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(viii) Other Documents

- **Construction Site Plan**
- **Urban-Technical Conditions (Urbanisticko-Tehnicki Uslovi)**
- **Environmental and Social Impact Assessment (ESIA)**
- **Environmental and Social Management Plan (ESMP)**
- **Geotechnical Survey Report**
- **Reports on Soil Contamination**
- **KAP Well Water Analyses Data**

DESIGN, CONSTRUCTION AND APPROVAL OF DESIGN PARAMETERS, TECHNOLOGY AND CAPACITIES OF WASTEWATER TREATMENT PLANT, SLUDGE TREATMENT AND INCINERATION PLANT AND SEWER EXTENSIONS

Environmental and Social Management Plan (ESMP)



September, 2020.

DOCUMENT CONTROL SHEET

Client:	"Vodovod i Kanalizacija Podgorica" (VIK) Ltd.
Project:	DESIGN, CONSTRUCTION AND APPROVAL OF DESIGN PARAMETERS, TECHNOLOGY AND CAPACITIES OF WASTEWATER TREATMENT PLANT, SLUDGE TREATMENT AND INCINERATION PLANT AND SEWER EXTENSIONS
Title of the Report:	Environmental and Social Management Plan (ESMP)
Contractor:	MEDIX Ltd.
Date:	September, 2020

Multidisciplinary team:

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MSc Dragan Radonjić graduated engineer of Chemical technology
Ivana Raičević, Environmental Specialist
Milan Maraš, spec. of chemical technology
Miljana Vuković, Spec. of Biology
Milica Stanišić, Civil Engineer
Maida Muratović, Environmental Specialist
Marija Sinđić, Social Expert

Signature:

Ljiljana Vuksanović
Executive Director

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Figure 20. Project location 2 (auxiliary facilities)
Figure 21. Community objects in the wider project area

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ABBREVIATIONS

BOD	Biochemical Oxygen Demand
CETI	Center for Ecotoxicological Testing
DUP	Detailed Urban Plan
EIA	Environmental Impact Assessment
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
EMP	Environmental Management Plan
EU	European Union
KAP	Aluminium Plant Podgorica
MARD	Ministry of Agriculture and Rural Development
NEPA	Nature and Environmental Protection Agency of Montenegro
OSH	Occupational Safety and Health
SSTP	Sewage Sludge Treatment Plant
SSIP	Sewage Sludge Incineration Plant
ViK	Vodovod i kanalizacija
WWTP	Wastewater Treatment Plant
WB	World Bank

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1. EXECUTIVE SUMMARY

The construction of a new wastewater treatment plant for the Capital City of Podgorica is of great importance. Namely, the existing WWTP of the city of Podgorica has a much smaller capacity than necessary, which is why it cannot provide the most modern wastewater and sludge treatment in accordance with current regulations on discharging treated wastewater into the natural environment. Efluents from the city of Podgorica are discharged into the Morača River, which provides the largest amount of water for Skadar Lake, a valuable and sensitive natural area that is under state and international protection.

The existing wastewater treatment plant of the city of Podgorica is 40 years old and technically outdated and critically overloaded. The plant cannot provide for a state-of-the art wastewater treatment with regard to both its design capacity and its treatment efficiency, especially considering removal of nutrients. The capacity of the plant is 55.000 PE, while the current wastewater flow and pollution load collected by the existing sewer network and transferred to the plant exceeds 100.000 PE, i.e. as close to or even more than 100 % overload. This results in the necessity to discharge partly treated and also untreated raw wastewater directly to the River Moraca and in a significant impact on the water quality of River Moraca and the downstream sensitive Skadar Lake.

The location where the construction of the wastewater treatment plant in Podgorica is planned is located in the southern part of the Capital, in the immediate vicinity of the Aluminum Plant from Podgorica and belongs to the planning document DUP Industrial Zone KAP. According to the DUP of the industrial zone of KPA, which covers an area of 483.68 hectares, and which was adopted in 2009, the new WWTP is located next to the KAP facilities, and borders its processing plants, water supply wells, canal for wastewater, as well as with the road to the settlements of Dajbaba / Zelenika and Botun.

DUP (Detailed Urban Plan)"Industrial Zone - Aluminum Plant Podgorica" has reserved an area of 11.1 ha (UP 5 lok 1 + UP 5 lok 2) for the construction of WWTP, which is considered adequate for WWTP with a planned capacity of about 235,000 PE.

In addition, 2.5 ha is reserved for the construction of the KAP WWTP (UP4), and the DUP also reserves space for the installation of collectors for the discharge of purified effluents into the Morača River (UP 6).

The proposed conceptual design for the WWTP Podgorica takes into account the individual process units that have been selected, emphasizing the most sustainable reliability and operability of plants and equipment, taking into account the special conditions of the project.

The design of the process will be in line with the recommendations of the German DWA / ATV, which represent the leading design experience in Central Europe, thus ensuring compliance with wastewater regulations.

Wastewater collected by the sewer network of the city of Podgorica will be transferred from the site of the existing wastewater treatment plant to the site of the new WWTP through an approx. 5 km long DN 1.300 mm gravity sewer.
The wastewater treatment plant consists in the following facilities:

- Wastewater Treatment Plant (WWTP);
- Sewage Sludge Treatment Plant (SSTP);
- Sewage Sludge Incineration Plant (SSIP);
- Common facilities.

The applied wastewater treatment technology is the activated sludge treatment process with primary sedimentation and tertiary treatment for nitrogen and phosphorous removal as well as final disinfection.

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The wastewater treatment line comprises following main facilities:

- Inlet works including grit trap, coarse screen, lifting pumping station and fine screen;
- Grit and grease removal;
- Primary sedimentation;
- Aeration tanks;
- Final sedimentation tanks;
- Disinfection.

Sewage sludge produced from the wastewater treatment and extracted from the primary and final sedimentation tanks will be treated in anaerobic digesters to decompose the organic matter and produce biogas. Biogas will be used in the plant for the production of heat and electrical power through the use of Combined Heat and Power (CHP) equipment. The remaining sludge will be dewatered and incinerated in the sludge incineration plant (see below). The sewage sludge treatment line comprises following main facilities:

- Primary sludge storage tank and thickening by use of centrifuges;
- Excess sludge storage tank and thickening by use of centrifuges;
- Thickened raw sludge storage tank;
- Anaerobic digesters;
- Biogas storage and reuse for production of heat and power;
- Digested sludge storage and dewatering.

Digested and dewatered sewage sludge will finally be incinerated in a Sewage Sludge Incineration Plant (SSIP) which will be part of the wastewater treatment plant. The SSIP includes following main facilities:

- Concrete bunker for storage of dewatered sludge and reception of external sludge;
- Sludge drying system (contact dryer or belt dryer);
- Fluidised bed sewage sludge incinerator with reuse of flue gas heat for sludge drying;
- Electrostatic precipitator for flue gas cleaning and flue gas treatment;
- Supernatant storage tank and recycling pumping station.

Common facilities of the wastewater treatment plant include principally:

- Administration building;
- Workshop and storage building;
- Transformer station medium and low distribution boards and emergency generator;
- Guard house;
- Internal roads;
- Fence and gate;
- Green areas.

The primary purpose of the ESMP is to document key environmental and social problems, the activities that need to be undertaken to address these issues adequately, and to appoint the staff/unit responsible for its implementation and monitoring.

This ESMP also gives an overview about the specific Environmental and Social management system (including Health and Safety) that is being implemented to ensure systematic and effective execution of above-mentioned commitments, including roles and responsibilities between the Investor, Contractor and Supervision/Engineer.

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2. INTRODUCTION

2.1. Project background and Scope

The Investor “Vodovod i Kanalizacija Podgorica” (VIK) Ltd. is planning the works for “Construction of Wastewater Treatment Plant” (Project). This Project is an integral part of the framework project “"Collection and treatment of wastewater in Podgorica" is a primary project from the aspect of sustainable development of the Capital of Podgorica.

This Project will be jointly financed by KfW, the EU Western Balkan Investment Framework (WBIF) and the Capital of Podgorica.

The Project will be constructed at a site in Podgorica, Capital of Montenegro, along the left bank of Moraca river.

2.2. Objective and content of ESMP

The primary purpose of the ESMP is to document key environmental and social problems, the activities that need to be undertaken to address these issues adequately, and to appoint the staff/unit responsible for its implementation and monitoring.

The idea is to apply environmentally sound management strategies in line with the related national regulations and international standards to carry out project activities conserving the integrity of natural systems and keeping the adverse impacts at acceptable levels. Thus, the ESMP sets out to ensure that all aspects of the work comply with relevant legislation, permit conditions and good practices, and that measures for mitigation of the identified negative impacts are implemented at all phases of the Project.

This ESMP also gives an overview about the specific Environmental and Social management system (including Health and Safety) that is being implemented to ensure systematic and effective execution of above-mentioned commitments, including roles and responsibilities between the Investor, Contractor and Supervision/Engineer.

The ESMP contains the following key sections:
- Location
- Project description
- Baseline data - current situation of the environment and solial issue
- Environmental and social impacts
- Project alternatives
- Mitigation management plan
- Monitoring plan
- Public consultation, stakeholder engagement and information disclosure
- Appendixes

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3. LOCATION

The location where the construction of the wastewater treatment plant in Podgorica is planned is located in the southern part of the Capital, in the immediate vicinity of the Aluminum Plant from Podgorica and belongs to the planning document DUP Industrial Zone KAP.

According to the DUP of the industrial zone of KPA, which covers an area of 483.68 hectares, and which was adopted in 2009, the new WWTP is located next to the KAP facilities, and borders its processing plants, water supply wells, canal for wastewater, as well as with the road to the settlements of Dajbaba / Zelenika and Botun.

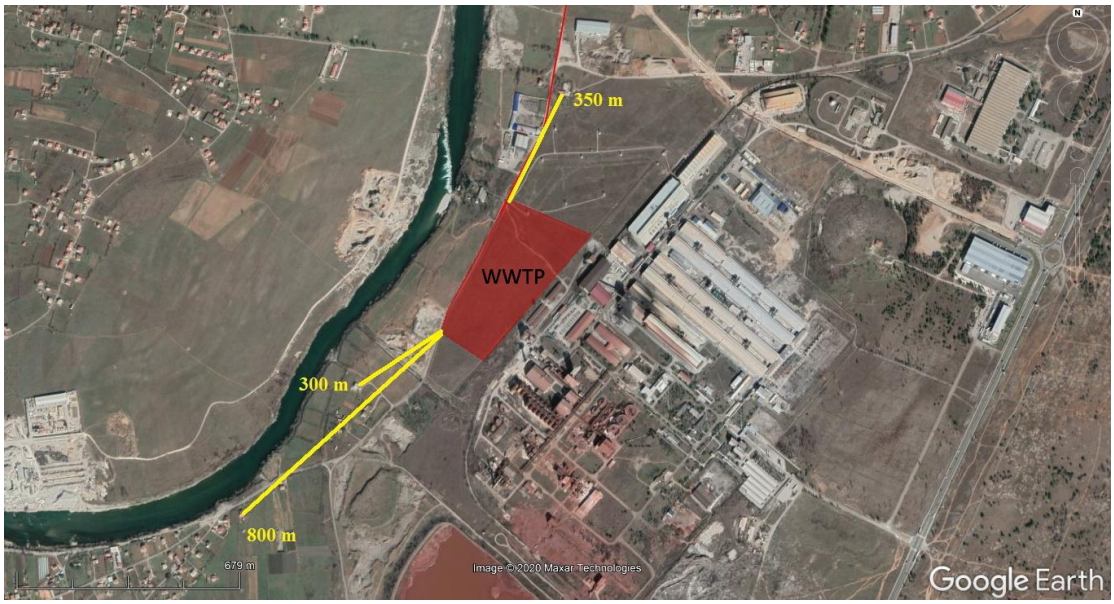


Figure 1. *Microlocation of the new WWTP*

The selected location for the new WWTP is 11.1 hectares, on the left bank of the Morača River, which is about 150 m away.

The plot is owned by the Capital of Podgorica and Aluminum plant Podgorica (KAP).

The land of the proposed location is currently an unused meadow of no special value.

Next to the plot there is a local road that connects the villages of Botun and Srpska with the settlements of Zelenika and Dahna. The plots on the other side of this road, towards the river Moraca are untidy and filled with various construction materials with waste.

The closest settlements to the future WWTP are the villages of Botun and Srpska. According to the 2011 List, Botun was inhabited by 696 inhabitants, in a total of 180 households, while Srpska was inhabited by 886 inhabitants in 252 households.

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The realization of the project is planned on the cadastral / urban parcels shown on figure below:

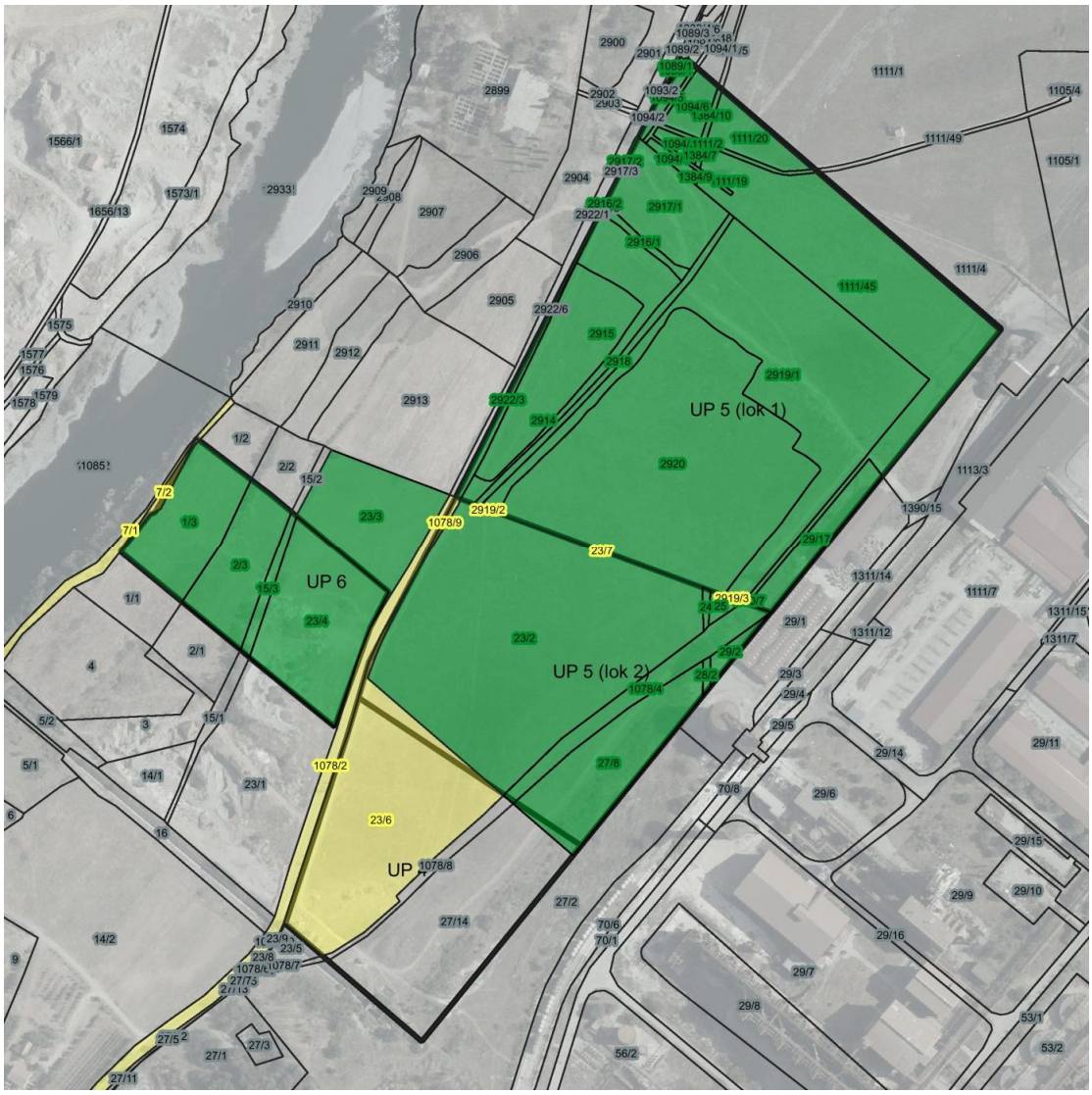


Figure 2. *Overview of cadastral and urban plots on which the construction of WWTP is planned*

3.1. Review of pedological, geomorphological, geological, hydrogeological and seismological characteristics of the terrain

Pedological characteristics

The area near KAP and the location of the planned WWTP is characterized by class 12 soil - brown soils on fluvial-glacial deposits (very shallow).

Geological characteristics

The terrain on which the construction of the WWTP is planned is built by sedimentary rocks of the Upper Cretaceous and Quaternary.

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The Upper Cretaceous is represented by stratified limestones that form the floor of Quaternary sediments and Dajbabska gora in the north and Srpska gora in the south.

Quaternary sediments are represented by sands, gravels, larger pebbles with and without various clays. Red clays occur along the edges of these hills, and often in the slope of these granular sediments on the limestone slope. Granular sediments are bound here and there by a carbonate binder to form true conglomerates

Geotectonic setting

The limestones of the surrounding hills of the project site and the bottom below the granular sediments (Quaternary-fluvioglacial) were wrinkled and intersected with cracks, fissures and faults by geotectonic stresses changing the spatial settlement of layers and elements of folding and fracture structures in shorter strokes. This can be clearly seen in Dajbabska gora.

Geomorphological characteristics

The terrain of the project site belongs to the Zeta plain. WWTP and KAP with their facilities is on flat ground with elevations from about 33 m above sea level to about 20 m above sea level and with a slope from north to south with an altitude difference of 13 m, on a stretch about 2.5 km long.

A mound called Zmijan rises in the circle of KAP with an elevation of 51.5 m above sea level (about 20 m above the surrounding flat terrain). In the north is Dajbabska gora with an elevation of 159 m above sea level, and in the south Srpska gora with an elevation of 97 m above sea level.

Hydrogeological features of the terrain

The terrain of the plain north of KAP, south of Dajbabska gora, is at an elevation of about 40 m above sea level, and immediately south of Srpska Gora is about 25 m above sea level, while in the circle of KAP it is at about 30 m above sea level. The compacted aquifer is pointed from the Morača watercourse towards the southeast, and then slowly turns to the south, taking this direction as dominant already in the plain east of the Adriatic road. The data are presented on the basis of surveys for the days of 30.09.1970 and 8.08.1990.

In the plain south of Dajbabska gora, the depth to the groundwater level is about 20 m, in the circle of KAP about 15 m, and south of Srpska gora about 10 m. All this is based on the available data that do not give, nor can they give, a true picture of the average groundwater regime for a multi-year period.

Engineering-geological features of the terrain

The terrains on which the WWTP is predicted and where KAP is are almost flat — with a barely noticeable slope to the southwest — to the Morača River bed. The edge of the Morača riverbed opposite Dajbabska gora is at about 30 m above sea level, and in that profile towards the east at about 2 km on the Adriatic road the elevation of the plain is about 40 m above sea level. The drop is about 10m on 2km.

In the profile south of the red sludge landfill (and south of the previous profile by about 2 km) the edge of the Morača riverbed is about 25 a.s.l., and to the east on the Adriatic road the elevation of the terrain is about 30m.n.m. The fall of the terrain is about 5m on 2 km.

Seismological characteristics

From the microseismic point of view, the territory of the Capital City of Podgorica is located within a space with a very pronounced seismic activity. From the point of view of seismic in this area, there is an intense coupling of forces, and the occasional phases of increased tension affect the differential ascent or descent of the blocks

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In the historical time, the Zeta-Skadar depression, where WWTP is predicted, was shaken by earthquakes from their own hotspots with a magnitude of up to IXº MCS scale.

3.2. Biodiversity

Flora

Thanks to the favorable microclimatic conditions, the area of the municipality of the capital Podgorica has an almost uninterrupted vegetation period. Based on the literature data, we can say that the wider environment of this area is characterized by a relatively diverse fund of plant species that mostly belong to the Mediterranean and sub-Mediterranean floral element.
The great diversity of the vascular flora of this area can be explained by the fact that the heterogeneous urban environment, which by itself implies the heterogeneity of habitats, enables the growth and survival of species with different survival strategies. This area is located in the vegetation zone of Oriental hornbeam (*Carpinion orientalis*, order *Quercetalia pubescentis*) in which a large diversity of plant communities has been recorded. In addition to indigenous plants, the vegetation cover of the city area of Podgorica consists of numerous non-indigenous species that dominate in some locations.
Ecological-phytogeographical study of the flora of the urban area of Podgorica showed that this area is inhabited by over 1200 species and subspecies, which represents more than a third of the vascular flora of Montenegro (Stešević, 2009). The families *Poaceae* (grasses), *Asteraceae* (sunflower family) and *Fabaceae* (bean family) are the most represented. Among grasses, some species are very common, sometimes with numerous populations such as *Eleusine indica, E. tristachya, Sporobolus poiretii* and *Paspalumdilatatum. Aster squamatus, Helianthus tuberosus, Conyza bonariensis, Crepis sancta* and others have a high frequency of occurrence. Among bean family, *Lathyrus cicera, Lotus corniculatus, Medicago orbicularis, M. grandiflora, M. sativa, M. rigidula*, several species of the genera *Trifolium* and *Vicia dominate*.
The location of the project is located in the industrial part of the city, surrounded by a park (left side of the main road Podgorica - Golubovci), which mostly builds Aleppo pine (*Pinus halepensis*) and cypress (*Cupressus sempervirens*). The degraded appearance of the park is the result of felling, fire and unfavorable weather conditions (due to the age or poor condition of individual trees, a large number of trees, most often pine trees, are destroyed during the winter months). In the increasingly open areas within the park, common and very widespread plants grow, mostly grasses. In addition to grasses, other wild plants grow, such as *Vicia sp., Fumariaofficinalis, Capsella bursa-pastoris, Lamium sp., Cirsium sp., Bellisperennis, Taraxacumofficinale, Centaurea sp., Euphorbia sp., Convolvulus arvensis, Cichorium. sp., Veronica persica, Geranium sp., Chenopodium sp.* etc.
The subject location is a flat surface, a spacious meadow where the flora is quite uniform and represented by herbaceous plants, among which the dominant grasses are Cynodon dactylon, Dactylis sp., Avena sp. (wild oats), Bromus sp ., Poa sp. and others. In addition to grasses, other herbaceous, annual plants that prefer this type of habitat grow here: Tordylium apulum, Matricaria chamomilla (chamomile), Althaea sp. (mallow), Achillea millefolium (ragweed), Euphorbia sp. (spurge), Fumaria officinalis, Auchusa sp., Medicago sp., Vicia sp. (vetches), Trifolium sp. (clover), Lamium sp., Papaverrhoeas, Plantago sp. (plantains), Ranunculus sp., Veronica sp., Taraxacumofficinalis (dandelion), Parsella bursa-pastoris (Shepherd's Purse), Geranium sp. (Bigroot Geranium), ... In the part towards the coast of Morača, there are woody species such as willow (Salix sp.), Hackberrie (Celtisaustralis), Vitexagnus-castus, then wild pomegranate (Punicagranatum), rose hip (Rosacanina), fig (Ficuscarica), thorn (Paliurusspina-christi) and others.

By visiting the site in question, it was determined that endangered, rare, endemic and protected plant species do not grow on it ("Official Gazette of the Republic of Montenegro, No. 76/2006").

Fauna

A review of the available professional and scientific literature shows that the subject area has not been researched in detail when it comes to its fauna, so it is not possible to realistically talk about its

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diversity (individual scientific papers, master's and doctoral theses are available, which mainly deal with certain groups of animals, e.g. only one genus, studies).

The fauna of the urban area of Podgorica consists of common urban mammal species such as bats (Chiroptera) (all recorded species are legally protected in Montenegro). In the wider area of the capital Podgorica live large game, such as wild boar, roe deer and chamois, and from smaller mammals foxes, martens, badgers, rabbits, squirrels. Of the reptiles, the most common are lizards (Lacerta muralis, Podarcis sp., ...), less common are turtles (Testudo hermanii) and snakes (like Aesculapian snake); of amphibians frogs are present (e.g. toad, Bufo bufo). Among the numerous invertebrates, insects are the most numerous.
Somewhat more data refer to the ornithofauna of the area in question (Morača with its surroundings). In this part, 115 bird species were registered (surveys were conducted in 2008, without winter and early spring aspect), with the probability of occurrence of at least 15 more species that were not recorded during these surveys, and are located in neighboring canyons (Mrtvica, Mala Rijeka, Cijevna). In the lower course of the Morača River, which gravitates to the area in question, due to intensive exploitation of gravel and stones during the warm months, "small lakes" are formed in which captured animals are ideal food for birds, such as little egret (Egretta garzetta) and Gray Heron (Ardea cinerea), Kentish plover (Charadrius alexandrinus) - the most important nesting bird of Morača, pygmy cormorant (Phalacrocorax pygmeus), great cormorant (Phalacrocorax carbo), common kingfisher (Alcedo attis), common whitethroat (Sylvia communis), European bee-eater (Merops) and others(Saveljić, 2009). All these bird species are protected by the law of Montenegro.
The closest watercourse to the location in question, the Morača River, has a torrent-flood character in this part. In this river, from the source to the mouth, live salmonid fish species: marble trout (Salmo marmoratus), brown trout (Salmo trutta), Balkan trout (Salmo dentex) (Mrdak, 2011), as well as California trout (Oncorhynchus mykiss) as introduced Species; of the other genera, common chub (leuciscus cephalus), Prussian silver carp (Carassius auratus gibelio), perch (Perca fluviatilis), eel (Anguilla anguilla) and others are present. However, trout "require" a high amount of soluble oxygen throughout the year and a water temperature not exceeding 20 °C, as well as a multitude of available food (a significant place in the diet of fish are larvae of Ephemeroptera, Simuliidae, Hironomida, Hydrachnidiae, ... ie river fauna bottom). Downstream of Dahna, the density of bottom fauna settlements is extremely low as a result of disturbances in the structure of bottom fauna settlements caused by constant habitat disturbance due to intensive gravel exploitation in this part of the stream. During the summer, due to very high summer temperatures in the Zeta-Bjelopavlićka plain, but also due to the small flow in those months, the water temperature of the Morača River reaches as much as 25°C, and the oxygen level drops below 5 mg / l, which is extremely unfavorable for trout species. During the summer months, in the lower reaches of this river (as well as the Zeta River), trout survive thanks to karst hydrology phenomena: there are many underwater springs that spring from the side of the river, under cut banks or from the bottom of ravines and pits and are abundant throughout whole year, even during the summer. In these places, there are local ecological conditions that correspond to trout species: the water temperature does not exceed 20 °C, and the level of dissolved oxygen is far higher than in other parts of the watercourse.
The subject area does not have the status of a protected natural asset. The presence of rare, sparse, endemic and endangered plant and animal species listed in the "Official Gazette of the Republic of Montenegro", no. 36/77 and 2/89 and “Official Gazette of the Republic of Montenegro”, No. 76/2006 is not evidented. Also, in the location that is the subject of this assessment, there are no habitats and species that the Berne Convention defines as a priority in protection, and of interest to the EU.

3.3. An overview of the basic characteristics of the landscape

The area as a segment of the capital's environment has a relatively large relief diversity, with karst geomorphology and a branched hydrological network, while the spatial unit is located in the contact zone of sea and land with a diverse lake shore. The consequence of a long past and the presence of different civilizations in the fields of Podgorica has contributed to the diversity of the cultural landscape. It is still a relatively sparsely populated, but preserved area that can be stated without exaggeration to be of rare landscape and biological value.

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According to the spatial urban plan of the Capital City of Podgorica until 2025, the area of the DUP within which the construction of the WWTP is envisaged, belongs to the type of area 2 - Plain area with eastern hills.

3.4. Overview of protected buildings and cultural and historical heritage

There are no protected plant and animal species in the immediate vicinity of the project. The planned intervention is not located in the zone of ecologically significant localities (EMERALD, IPA, IBA) and protected localities.
There are a large number of protected buildings and goods from the cultural and historical heritage in Podgorica, while there are none in the immediate vicinity of the project.

The closest cultural and historical heritage to the project in question is the Dajbabe Monastery, which is classified as a cultural property of the II category according to the Law on Protection of Cultural Heritage ("Official Gazette of Montenegro", 49/10). The project is 1.4 km away from the Monastery.

3.5. Population and population concentration

The capital Podgorica occupies an area of 1441 km2, which is 10.43% of the area of Montenegro. According to the 1948 census, the number of inhabitants in Podgorica was 48,417, and in 2003 the number of inhabitants reached the figure of 169,132. The number of inhabitants in the area of the City of Podgorica according to the 2011 Census is 187085.

The closest settlements to the future WWTP are the villages of Srpska and Botun.
According to the 2011 Census, Botun was inhabited by 696 inhabitants, in a total of 180 households, while Srpska was inhabited by 886 inhabitants in 252 households.

The location for the new WWTP is about 300 meters away from the nearest individual residential building (Figure 1).

3.6. Data on existing facilities and infrastructure

There are no buildings on the site itself. Near the location on the northeast side, there are industrial facilities of Kombinat aluminijuma, while on the south and west side, in the immediate vicinity of the project location, there are no built facilities of any kind.

The WWTP will be connected to the existing electricity and water supply network in accordance with the conditions prescribed by the competent authorities.

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4. PROJECT DESCRIPTION

The project description was taken from the Feasibility Study prepared by FICHTNER Water & Transportation, Freiburg, Germany, September 2016. The Feasibility Study presented the Preliminary Design for the WWTP, which will be described in this chapter.

The design approach for the needs of the conceptual design of the WWTP covers the final time period until 2040 (235000 ES).

A more modern purification process was selected to take into account the existing economic and operational aspects of the project. This process offers the most energy efficient purification process to achieve the lowest possible operating costs (OPEX).

The design of the process will be in line with the recommendations of the German DWA / ATV, which represent the leading design experience in Central Europe, thus ensuring compliance with wastewater regulations.

The following internationally recognized German DWA / DVGW rules and standards will be considered:

- DWA-A 131E Sizing of single-stage activated sludge plants
- DWA-A 202E Chemical-physical methods for the removal of phosphorus from wastewater
- DWA-M 265E Regulation of oxygen transfer with activated sludge process
- DWA-M 268E Control and regulation of N removal using activated sludge process
- DWA-M 368E Biological stabilization of sewage sludge.

4.1. Basic parameters of WWTP

The proposed conceptual design for the WWTP Podgorica takes into account the individual process units that have been selected, emphasizing the most sustainable reliability and operability of plants and equipment, taking into account the special conditions of the project.

DUP (Detailed Urban Plan)"Industrial Zone - Aluminum Plant Podgorica" has reserved an area of 11.1 ha (UP 5 lok 1 + UP 5 lok 2) for the construction of WWTP, which is considered adequate for WWTP with a planned capacity of about 235,000 PE.

In addition, 2.5 ha is reserved for the construction of the KAP WWTP (UP4), and the DUP also reserves space for the installation of collectors for the discharge of purified effluents into the Morača River (UP 6).

The concept of the presented design process took into account the following process steps in order to meet the regulations for wastewater, having in mind the seasonal working conditions.

	Process	Description
A	Primary wastewater treatment	Mechanical removal of undissolved coarse inorganic (mineral) and organic solids
B	Secondary wastewater treatment	Bio / chemical decomposition of dissolved organic carbon (C), removal of organic solids
C	Tertiary wastewater treatment	Bio / chemical decomposition of dissolved organic nutrients (N / P) BNR
	Advanced wastewater treatment (optional)	Removal of residual pathogenic microbes, microbiological contamination and removal of suspensions
D	Sludge treatment	Anaerobic digestion of organic substances with biogas and energy production using biogas (CCHP)

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E	Sludge drainage	Thickening and drainage of residual sludge (volume reduction)
F	Advanced sludge treatment	Further reduction of moisture content in sludge (solar) - sludge drying

The project concept examines multi-line wastewater treatment (at least two parallel operating lines) and sludge treatment for the final design period.

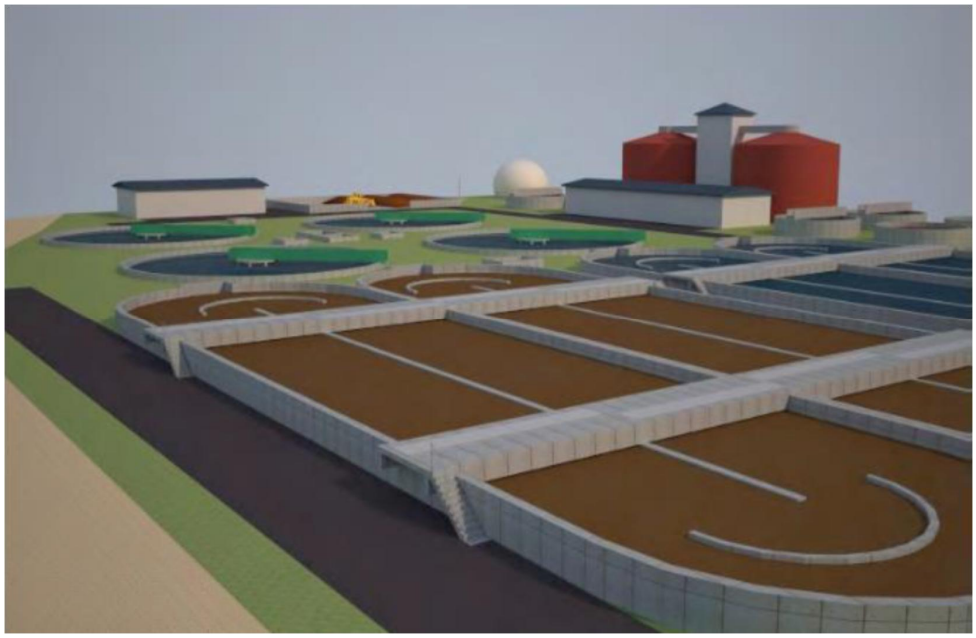


Figure 3. *3D view of the future WWTP*

Indirect discharge

The discharge of industrial and commercial wastewater into the public sewerage network will be limited by an appropriate bylaw to ensure the safe operation of the sewerage network and the WWTP, and to protect the WWTP from failure.
The discharge of toxic and inhibitory chemicals, harmful chemicals or additives, as well as the oscillations of pH and temperature in the public sewerage network (indirect discharge), which will disrupt the network and the operation of the WWTP, must be avoided.

The following maximum concentrations for indirect discharge will be allowed:
BOD_5 concentration ≤ 600 mg BOD_5 / l ≤ 2,000 mg COD / l
Sewage temperature ≤ 40 ° C
pH value 7.0 - 8.5 pH

Therefore, appropriate primary treatment of large amounts of wastewater from industrial plants is an important prerequisite for the safe operation of WWTPs.

Mechanical wastewater treatment [100]

Mechanical or primary wastewater treatment plants [100] for the removal of coarse substances include treatment units shown in the following diagram.

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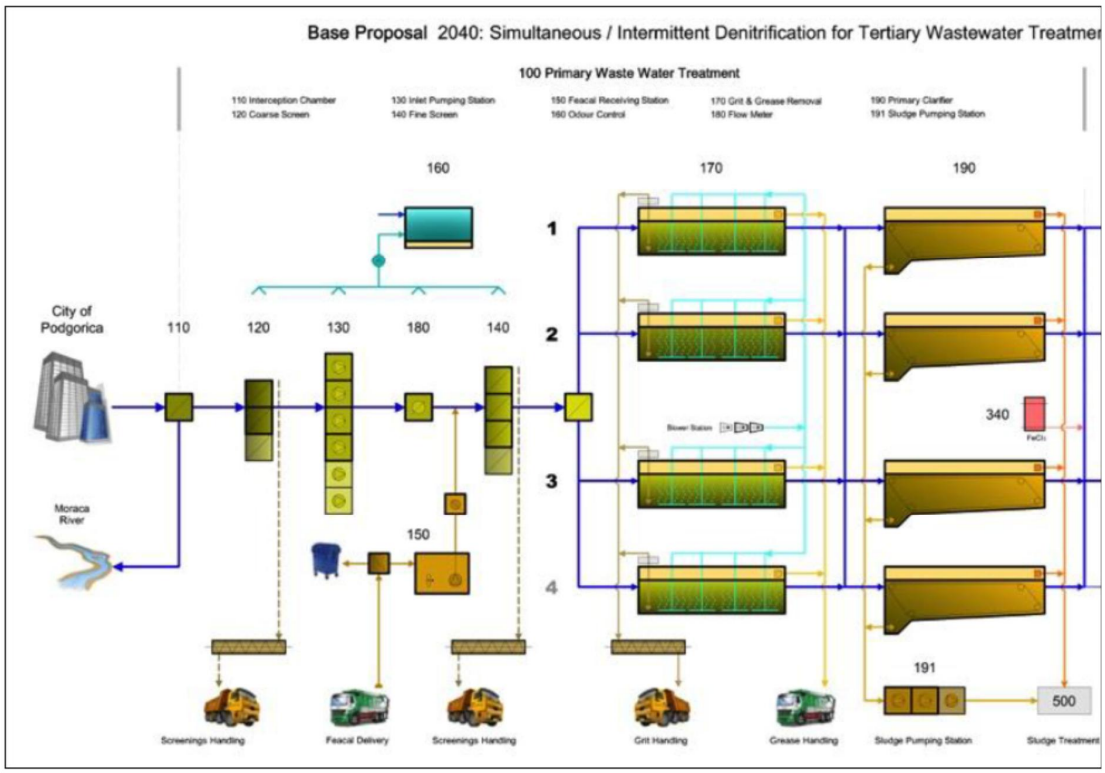


Figure 4. *Diagram [100] primary treatment*

Primary wastewater treatment plants include the following process units (designations):

- 100 Mechanical purification
- 110 Protective chamber (optional)
- 120 Coarse gratings
- 130 Inlet pump station
- 140 Fine gratings
- 150 Fecal receiving station
- 160 Odor control
- 170 Sand and grease removal
- 180 Flow meter and sampling
- 190 Primary purifier with [191] pumping station for primary sludge

Biological wastewater treatment [200 / 300]

Biological wastewater treatment plants will include two combined steps of a secondary wastewater treatment process to remove organic carbon [200] and a tertiary wastewater treatment to remove nutrients (BNR). [300].
Biological wastewater treatment according to the activated sludge process including bioreactors, final treatment plants and a return sludge pumping station has been selected to fulfill the following process steps:

- carbon removal (BOD_5 / COD) [210] requires aerobic process conditions and sufficient biomass concentration (MLSS) achieved by continuous return sludge;
- Nitrate and ammonia nutrient removal requires two process steps that include nitrification [310] under aerobic / aerated conditions and denitrification [320] under anoxic / non-aerated process conditions and a sufficient supply of nitrate-enriched biomass;

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- removal of phosphate nutrient by advanced biological removal of P [330] (EBPR / Bio-P) requires an aerobic process step with a sufficient supply of biomass by continuous sludge recirculation;
- In addition, simultaneous chemical precipitation of phosphorus (CPR) will be considered as a polishing step to meet the requirements prescribed for effluent and all operating conditions.

The recommended biological treatment process was determined taking into account the complexity of facilities and MEICA installations, needs in terms of operability and process control, reliability and ease of servicing equipment, in order to maintain a very high degree of availability and efficiency of the system with low operating costs. Limitations on available space have also been taken into account.

In particular, the following two state-of-the-art process variants were analyzed and considered for the purposes of the conceptual design, as shown in the following graphs:

a) simultaneous denitrification / nitrification (and removal of carbon) after previously applied biological removal of phosphorus (EBPR+CPR).

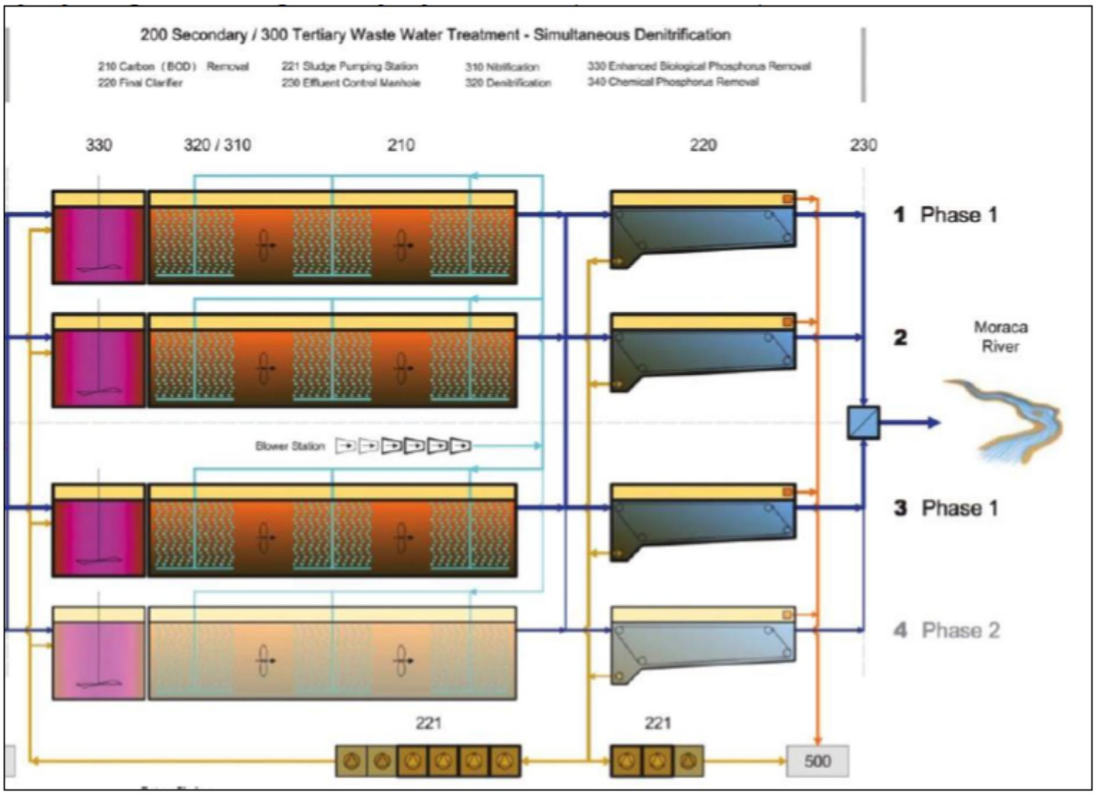


Figure 5. *Diagram - simultaneous denitrification*

b) A^2 / O process with previously applied Bio-P with previously applied denitrification with piston flow nitrification (and carbon removal) with aeration by compressed air with fine bubbles.

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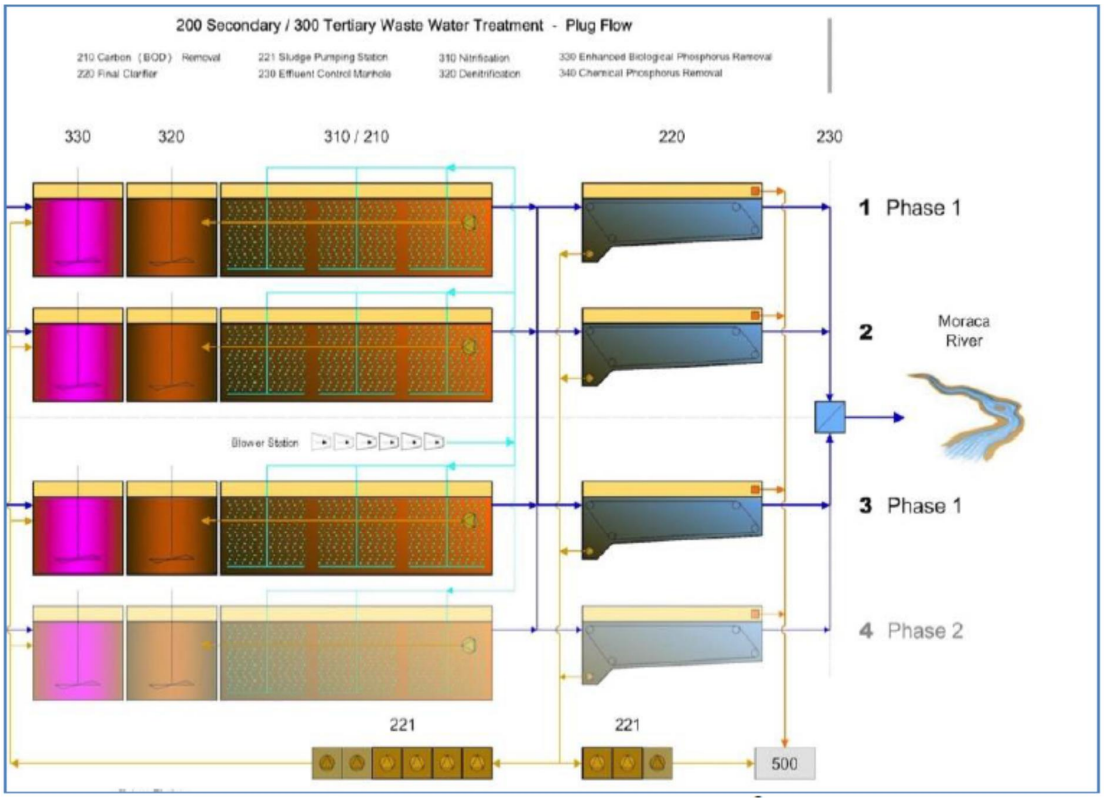


Figure 6. *Diagram - Process A^2/O*

The simultaneous denitrification process (a) - with previously applied EBPR - establishes the necessary anoxic and aerated process conditions in the different zones of one tank with complete mixing.
(b) The A^2 / O process establishes different process conditions of anaerobic, anoxic and aerobic conditions for previously applied EBPR, previously applied denitrification and piston flow nitrification by construction of different reservoirs.

Biological wastewater treatment plants include the following treatment units (designations):

- 200 Secondary Purification / Carbon Removal
- 210 Carbon removal (BOD_5)
- 220 Final purifier with 221 pumping station for recirculation and excess sludge (WAS)
- 230 Effluent control window
- 300 Tertiary purification / removal of nutrients
- 310 Nitrification
- 320 Denitrification
- 330 Biological Disposal P (EBPR)
- 340 Deposition P (CPR)

The activated sludge system will be designed in accordance with the design recommendations of the German DWA-A131E Sizing of single-stage activated sludge plants or similar internationally accepted design methodology.

Sludge line process description

The sludge treatment aims to maximize the amount of sludge through anaerobic digestion of sludge (stabilization) which produces gas from the digester (biogas). Biogas is again used for the combined

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production of electricity, heat and cooling energy (trigeneration = CCHP) with the use of methane content as fuel.

The content of electricity is consumed in the WWTP as independently produced electricity in order to reduce the annual consumption of electricity, ie. electricity costs.

The heat is used for the process of mesophilic digestion in the WWTP, especially for the digester and heating of the raw sludge during the cold months. In the summer months, excess heat could be used to produce refrigeration energy (cooling from renewable energy sources) to power local air conditioners in the WWTP (trigeneration via CCHP) with additional absorption coolers.

Sludge treatment includes two main process steps: sludge stabilization [500] and sludge dehydration [600] to meet the requirements of domestic regulations and UWWD 91/271 / EEC and the Sewage Sludge Directive 86/278 / EEC, which cover the following main process steps:

- sludge stabilization by anaerobic sludge digestion;
- sludge heating and sludge transport;
- digester gas system and reuse of that gas;
- sludge thickening and dehydration plants.

The sludge treatment process is shown in the following diagram:

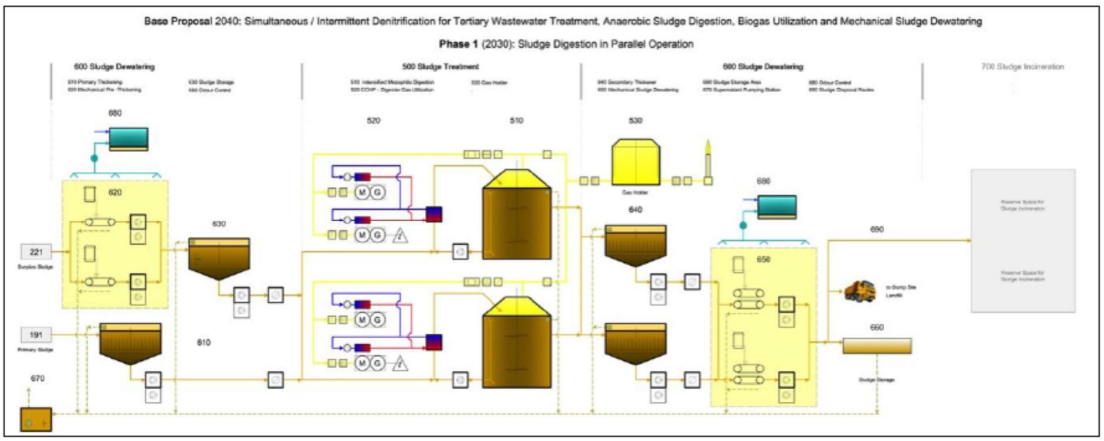


Figure 7. *Diagram - sludge treatment process*

Sludge appears as the final product of wastewater treatment in the form of primary sludge from primary sedimentation [190] and excess sludge (Surplus Sludge = Excess Sludge = Waste Activated Sludge, WAS) from final sedimentation [220]. Primary sludge consists mainly of inorganic and mineral substances with a lower concentration of organic substances bound to mineral particles, while excess sludge mainly consists of activated sludge, ie. microorganisms with a high concentration of organic matter.

Sludge stabilization [500] aims at far-reaching decomposition of organic matter (volatile suspended matter), so-called mineralization, through the process of sludge stabilization, in order to reduce the amount of sludge, ie. amount of total suspended matter.

Sludge occurs in various concentrations with a generally high water content. Sludge thickening [610/620/640] and sludge dehydration [650] are provided to reduce the volume of crude and stabilized sludge having in mind the need for transport.

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Sludge stabilization [500]

Sludge stabilization was considered as a separate anaerobic digestion of sludge in relation to the fact that during the process of anaerobic stabilization, gas from the digester (biogas) will be produced. Biogas contains approximately 65% methane that will be used for combined heat and power (CCHP) to significantly reduce operating costs (OPEX) due to electricity generation.

Sludge stabilization plants contain:

- **500 Sludge stabilization**
- 510 Sludge digestion
- 520 Digester gas system
- 530 Using gas from the digester, CHP / CCHP

Sludge [190] and excess activated sludge (WAS) [220] from the primary sludge thickening plant [610/620/630] are pumped into digesters [510] for "intensified, alkaline, mesophilic anaerobic sludge digestion" for stabilization (mineralization) of residual organic matter and a significant reduction in the amount of total suspended matter.

Sludge stabilization plants include digesters with a staircase, a basement for pipes, a machine room for the installation of pumps, heat exchangers and boilers, installation rooms for gas purification, as well as service rooms and a local control room for power supply and operation control (MCC).

The process is described in detail in the following diagram:

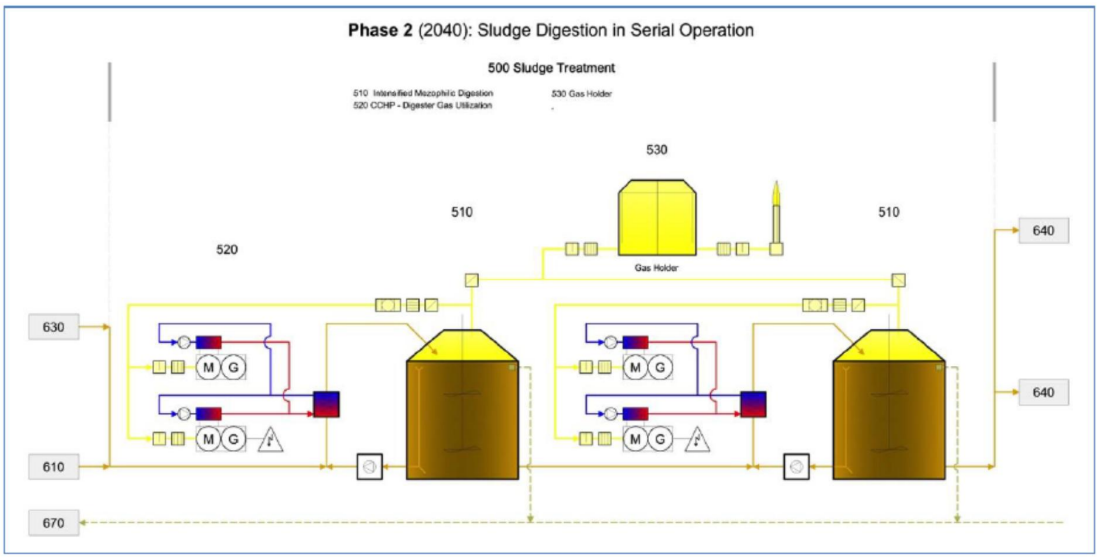


Figure 8. *Diagram - Sludge digestion - parallel operation*

Sludge thickening and dehydration [600]
Sludge thickening and dehydration plants will include thickening of primary sludge [610/620], prior to separate stabilization of sludge [500], and secondary thickening of sludge [630] prior to sludge dehydration [640]. In addition, it will contain a storage of dehydrated sludge [650] with a pumping station for sludge water [660] and a biofilter for odor control.

Sludge dehydration plants should include the following process units as shown in the following graph:

- **600 Sludge dehydration**
- 610 Primary thickener
- 620 Mechanical pre-thickening

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- 630 Normal thickening - optional
- 640 Secondary thickener
- 650 Mechanical sludge dehydration
- 660 Sludge storage area
- 670 Pumping station for sewage sludge
- 680 Odor control

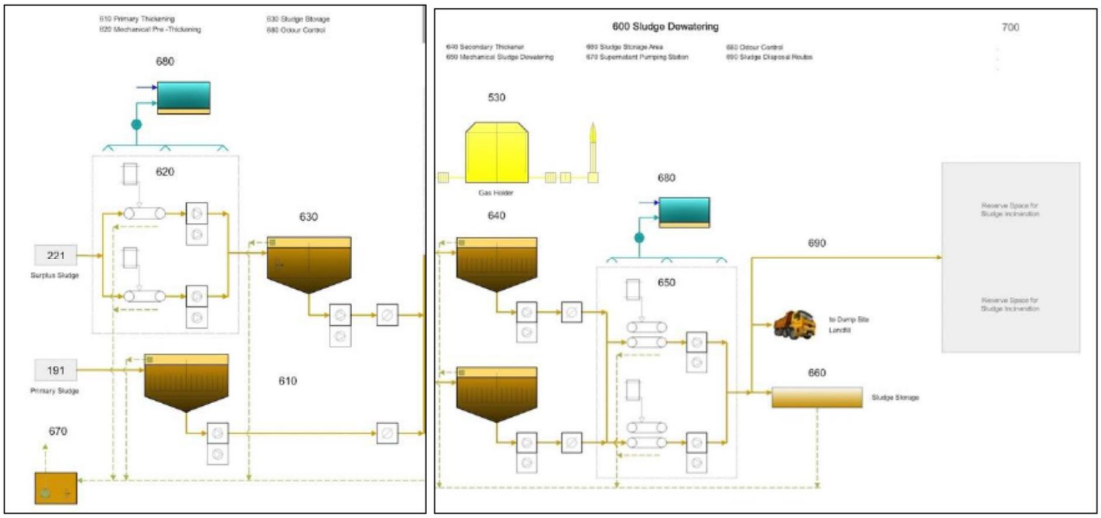


Figure 9. *Diagram - Thickening and dehydration of sludge*

Sludge dehydration plants [620/650] will be connected to an odor control system [680] to prevent and reduce odor emissions.

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5. BASELINE DATA - CURRENT SITUATION OF THE ENVIRONMENT

5.1. Natural and environmental characteristics

5.1.1. Climate and meteorological conditions

The main factors of climatic types in the spatial coverage of the Capital Podgorica are the proximity of the Adriatic Sea and direct openness to it along the corridor line: Skadar Lake - Bojana River - Adriatic coast; altitude range from 4.6 to 2,487 m above sea level.

In relation to this position in space, in the general approach, the following can be singled out:

- sub-Mediterranean climate (shore of Skadar Lake, Zeta plain);
- altered mountainous sub-Mediterranean climate (lower positions of Lješanska nahija, Komani, Bandići, Piperi, Bratonožići, Kuči, Malesija 100 - 400 m above sea level);
- submontane climate (positions between 400 and 800 m above sea level)
- mountain climate (between 800 and 1,300 m above sea level);
- high mountain climate between 1,300 and 2,487 meters above sea level.

The climate of the capital city of Podgorica is classified as a Mediterranean climate with warm and dry summers and moderately cold winters. The temperature exceeds 25 ° C in about 135 days a year. The period of average daily temperatures above 0 ° C lasts over 320 days a year, and above 15 ° C about 180 days. In Podgorica, the average annual temperature is 15.5 ° C with an average minimum of 5 ° C in January and an average maximum of 26.7 ° C in July. Podgorica is one of the warmest cities in Europe. The average annual number of tropical days (maximum temperatures above 30 ° C) here is 50 to 70 days. Temperatures above 40 ° C are common in July and August. The highest recorded temperature was 44.8 ° C on August 16, 2007.
The average annual rainfall is 1,544 mm (60.8 in). The number of rainy days is about 115, and those with a strong wind around 60. Periodic but strong north wind has an impact on the climate in winter. The average relative humidity for Podgorica is 63.6%, and snow is a rare occurrence, as it rarely falls more than a few days a year.
In the area of Podgorica, of the numerous wind blowing directions, two are mainly carriers of weather conditions. These are the north and south, which blow mainly in the period September - April. The average number of days with wind is about 60, which has a special impact on the climate of Podgorica, affecting the subjective experience of temperature, making it two to three degrees lower. The route of the project in question is dominated by strong north winds.

5.1.2. Seismological characteristics

From the microseismic point of view, the territory of the Capital City of Podgorica is located within a space with a very pronounced seismic activity.
Figure 1 shows a map of seismic regionalization of the territory of Montenegro (B. Glavatović et al. 1982) with zones of expected maximum earthquake intensities, expressed in MCS scale, while Figure 2 shows a map of seismic hazard of Montenegro and its surroundings (expected maximum horizontal acceleration of the soil in parts of gravity) within a return period of 475 years (EUROCOD 8) with a probability of realization of 70%.

According to the map of seismic microregionization, the considered area belongs to the zone with the basic degree of seismic intensity of VIII^{o} MCS.
According to the Map of seismic micro-regionalization, the area of Podgorica belongs to seismogeological zones from B3 to C3, which indicates a significant difference in soil acceleration, ie the intensity of the earthquake on the surface of the terrain.

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Figure 10. *Map of seismic regionalization of Montenegro*

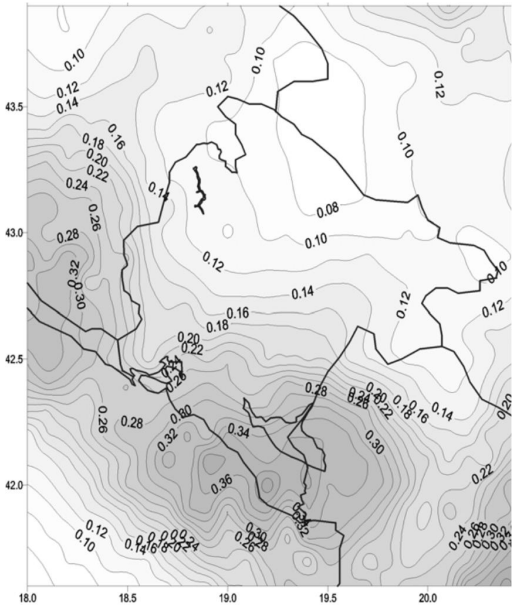


Figure 11. *Map of seismic hazard of Montenegro and its surroundings (expected maximum horizontal acceleration of the soil in parts of gravity) within a return period of 475 years (EUROCOD 8) with a probability of realization of 70%.*

5.1.3. Geology and hydrogeology

Geological characteristics

The terrain on which the construction of the WWTP is planned is built by sedimentary rocks of the *Upper Cretaceous*[1] and *Quaternary*[2].
The terrain of the WWTP site belongs to the Zeta plain. WWTP and KAP with their facilities is on flat ground with elevations from about 33 m above sea level to about 20 m above sea level and with a slope from north to south with an altitude difference of 13 m, on a stretch about 2.5 km long.

Hydrogeological features of the terrain

The limestone rock masses in the field are characterized by a combined crack-cavernous porosity. This porosity makes the terrains that build limestone very permeable, which have the function of hydrogeological collectors and reservoirs for free groundwater.

Quaternary-glaciofluvial granular sediments (which flood the limestone mountains in the slope of the plain) are characterized by intergranular porosity, making the terrains they build very permeable with a filtration coefficient of $1x10^{0}$cm/s to $1x10^{-3}$cm/s. The thickness of these granular sediments is up to 70 m.
Precipitation (rain, rarely snow) sinks practically where it falls, feeding with waters a compacted aquifer, and in the lower horizons a broken-karst aquifer.

[1] The Upper Cretaceous is represented by stratified limestones that form the floor of Quaternary sediments and Dajbabska gora in the north and Srpska gora in the south
[2] Quaternary sediments are represented by sands, gravels, larger pebbles with and without various clays. Red clays occur along the edges of these hills, and often in the slope of these granular sediments on the limestone slope. Granular sediments are bound here and there by a carbonate binder to form true conglomerates.

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This aquifer is fed by water also from the watercourse of the river Morača, which touches the terrains of KAP on the west side.
The terrain of the plain north of KAP, south of Dajbabska gora, is at an elevation of about 40 m above sea level, and immediately south of Srpska Gora is about 25 m above sea level, while in the circle of KAP it is at about 30 m above sea level. The compacted aquifer is pointed from the Morača watercourse towards the southeast, and then slowly turns to the south, taking this direction as dominant already in the plain east of the Adriatic road. The data are presented on the basis of surveys for the days of 30.09.1970 and 8.08.1990.

In the plain south of Dajbabska gora, the depth to the groundwater level is about 20 m, in the circle of KAP about 15 m, and south of Srpska gora about 10 m. All this is based on the available data that do not give, nor can they give, a true picture of the average groundwater regime for a multi-year period.

5.1.4. Water

The territory of Podgorica is one of the water richest areas in Montenegro. The richness of water bodies is the main characteristic of the Capital Podgorica. They consist of six rivers and numerous springs, wells and aquifers.

The hydrological system of the capital Podgorica belongs to the Adriatic Sea basin. The main surface watercourses include the Morača River with its tributaries:
- Zeta (main tributary, the mouth is upstream from the urban center);
- Ribnica (the mouth is in the city);
- Sitnica (the estuary is downstream from the urban center);
- Cijevna (the mouth is downstream from the city).

The Morača River is the largest river in the city, it is 70 m wide in the lower part of the city and forms a canyon 20 m deep along its course through the city. Its left tributaries are the rivers Ribnica and Cijevna, and its right tributaries are the rivers Zeta, Mareza and Sitnica.
The Morača River and the Ribnica River flow through the town, while the Zeta, Cijevna, Sitnica and Mareza rivers flow nearby.

The Morača River and the Ribnica River pass through the town in a north-south and east-west direction.
The Morača basin discharges water into Skadar Lake, which is the largest lake in the Balkans; the great swamp is an integral part of the hydrological ecosystem of the lake.

Main hydrological parameters of Morača:
- Q absolute minimum: 5.5 m^3/s
- Q average: 140 m^3/s
- Q absolute maximum 900 m^3/s

The average annual flows of the two main tributaries - Zeta and Cijevna - are 73 and 25 m^3/s at the hydrological stations Danilovgrad and Trgaj (respectively), while Sitnica and Ribnica have a much lower flow and regularly dry up during the summer.

The average annual flow of the Morača River at the Podgorica hydrological stations is about 140 m^3/s, and the volume is about 4.415 million m^3. The highest monthly flow for the Podgorica station is in April and December, while in July and August the flow drops to the lowest values of less than 30 m^3/s.

The water level of the river drops drastically during the summer period, and during extremely dry years, even the Morača River dries up in the downstream parts (at the site around Bioče).
The waters of Morača to Bioče are completely clean, and water supply from those positions is possible in the future. Morača, for the most part, feeds groundwater in the Zeta plain, so from that aspect it is extremely important for the existence and development of Podgorica.

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Water quality of the Morača river

Morača is sampled in 6 places and according to the classification of its water should belong to A1SK1 class upstream from Duklja - upper stream (Pernica and Zlatica) and A2CK2 class downstream from Duklja to the mouth of Skadar Lake (city beach Momišići, below the inflow of the City's Collector water - middle stream and Grbavci and Vukovci - lower stream).

In the upper course of the river Morača, the water quality exceeds the required credit rating according to some indicators: outside its class, ie in A2 or A3 class, at both measuring points, the physical-chemical parameters were: temperature (A2-A2), ammonium ion (A3C -A3C), phosphates (A2-A3), nitrites (A3C-C), TOC (A2-A3) and detergents (A3-A3); and only at the measuring point Pernica did the ionic Ca / Mg ratio appear in the A3 class, and at Zlatica the microbiological quality was outside its class - that is, the number of fecal bacteria in the A2 class, and the ionic Ca / Mg ratio was outside all classes (VK). Of certain classes, 71.9% belonged to the prescribed A1 class in Pernica, and 68.8% in Zlatica and 3.1% of classes were outside all classes - VK. Microbiological quality on Pernica was in the required A1 class, and on Zlatica it had a shift to A2 class.

In the area of the city, the waters of the city beach Momišići showed better quality than all measuring points on Morača, which is the impact of the inflowing waters of Zeta, which have better water quality and higher water level compared to Morača itself. Of the certain classes of this measuring point, 78.1% were in their class, and no case was VK (outside all classes).

Below the City Collector, as expected, the water quality of Morača is in the worst condition.
In its class there were 50.0% of classes, while VK (outside all classes) was 40.6% of classes in the following contents: ionic ratio Ca / Mg, BOD5, ammonium ion, phosphates, nitrites, TOC and microbiological indicators - the number of coliform and fecal bacteria (class bathing water and fish life), while the remaining 6.2% of classes were in A3 quality class - detergents and the number of colic and fecal bacteria (drinking water class).
Downstream from the impact of this greatest pollution, the situation is changing, thanks to the characteristics of Morača - cold water, fast flow, sandy bottom and the amount of water, as well as the influence of meteorological conditions. In the required class in Grbavci there were 53.1% of classes and 31.3% of VK. In Vukovci, the situation was significantly better than in Grbavci, 62.4% of classes were in the required class and 18.8% of VK. The reduction of pollution was reflected through the reduction of the content of: phosphate, BOD5, TOC and coliform bacteria.

Groundwater quality of the Zeta plain

The waters and aquifers of the Zeta plain are sampled in 6 places and are classified in the most demanding A class, because the water of some wells is still used today for drinking without any treatment. Well waters in only 35.0% of classes were in the required class, ie in many cases they were outside the prescribed class - 65.0% of cases, of which 9.2% belonged to VK by content: ionic ratio Ca / Mg, TOC, phosphate and nitrate. Pollutants, parameters, their content and spatial distribution are mostly the same as in previous years, and the most chemically polluted wells were wells in Srpska, Balijače, Mahala, Vranje, Gostilje and Drešaj, and joined by a well in Farmaci.

The water temperature ranged from 13.2 to 20.1 ° C in the April-November measurement period. Most uniform temperature water had a well Cijevna 0.8 ° C and the highest variation was at the Grbavci well, 4.2 ° C. The waters had satisfactory organoleptic properties - no color and no characteristic odor.

Of particular concern is the nitrate content at the wells Vranj, Gostilj and Drešaj, where their contents have high values and reach up to 56.7 mg/l, 32.6 and 19.8 mg/l respectively. This is about the influence of artificial fertilizers - saltpetre on groundwater, because the potassium content is increased to 6.4 mgK / l - Gostilj, or 10.1 mgK / l - Vranj.

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Microbiological pollution with faecal bacteria of groundwater was shown in wells in Farmaci, Grbavci, Drešaj and Cijevna, A2 class. Only the quality of the well in Vranje from this aspect belonged to the required A class, but it is chemically polluted.

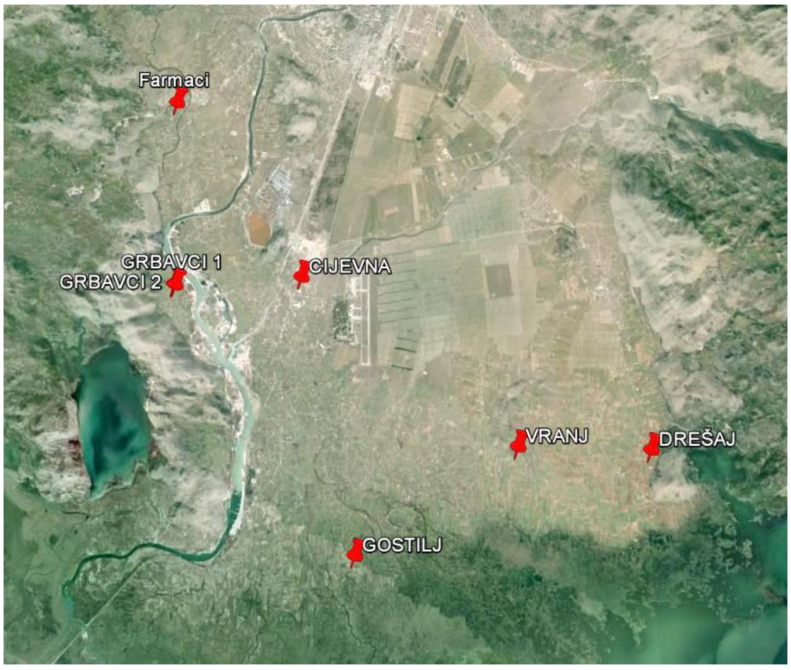


Figure 12. *Wells for monitoring groundwater quality in the Zeta plain*

5.1.5. Waste management

Waste management on the territory of the Capital Podgorica is solved by the construction of the regional sanitary landfill "Livade" and the construction of a regional recycling center. Municipal waste on the territory of the Capital Podgorica is collected in the existing containers for collecting municipal waste (1.1 m^3), underground containers, containers for selective waste collection, recycling yards and containers with a volume of 5 m^3 used in some rural areas.

The company "Čistoća" d.o.o. Podgorica performs the following activities: waste collection, collection of non-hazardous waste, maintenance and cleaning of public areas, collection, transport and disposal of municipal waste for the needs of service users, collection and sale of secondary raw materials.
The company "Deponija" doo Podgorica performs reception, secondary selection and disposal of municipal waste, maintains the landfill, recycles metal and non-metal waste and residue, wholesales waste and scrap, collects and trades secondary raw materials and other activities of public interest.
Based on the above data, it is clear that all municipal waste generated at the WWTP site is temporarily disposed of in containers and then transported by the company "Čistoća" to the regional landfill "Livade".

During the analysis of the site for the construction of the new WWTP, it was determined that in one part of it, due to the proximity of KAP, there are different types of waste, due to which a part of the WWTP site was contaminated. It is about asbestos, plastic waste and other various residues, as well as the influence of fluorine, PAH and the like. In order to prevent further spread of pollution (fluorine, PAH, asbestos, plastic waste and residues) surface waste must be removed from the entire construction area, but also from the contaminated area in the north of the site. Collected waste should be disposed of in accordance with local legislation and in coordination with local authorities, e.g. at the municipal

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landfill. The amount of waste generated is estimated at approximately 100 m^3, of which approximately 10 m^3 of asbestos cement, melt slag, etc.
Due to a certain amount of contaminated land, the quantities of which should be determined through the preparation of a Feasibility Study, as well as the above-mentioned quantities of waste, special attention should be paid to solving this problem. All quantities of hazardous types of waste materials should be handed over to a company that has a permit from the Agency for Nature and Environmental Protection to take this sort of waste.
In order to adequately manage waste materials at the site of the new WWTP, it is necessary to make a Hazardous Waste Management Plan and a Non-Hazardous Waste Management Plan.

5.1.6. Air quality

Control and monitoring of air quality in Montenegro is carried out for assessment, planning and management of air quality. The analysis of the obtained results serves as a basis for proposing measures to improve and enhance air quality.
Implementation of the Air Quality Monitoring Program was performed in accordance with the Rulebook on the manner and conditions of air quality monitoring ("Official Gazette of Montenegro", No. 021/11), which prescribes the manner of air quality monitoring and data collection, as well as reference measurement methods, criteria for achieving data quality, data quality assurance and their validation.
In accordance with the Decree on the establishment of a network of measuring points for air quality monitoring ("Official Gazette of Montenegro", No. 44/10, 13/11, 64/18), the territory of Montenegro is divided into three zones, which are determined by a preliminary quality assessment of air in relation to the limits of pollutant assessment based on available data on pollutant concentrations and modeling of existing data. The boundaries of the air quality zones coincide with the external administrative boundaries of the municipalities that are part of these zones. The area of Podgorica belongs to the Central Air Quality Zone.
Pursuant to Article 7 of the Law on Air Protection ("Official Gazette of Montenegro", No. 025/10, 043/15), the Air Quality Monitoring Program was implemented by D.O.O. "Center for Eco-Toxicological Research".
The concentration of the following parameters was measured: sulfur dioxide (SO_2), nitrogen monoxide (NO), nitrogen dioxide (NO_2), total nitrogen oxides (NOx), carbon monoxide (CO), methane (CH_4), non-methane hydrocarbons(NMHC), total hydrocarbons (THC), PM_{10} particles, ground-level ozone (O_3), benzene, toluene, ethylbenzene, o-m-p xylene (BTX).The assessment of air quality was performed in accordance with the Decree on determining the types of pollutants, limit values and other air quality standards ("Official Gazette of Montenegro", No. 045/08, 025/12).
In the fourth quarter of 2018, the amended Decree on the establishment of a network of measuring points for air quality monitoring entered into force ("Official Gazette of Montenegro", No. 044/10, 013/11, 064/18 of 04.10.2018). This Decree prescribes the repositioning of measuring points which, on the basis of previous measurement results, have been determined to meet the conditions for relocation to a new location, as well as the redefining of air quality zones.

Air quality results in Podgorica in 2018

At the measuring station in Podgorica, the average annual concentration of nitrogen (IV) oxide was 18.63 μg/m^3, which is below the limit value of 40 μg/m^3. There was no overrun of one-hour values.
At the measuring point Podgorica-Nova Varoš, the average daily concentrations of PM_{10} exceeded the prescribed limit value (50 μg/m^3) for 75 days. The allowed number of overdrafts is 35 days during the year. The annual average concentration was at the limit of the prescribed limit value (40 μg/m^3) and was 40.3 μg/m^3.

The maximum eight-hour average annual concentrations of carbon monoxide in Podgorica during 2018 were below the prescribed limit value of 10 mg/m^3.
The average annual concentration of benzo (a) pyrene in Podgorica was above the prescribed target value.

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The average annual values of lead, cadmium, arsenic and nickel content in the suspended PM_{10} particles at the measuring station Podgorica-Nova Varoš were below the prescribed limit and target values.

5.1.7. Noise

Pursuant to the Decision on Determining Acoustic Zones on the Territory of the Capital of Podgorica ("Official Gazette of Montenegro-Municipal Regulations", No. 27/15), the area where the construction of WWTP Podgorica is envisaged belongs to the industrial zone, which indicates that on the border of this zone the noise must not exceed the limit values of the noise level in the zone with which it borders. The zone bordering the industrial zone belongs to the Quiet Zone in the agglomeration, where the permissible noise level during the day and evening is 40 dBA, and during the night 35 dBA.
The operation of the new WWTP with all planned facilities must meet these boundary criteria.

Noise monitoring results in Podgorica for 2018

On the territory of the Capital of Podgorica, noise levels were measured at two locations: Stari Aerodrom, Bulevar Pera Ćetkovića no. 175, common residential building, I floor and I Proleterske brigade no. 33, mini bypass, individual residential building, 1st floor, in the interval of day (Lday) 07-19 h, evening (Levening) 19-23 h and night period (Lnight) 23-07 h.
The noise level in the first cycle was measured on the mini bypass, I Proleterske no. 33 in the period from 11-19. July 2018, and at the location of the Old Airport, Bulevar Pera Ćetkovića no. 175 on 19-26. July 2018.
The noise level in the second cycle was measured at the Stari Aerodrom, Bulevar Pera Ćetkovića no. 175, in the period from 01-06. November 2018 and at the location of the mini bypass, I Proleterske no. 33, 11-18. January 2019.

The values of the noise level indicators for day, evening and night exceed the limit values of the noise level in both the first and second cycle of measurements.
The values of the day, evening, night and total noise level indicators are higher in the second (winter) measurement cycle than in the first (summer) measurement cycle.
The average annual measured values of the day, evening and night noise level indicators exceed the limit value.
Only the evening noise level indicator in the first summer measurement cycle does not exceed the noise level limit values, while in the second winter cycle, all noise level indicators exceed the limit values.

Day, evening and night noise level indicators are lower in the first than in the second measurement cycle. The average annual measured values of all noise level indicators exceed the limit values.

5.1.8. Biodiversity

Flora

Thanks to the favorable microclimatic conditions, the area of the municipality of the capital Podgorica has an almost uninterrupted vegetation period. Based on the literature data, we can say that the wider environment of this area is characterized by a relatively diverse fund of plant species that mostly belong to the Mediterranean and sub-Mediterranean floral element.
The great diversity of the vascular flora of this area can be explained by the fact that the heterogeneous urban environment, which by itself implies the heterogeneity of habitats, enables the growth and survival of species with different survival strategies. This area is located in the vegetation zone of Oriental hornbeam (*Carpinion orientalis*, order *Quercetalia pubescentis*) in which a large diversity of plant communities has been recorded. In addition to indigenous plants, the vegetation cover of the city area of Podgorica consists of numerous non-indigenous species that dominate in some locations.

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Ecological-phytogeographical study of the flora of the urban area of Podgorica showed that this area is inhabited by over 1200 species and subspecies, which represents more than a third of the vascular flora of Montenegro (Stešević, 2009).
The location of the project is located in the industrial part of the city, surrounded by a park (left side of the main road Podgorica - Golubovci), which mostly builds Aleppo pine (*Pinus halepensis*) and cypress (*Cupressus sempervirens*). The degraded appearance of the park is the result of felling, fire and unfavorable weather conditions (due to the age or poor condition of individual trees, a large number of trees, most often pine trees, are destroyed during the winter months). In the increasingly open areas within the park, common and very widespread plants grow, mostly grasses. In addition to grasses, other wild plants grow, such as *Vicia sp., Fumariaofficinalis, Capsella bursa-pastoris, Lamium sp., Cirsium sp., Bellisperennis, Taraxacumofficinale, Centaurea sp., Euphorbia sp., Convolvulus arvensis, Cichorium. sp., Veronica persica, Geranium sp., Chenopodium sp.* etc.
The subject location is a flat surface, a spacious meadow where the flora is quite uniform and represented by herbaceous plants, among which the dominant grasses are Cynodon dactylon, Dactylis sp., Avena sp. (wild oats), Bromus sp., Poa sp. and others. In addition to grasses, other herbaceous, annual plants that prefer this type of habitat grow here: Tordylium apulum, Matricaria chamomilla (chamomile), Althaea sp. (mallow), Achillea millefolium (ragweed), Euphorbia sp. (spurge), Fumaria officinalis, Auchusa sp., Medicago sp., Vicia sp. (vetches), Trifolium sp. (clover), Lamium sp., Papaverrhoeas, Plantago sp. (plantains), Ranunculus sp., Veronica sp., Taraxacumofficinalis (dandelion), Parsella bursa-pastoris (Shepherd's Purse), Geranium sp. (Bigroot Geranium). In the part towards the coast of Morača, there are woody species such as willow (Salix sp.), Hackberrie (Celtisaustralis), Vitexagnus-castus, then wild pomegranate (Punicagranatum), rose hip (Rosacanina), fig (Ficuscarica), thorn (Paliurusspina-christi) and others.
By visiting the site in question, it was determined that endangered, rare, endemic and protected plant species do not grow on it ("Official Gazette of the Republic of Montenegro, No. 76/2006").

Fauna

A review of the available professional and scientific literature shows that the subject area has not been researched in detail when it comes to its fauna, so it is not possible to realistically talk about its diversity (individual scientific papers, master's and doctoral theses are available, which mainly deal with certain groups of animals, e.g. only one genus, studies).

Somewhat more data refer to the ornithofauna of the area in question (Morača with its surroundings). In this part, 115 bird species were registered (surveys were conducted in 2008, without winter and early spring aspect), with the probability of occurrence of at least 15 more species that were not recorded during these surveys, and are located in neighboring canyons (Mrtvica, Mala Rijeka, Cijevna). In the lower course of the Morača River, which gravitates to the area in question, due to intensive exploitation of gravel and stones during the warm months, "small lakes" are formed in which captured animals are ideal food for birds, such as little egret (Egretta garzetta) and Gray Heron (Ardea cinerea), Kentish plover (Charadrius alexandrinus) - the most important nesting bird of Morača, pygmy cormorant (Phalacrocorax pygmeus), great cormorant (Phalacrocorax carbo), common kingfisher (Alcedo attis), common whitethroat (Sylvia communis), European bee-eater (Merops) and others(Saveljić, 2009). All these bird species are protected by the law of Montenegro.
The closest watercourse to the location in question, the Morača River, has a torrent-flood character in this part. In this river, from the source to the mouth, live salmonid fish species: marble trout (Salmo marmoratus), brown trout (Salmo trutta), Balkan trout (Salmo dentex) (Mrdak, 2011), as well as California trout (Oncorhynchus mykiss) as introduced Species; of the other genera, common chub (leuciscus cephalus), Prussian silver carp (Carassius auratus gibelio), perch (Perca fluviatilis), eel (Anguilla anguilla) and others are present. However, trout "require" a high amount of soluble oxygen throughout the year and a water temperature not exceeding 20 °C, as well as a multitude of available food (a significant place in the diet of fish are larvae of Ephemeroptera, Simuliidae, Hironomida, Hydrachnidiae i.e. river fauna bottom). Downstream of Dahna, the density of bottom fauna settlements is extremely low as a result of disturbances in the structure of bottom fauna settlements caused by constant habitat disturbance due to intensive gravel exploitation in this part of

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the stream. During the summer, due to very high summer temperatures in the Zeta-Bjelopavlićka plain, but also due to the small flow in those months, the water temperature of the Morača River reaches as much as 25°C, and the oxygen level drops below 5 mg / l, which is extremely unfavorable for trout species. During the summer months, in the lower reaches of this river (as well as the Zeta River), trout survive thanks to karst hydrology phenomena: there are many underwater springs that spring from the side of the river, under cut banks or from the bottom of ravines and pits and are abundant throughout whole year, even during the summer. In these places, there are local ecological conditions that correspond to trout species: the water temperature does not exceed 20 °C, and the level of dissolved oxygen is far higher than in other parts of the watercourse.

The subject area does not have the status of a protected natural asset. The presence of rare, sparse, endemic and endangered plant and animal species listed in the "Official Gazette of the Republic of Montenegro", no. 36/77 and 2/89 and “Official Gazette of the Republic of Montenegro”, No. 76/2006 is not evidented. Also, in the location that is the subject of this assessment, there are no habitats and species that the Berne Convention defines as a priority in protection, and of interest to the EU.

5.1.9. Previous environmental surveys („Zero“ state measurements)

In order to comply with National legislation and the EU, the obligation of the Investor is to determine the existing state of the environmental segments, before the start of construction of a new WWTP. Investor "Vodovod i kanalizacija" d.o.o. Podgorica foresaw and at the tender selected organizations that will take samples for the analysis of soil, sediments and groundwater at the location in question. Samples were taken and analyzes of soil, sediment and groundwater of the new WWTP site were performed.

Soil quality

In accordance with the signed contract between Fichtner Water & Transportation GmbH - Germany and the Center for Ecotoxicological Testing Podgorica - Montenegro (CETI), the CETI team performed sampling and analysis of soil from the location of the future wastewater treatment plant, in order to assess possible pollution from an adjacent KAP plant. Sampling of soil samples was performed from 41 boreholes.

The quality of land in Montenegro is regulated by the "Rulebook on permitted quantities of hazardous and harmful substances in the soil and methods for its testing" (Official Gazette of the Republic of Montenegro, 18/97).

The results of the tested samples showed that in one part of the site there are increased concentrations of chromium, nickel, fluorine and PAHs, which does not meet the requirements of the Rulebook on permitted quantities of hazardous and harmful substances in soil and methods for its testing. “, No. 18/97).

There are no regulations for the maximum permitted concentrations of pollutants in sediment in Montenegro, and the results of the analysis of sediment samples were observed in relation to the recommendations of Dutch and Italian standards. The results of physical and chemical tests have shown that it is necessary to predict the remediation of soil, sediments and groundwater in the part of the site of the new WWTP, where increased concentrations of hazardous and harmful substances have been determined.
The location that is the subject of testing is located west of the PAK plants: Electrolysis and Anotec, and the impact of these production plants is evident throughout the site both in terms of fluoride content (influence of Electrolysis) and in terms of PAH (Anotec) content.
The impact of disposed waste / mineral oils as well as the combustion process has resulted in an additional increase in PAH content at certain micro (individual) sites and a significant mineral oil content. Thus, for example, in the vicinity of borehole 23, on an area of about 40 m2, the remains of burned wood waste are evident, which has further increased the PAH content.

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In most boreholes as representatives of a certain area (except borehole 4), the PAH content decreases with increasing depth. The content of TPH, however, increases with depth, which is a consequence of different density, porosity, structure, permeability of the soil: clay alternates with sand and gravel.
When it comes to TPH, the content in some boreholes or soil/gravel samples is several times higher than the maximum allowed concentration of 750 mg/kg, which is the maximum allowed level in Italian legislation.
The PAH and TPH content in boreholes (B3, B4, B11, B14, B15, B25 and B28) by depth is such that the PAH content is above the Italian standard of 100 mg/kg for industrial soil only on the surface layer of B3 borehole, while the TPH content is different in depths in the said boreholes.
The TPH content does not exceed the intervention level of the Dutch standard of 5000 mg/kg in any of the boreholes, but it is enough above the "target" level (50 mg/kg) to recommend further research in that case.
Figure 4 shows the distribution of fluoride concentration in the soil surface layer. Lines of equal concentration are based on the 2017 survey (red dots). In addition, the results of the research for 2019 are shown in blue.

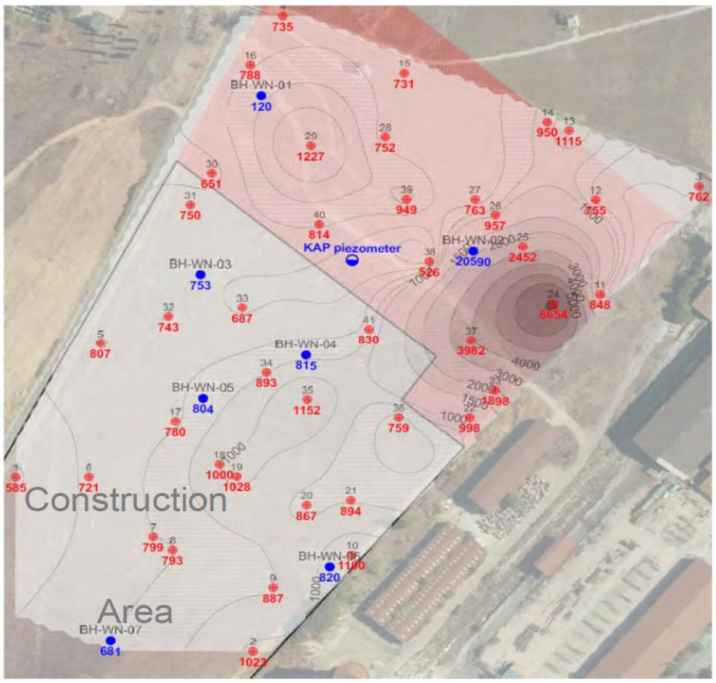


Figure 13. *Location of future WWTP: fluoride concentration in mg / kg in the surface layer. Results from 2017 in the form of lines of the same concentration and red dots and blue dots results from 2019.*

Lines of equal concentration, measured in 2017, show a strong increase in concentrations to the northeast of the site. On the remaining surface, and thus on the entire surface for the construction of the new WWTP, a significantly increased concentration of fluorine in the range of 600-1,000 mg / kg was measured.

The test results in 2019 confirm this distribution with high concentrations in the northeastern well BH-VN-02 and slightly increased values in all other places.
Figure 14 shows the distribution of PAH concentration in the surface layer. Lines of equal concentration are based on the test results from 2017 (red dots). The test results for 2019 are shown in blue.

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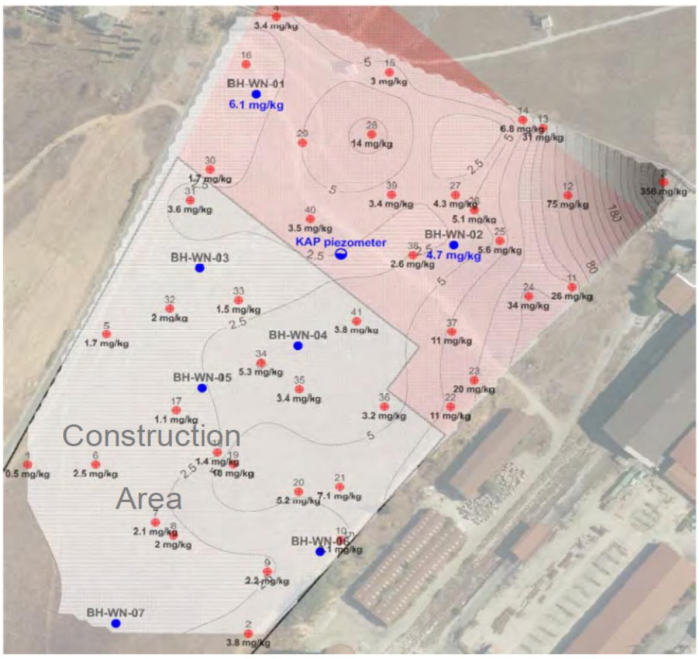


Figure 14. *Location of future WWTP: PAH concentration in mg / kg in the surface layer. Results from 2017 in the form of lines of the same concentration and red dots and blue dots results from 2019.*

Lines of equal PAH concentration, measured in 2017, show increasing concentrations toward the northeast of the site. Significantly higher concentrations are limited to the point in the northeast. Even at a short distance from this point, the values decrease rapidly. Moderately higher concentrations were measured in the entire construction area in 2017. The results on boreholes BH-VN-01 and BH-VN-02 determined in 2019 confirm this distribution.

Figure 15 shows the distribution of TPH concentration in the surface layer. Lines of equal concentration are based on the results of the 2017 survey. The 2019 survey did not examine near-surface samples for TPH.

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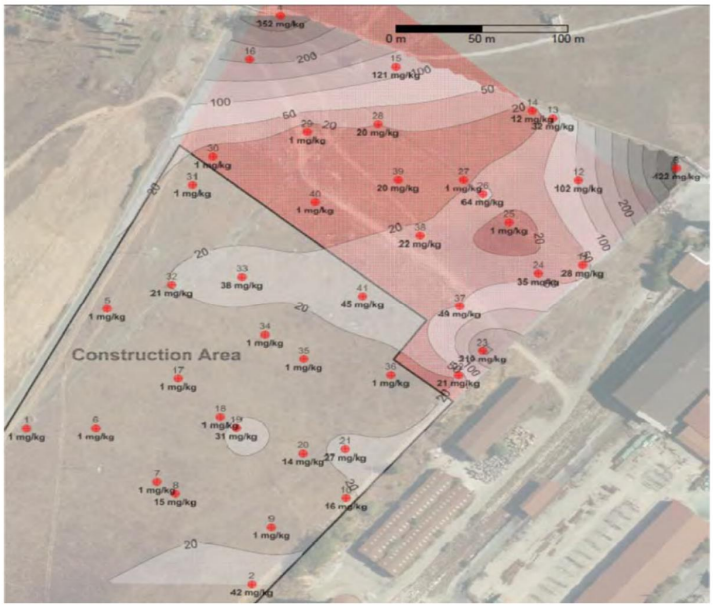


Figure 15. *Future WWTP location: TPH concentration in mg / kg in the surface layer. Results from 2017 in the form of lines of the same concentration and red dots*

The concentration of TPH is again significantly higher in the northeastern and northern zones, while at the WWTP construction site it is imperceptible. Tests for 2017 showed increased hydrocarbon values, especially in the deeper layers of the soil.

Figure 16 shows the distribution of the maximum concentration of TPH in the deeper soil layers of 2.0 - 5.0 m.

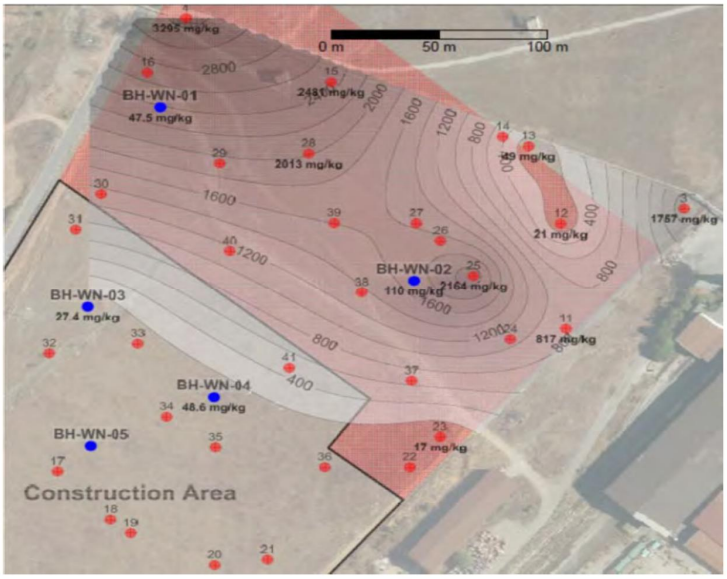


Figure 16. *Location of future WWTP: TPH concentration. Maximum in deeper soil layers (2.0 - 5.0 m) in mg / kg. Results from 2017 in the form of line of the same concentration and red dots and blue dots from the results from 2019.*

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The 2017 results show three hotspots (criticalpoints) of increased TPH concentrations in the deeper soil layer in boreholes 3, 4 and 25. The findings in boreholes 3 and 4 correspond to increased concentrations in the surface layers (Figure 15), while the concentration in the surface layer is rather low in borehole 25.

In 2019, the newly determined TPH concentrations in the deep soil layers were significantly lower than the interpolated values of the 2017 survey. Within the construction area all concentrations measured in 2017 and 2019 were imperceptible.

In 2019, points with increased values for TPH in 2017 were also tested on PCBs, which sometimes appear with TPH. No increased PCB concentrations were observed.

Groundwater quality

The results of groundwater sampling on the KAP's piezometer show that the examined parameters are completely imperceptible. Only the fluoride values and the value of the electrical conductivity are slightly increased.

The water sample from the KAP's piezometer (No. 101/04) corresponds to the quality of class A1 according to the Rulebook on classification and categorization of surface and groundwater (Decree on classification and categorization of surface and groundwater) ("Official Gazette of Montenegro", No. 02/07) only due to the value of electrical conductivity in relation to the prescribed value.The concentrations of all other parameters measured in groundwater correspond to water quality A0.

5.2. Social baseline

According to the last Census (2011), population of Montenegro was 620.079, while the most recent population estimate indicates that population size in 2019 was 622.028, which represents an increase of 0.31% since 2011.

This project is being implemented in Podgorica, the capital of Montenegro. According to data from the latest census (2011), population size of Podgorica is 187.085, while its population density is 129 people/km^2. Population of Podgorica represents 29.99% of the total Montenegrin population (Census 2011). Population size of Podgorica increased by 1.16% in the period from 2011 until 2019[3], which is an indicator of the trend of growth of economic activity in the Capital.

5.2.1. Demographics

Settlements which are located closest to the project area are Srpska and Botun. According to the most recent available data (Census 2011), the number of people living in Srpska was 886, or 252 households, while the population size of Botun was 696, i.e. 180 households.

Although there is no official data about the population in the project area, site visit was carried out and it was determined that this area is characterized by a low number of households, whereby there is a high number of dilapidated and/or abandoned residential objects. Photos from site visit are show below and they are indicative of the residential structure and landscape in the project area.

[3] Estimated population size of Podgorica in 2019 was 189.260 (Statistical Office of Montenegro, MONSTAT)

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Figure 17. *Dilapidated house in proximity to the project area*



Figure 18. *Landscape in the project area*



Figure 19. *Project location 1 (main facility)*



Figure 20. *Project location 2 (auxiliary facilities)*

5.2.2. Land use

This project is being implemented in the area which is defined as primarily industrial, whereby the bordering settlements are located in the wider project area. Namely, the WWTP and all the pertaining facilities are going to be built on land plots which are owned by "KAP", the Capital of Podgorica and the Government of Montenegro (UP 5 and UP6), as shown in Project Description. Total land surface which is going to be taken for the purpose of construction of the project facilities is 128.198m^2. The project area is regulated by the Detailed Spatial Plan "KAP", which defines the following types of land use: *industry and production; central activities; surface and landscape management*[4].

Considering the fact that this area is defined for industrial purposes, and that the land at which the facilities are going to be built is owned by "KAP" and the Capital Podgorica, land acquisition/expropriation is not going to be carried out among private individuals. Thus, private individuals are not going to be affected by acquisition and/or occupation of their private land plots.

5.2.3. Agriculture

Agriculture is not represented in the project area, considering the fact that the subject space is primarily used for industrial purposes. Additionally, considering the fact that there are no populated residential objects in the immediate project area, it may be concluded that agriculture is not represented in the project area.

[4] ID DUP Industrial Zone "KAP", Podgorica, p.29

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5.2.4. Economy and employment

Podgorica represents the central point of economic activity in Montenegro, which may be recognized in the fact that it had the highest share of active business entities in 2019 (36.2%, i.e. 12.565) in comparison to all other municipalities. However, when it comes to the project area, it is predominantly characterized by industrial production, which primarily relies on production of metal (aluminum). On the other hand, sector of business activity which has the highest representation in Montenegro is *retail and wholesale, and repair of vehicles and motorcycles*. The number of this type of companies in 2019 was 10.602, which represented 30.6% of companies in Montenegro.

Wider project area is characterized by a number of companies which have storage facilities along the main road which leads towards the Airport and the southern region. A detailed overview of the population structure according to business activity is shown in Table 1.

Table 1. *Economic activity of population in Botun and Srpska*

Category		Botun	% (settlement population)	Srpska	% (settlement population)
Employment	Unemployed	76	13.66	100	14.45
	Employed	163	29.31	219	31.65
	Retired	119	21.40	110	15.89
	Student	44	7.91	66	9.54
	Housewife	152	27.34	195	28.18
	No response	2	0.36	2	0.29
	Total	556		692	

5.2.5. Livelihoods

This project did not require a socio-economic survey for the purpose of establishing the social and demographic baseline, thus there is no data about livelihoods of people living in the settlements which are located in the wider project area. However, it is assumed that majority of people are employed locally, i.e. in large companies which operate along the main road and/or in the urban area of Podgorica.

5.2.6. Infrastructure

Power supply
The project area is defined by the Detailed Spatial Plan "KAP", according to which this area is equipped with various power supply objects which have different types of voltage: 110kV, 35kV, 10kV and 1kV. Specifically, the project area is equipped with the overhead power line, 35kV.

Water supply
The only public water supply system in the wider project area which is regulated by the Public Enterprise Water Supply and Sewage is the water pipeline along the railway Belgrade-Bar. Another project which is being implemented as part of the wider programme of activities related to water supply and water treatment is aimed at providing public water supply to all the households in the wider project area.

Telecommunication
The wider project area, which is defined by the Detailed Spatial Plan "KAP" is equipped with the telecommunication system "RSS KAP", which is located in the premises of the "KAP" HQ. This system provides direct connections to the users and its capacity is sufficient for all the existing and future users in the area covered by the subject spatial plan. Additionally, construction of a new telecommunication system is planned in this area, in order to provide preconditions for connecting individual objects which are planned to be built in the area.

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Public transportation

Public transportation system is regulated by the Capital Podgorica and it relies on bus traffic. The bus line which is operational in the wider project area is Podgorica-Dajbabe-Botun, and it connects the residents of the local settlements to the wider rural and urban areas in Podgorica. This bus line operates 13 times per day, while there is bus traffic on Sundays. Additionally, this bus line is operational less frequently during the period when schools do not work, whereby it operates 8 times per day during these periods.

5.2.7. Education

There are no educational facilities in the immediate project area. However, the closest school is located in settlement Srpska (Elementary School "Vladika Danilo", 42°22'28.6"N 19°13'25.2"E), at the distance of 1.966m[5] from the project area.

5.2.8. Community Health and Safety

Considering the fact that socio-economic survey was not required for this project, there is no official data regarding community health and safety. The closest public health institution is Golubovci Health Centre 42°19'38.8"N 19°13'17.8"E, which is located at the distance of 7.107m from the project area. Another private clinic is located at the property of Airport Podgorica, Cutis Polyclinic Dubrovnik (42°22'05.1"N 19°14'54.1"E), which is located at the distance of 3.651 m from the project area. Locations of both health institutions are shown in figure below.

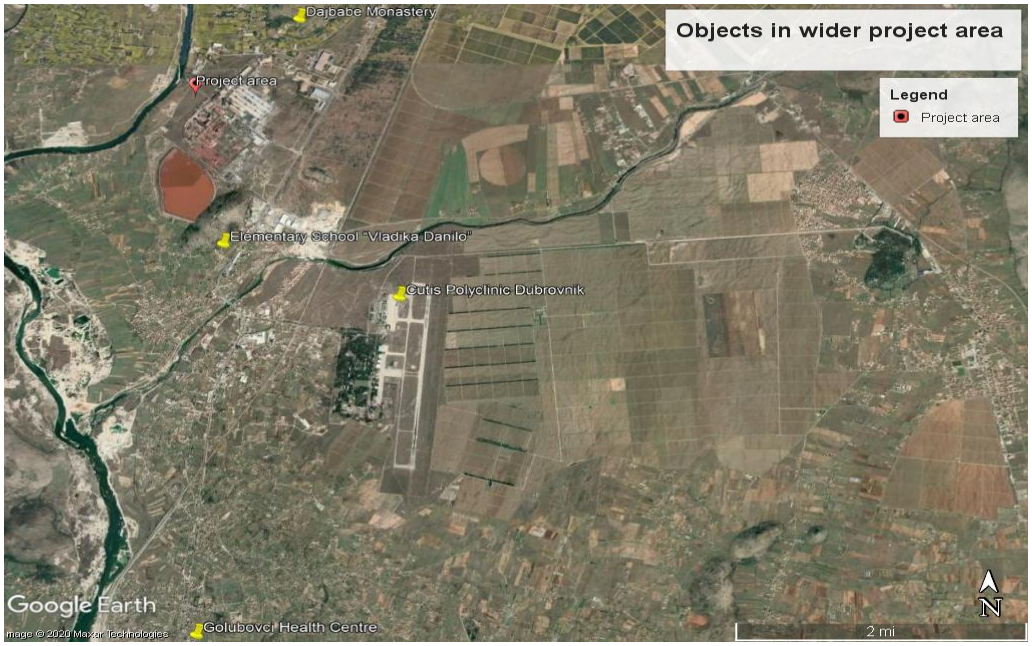


Figure 21. *Community objects in the wider project area*

5.2.9. Poverty and Vulnerable groups

Data about poverty in Montenegro is published on the national level, and the most recent data was provided by the Statistical Office of Montenegro in 2017. According to data, absolute poverty line in Montenegro was 192.42 EUR (single households).

[5] Distances shown in this document represent the closes aerial distance from the project area

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Official statistical data about poverty and vulnerable groups does not exist on the level of settlements, and since socio-economic survey was not carried out for the purpose of this project, there is no data about poverty and vulnerable groups in the project area.

5.2.10. Cultural heritage

Podgorica is characterized by a significant number of cultural and historical monuments and resources. However, there are no cultural monuments and/or resources in the project area.

Cultural monument which is located closest to the project area is Dajbabe Monastery, which is located at the distance of 940m from the project area.

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6. ENVIRONMENTAL AND SOCIAL IMPACTS

6.1. Impact assessment approach and methodology

The Law on Environmental Impact Assessment ("Official Gazette of Montenegro", No. 75/18) regulates the manner and procedure of impact assessment for projects that may have a significant impact on the environment, preparation and evaluation of studies on environmental impact assessment and other issues relevant to environmental impact assessment. The law is fully in line with EU guidelines, which define this area.

Environmental impact assessment is a procedure that includes: preparation of studies on environmental impact assessment, participation of interested bodies and organizations and the public, procedure of assessment of studies and decision-making on giving or refusing to give consent, as well as explanation of significant project impacts on the environment on which the decision is based, taking into account the results of the public consultation.

This Law, through environmental impact assessment, determines, in each individual case, the direct or indirect impacts of the planned project on the population and human health; biodiversity, in particular protected species of plants, animals and fungi and their habitats; land, water, air, climate and landscape; material goods and cultural heritage; as well as the interrelationships of the aforementioned elements.

The subject of impact assessment are projects that are planned and carried out, which can significantly affect the environment or human health. Impact assessment is performed for projects in the field of industry, mining, energy, transport, tourism, agriculture, forestry, water management, utilities and projects planned in the protected natural asset and the site of immovable cultural property.
Impact assessment is not performed for projects intended exclusively for the purpose of defense, ie elimination of the consequences of natural disasters and natural disasters.

The holder of a project for which the preparation of a study is obligatory or of a project for which a decision has been made on the need to prepare a study, cannot start the project, ie obtain approval to perform activities without consent on the study or a decision that no study is required.
When the impact assessment procedure includes the implementation of the acceptability assessment procedure, the acceptability assessment procedure is carried out within the impact assessment procedure in accordance with the law governing nature protection.
When the impact assessment procedure is carried out within other procedures in accordance with special regulations, these procedures are carried out in a harmonized manner.
The study and consent to the study, or the decision that it is not necessary to prepare a study, is an integral part of the documentation required to obtain a building permit, or application for construction, approval or consent to start the project.

6.2. Potential area of influence

The location where the construction of the wastewater treatment plant in Podgorica is planned is located in the southern part of the Capital, in the immediate vicinity of the Aluminum Plant from Podgorica and belongs to the planning document DUP Industrial Zone KAP.

According to the DUP of the industrial zone of PAK, which covers an area of 483.68 hectares, and which was adopted in 2009, the new WWTP is located next to the KAP facilities, and borders its processing plants, water supply wells, canal for wastewater, as well as with the road to the settlements of Dajbaba / Zelenika and Botun.

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The selected location for the new WWTP is 11.1 hectares, on the left bank of the Morača River, which is about 150 m away.

The plot is owned by the Capital of Podgorica and Aluminum plant Podgorica (KAP).
The plot for the new WWTP is located about 300 m from the nearest residential building. The village of Botun is located about 800 m southwest.
The land of the proposed location is currently an unused meadow of no special value.

Next to the plot, there is a local road that connects the villages of Botun and Srpska with the settlements of Zelenika and Dahna.
The plots on the other side of this road, towards the river Morača, are unarranged and filled with various construction materials (waste).

The closest settlements to the future WWTP are the villages of Botun and Srpska. According to the 2011 List, Botun was inhabited by 696 inhabitants, in a total of 180 households, while Srpska was inhabited by 886 inhabitants in 252 households.

The realization of the project is planned on the cadastral parcels no.: 1094/3, 1094/4, 1094/5, 1094/6, 1111/2, 1111/19, 1111/20, 1111/45, 1384/9, 1384/10, 1384/7, 2914, 2915, 2916/1, 2917/1, 2918, 2919/1, 2920, 29/17, 1390/7, 2916/2, 2917/2 CM(cadastral municipality) Dajbabe, 23/2, 24, 25, 27/8, 28/2, 29/2, 1078/4, 23/7, 23/4, 15/3, 1/3, 2/3 CM Botun.

6.3. Environmental impacts

6.3.1. Air quality

The presented data on air quality and climatic conditions have shown that the physical-chemical composition and climate of the wider area of this facility are influenced by the movements of air masses from further geographical areas.
The air quality of the project area, in addition to the above, is also influenced by the functioning of the Aluminum Plant from Podgorica.

Impact during construction

During the construction of the WWTP, earthworks will be performed, and thus the emission of pollutants into the air will occur, due to the operation of construction machines.
During the excavation phase and during the preparation of the land for concrete and asphalt works, construction machines will be engaged: excavators, loading shovels and trucks for transporting the excavated material, as well as automixers for concrete. As a propellant, the listed machines use diesel fuel, and its consumption is 0.2 kg / kWh.
The average values of exhaust gases from heavy diesel vehicles are given differently in the literature, depending on the applied model (COPERT model, CORINAIR methodology, ...), and in this case we presented the EPA coefficients (US EPA, 2008).
The following table gives data on the emission of pollutants per 1000 liters / fuel that is burned during the operation of construction machinery.

Table 2. *Pollutant emissions*

Equipment type	CO	NO_x	CO_2	VOC_s
Bulldozer	14.73	34.29	3.74	1.58
Truck	14.73	34.29	3.73	1.58
Loader	11.79	38.5	3.74	5.17
excavator	10.16	30.99	3.7	1.7
Grader	6.55	30.41	3.73	1.53

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Given the scope of construction works and the proximity of KAP, the execution of the project cannot cause negative effects on the environment (primarily air).

During the excavation, the excavated soil will be moistened, in order to prevent the emission of dust.

Influence during functioning

During the operation of the plant, air pollution can occur with substances that are sprayed or evaporated from wastewater, and with the emission of droplets from aeration pools. The intensity of unpleasant odors depends on the amount of released substances, water and air temperature, as well as the direction and strength of the wind flow.
During the operation of the WWTP, the occurance of unpleasant odors is possible. Unpleasant odors can be emitted from different parts of the WWTP: from grates, sand traps, thickening and dewatering of sludge, etc. Air polluted with unpleasant odors will be collected in a controlled manner and taken to a biofilter, where it will be purified. The odor control system as a compact unit contains wet, vertical cross humus filters, a horizontal fan with suction pipes and a water spray system for installation on a concrete base box. Biological air purification in an organic filter (humus filter) with natural micro flora is the most modern and economical way of eliminating odors and purifying air of low or undefined concentration. The biofiltration process is based on the natural decomposition of air pollutants into harmless products.

Impact in case of accident

Impact on air pollution can occur in case of uncontrolled spillage of wastewater on the ground during an earthquake, or intentional damage to the system.
Also, an accident situation can occur due to a biogas explosion. The basic combustible component of biogas is methane, which is an explosive gas. It is a known fact that all fuels have the property of explosiveness in certain conditions, so biogas is no exception. Methane and air form an explosive mixture in those cases when there is at least 5% and at most 15% of methane in the air. These are both the lower and upper limits of the explosiveness of a mixture of methane and air. There are no explosives outside these limits.

It can be assumed that the stated limits also apply to biogas as for methane.
Compared to other gaseous and liquid fuels, biogas is relatively highly resistant to explosive (detonating) combustion. The evidence for this claim is:
- high temperature of self-ignition of biogas, ie methane,
- high methane number.

The following table shows the values of self-ignition temperatures of some commonly used gaseous and liquid fuels, where it can be seen that methane has the highest self-ignition temperature at a pressure of 1 bar.

Table 3. *Auto-ignition temperatures of the most commonly used gaseous and liquid fuels at p = 1 bar*

Gaseous fuels	Temp. self-ignition (° C)	Liquid fuels	Temp. self-ignition (° C)
Bhutan	480	Diesel fuel	300-350
Propane	500	Petrol	480-550
Hydrogen	510	Lubricating oil	420-480
Methane	645	Ethyl alcohol	450

Thus, it can be concluded that methane, as the most important fuel component of biogas, is reliable when it comes to auto-ignition temperature.

Every combustible gas is in danger of fire and explosion, so it is necessary to know and apply the basic safety rules when working with it. The application of such rules means taking the necessary measures for the safe operation and consumption of each gaseous fuel.

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6.3.2. Geology, soils and contaminated land

There are no geological sites in the mentioned area with the remains of faunal or floristic material that would be endangered by the planned intervention.

According to the data given in the description of the planned project, no negative impact on the land is expected by the planned process.
Potential impacts on land quality are also divided into three phases.

Impact during construction

The site for the proposed WWTP is located in the immediate vicinity of land contaminated with heavy metals, PCBs, red sludge. It is recommended that an assessment of contaminated soil be performed prior to any site work. The construction of the WWTP offers an opportunity for land rehabilitation, which is considered a positive impact.
The proposed WWTP site is not at risk of flooding by the Morača River, so flood protection is not necessary.
The physical impacts on the land, with the construction of the wastewater treatment plant, will be significant, given that extensive earthworks will be carried out.
Due to the performance of works on the preparation of the terrain, there will be an increased generation of dust which, in case of unfavorable weather conditions (wind), can contribute to air pollution directly in the environment of the construction site.
Soil contamination can occur in the case of disposal of construction materials and excess excavated material on land that is not designated and prepared as a landfill, and due to uncontrolled leakage of fuel and lubricants from construction machinery and vehicles. This impact is limited in time, ie until the moment of project construction.
During the construction phase, construction waste will be generated, which in accordance with the Rulebook on waste classification and waste catalog (Official Gazette of Montenegro, No. 59/13) has a waste group 17: construction waste and demolition waste (including excavated land from contaminated sites). Also, smaller quantities of other types of waste will be generated.

Impact during exploitation

The operation of the wastewater treatment plant will not deposit chemical and other substances that could affect soil pollution, given that the Project Holder is obliged to act in accordance with the solutions and proposals given in the technical documentation (description of the work process).
The project in question will use the entire area of land on the site for the needs of functioning, but that will not have significant consequences.
There are no mineral resources on the site, so there is no impact of the project on them.

In case of an accident

In case of oil or fuel spillage from working machines during the construction of the facilities, soil contamination could occur. In that case, it is necessary to treat the contaminated soil as hazardous waste (17 05 03 * - soil and stone containing hazardous substances).
Inadequate waste treatment during the construction and operation of the project can lead to soil contamination.
In the event of an accident during operation, the quality of the land may be endangered if wastewater is spilled on (into) the land (pool cracking, etc.). In order to prevent an accident, the operation of the wastewater treatment plant must be regularly monitored.

6.3.3. Surface and ground water resources

According to the spatial planning documentation, and taking into account the provisions of EU Directive 91/271 / EEC, the project / recipient area is not considered a sensitive recipient.

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After treatment, the water will be discharged into the Morača River, which flows into Skadar Lake (National Park), and yet for this reason the Effluent criteria for sensitive areas have been applied from the Directive.

Impact during construction

During the execution of works, if the tests determine that the land is not contaminated, in order to build a WWTP, the project will not have an impact on groundwater and surface water.
Contamination of Morača water can possibly occur due to possible leakage of fuel and lubricants from construction machines for earthworks. Pollution can also occur due to the leaching of bulk and loose material from the construction site surface during precipitation, which would result in their removal to the river.

Influence during functioning

The conditions proposed by the project that the effluent should meet for future WWTPs are shown in the following table.

Table 4. *Proposed conditions to be met by the effluent for future WWTP Podgorica*

Parameter	Unit	Conditions prescribed for effluent
Biological oxygen consumption after 5 days (BOD5)	mg O_2/l	< 25
Chemical oxygen demand (COD)	mg O_2/l	< 125
Total suspended matter (TSS)	mg/l	< 35
Total nitrogen (TN)	mg N/l	<10
Total phosphorus (TP)	mg P/l	<1

The parameters listed in the table are in accordance with the Rulebook on quality and sanitary conditions for wastewater discharge into the recipient and public sewerage, the manner and procedure of testing wastewater quality, the minimum number of tests and the content of reports on determined wastewater quality ("Official Gazette of Montenegro", No. 45/08, 09/10, 26/12, 52/12 and 59/13) and the European UWWD Directive (91/271 / EEC).
Although quantitative analyzes of the project's impact on groundwater quality could not be done, it is clear that the project will have a positive impact on their quality.
Improving the sewage system, including controlling septic tanks and building a sewer system, will significantly reduce shallow groundwater pollution by eliminating water infiltration from sewage into groundwater. Then, by reducing the levels of pollution in watercourses, the condition of shallow aquifers will also be improved.
Given that the WWTP will be built downstream from the wells from which the KAP is supplied (location next to the northern and northeastern rim of the WWTP plot) and that groundwater moves from the north and northwest to the south and southeast, there will be no significant impact on groundwater.

In accordance with the current regulations, the new WWTP will achieve a high degree of removal of organic pollution (BOD5 and COD), as well as phosphorus, nitrate, ammonia, etc., so that there will be no significant decline in the water quality of the Morača River at the outlet.
Therefore, it can be stated that from the point of view of physical and chemical pollution, the water quality of the Morača River will be significantly better in relation to the current situation, because the fecal waters of the Capital will be treated in the prescribed manner. This finding is mainly related to the improvement of water quality downstream of the existing wastewater treatment plant. This will not be the case regarding microorganisms. Typical wastewater contains about 107 fecal coliform bacteria per 100 ml of water. After purification in a new WWTP, the number of fecal coliform bacteria in the water will be reduced to approximately 105/100 ml. The treated wastewater will then be discharged into the Morača River, where it is diluted with river water so that the number of bacteria will be even smaller. However, fecal coliforms (and pathogens) will still be present in significant numbers in river

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water. Class A2 water quality, therefore, is very likely not to be achieved at the point of discharge with respect to the conditions prescribed for bacteriological quality.
Pathogens pose a potential health hazard to downstream water users. This can especially negatively affect the following 3 localities:

- water intake on Malo Blato for drinking water supply of the Montenegrin coast (karst water source Bolje sestre);
- various water supply wells in the Zeta plain;
- Skadar Lake (National Park and recreational use).

Water intake on Gornje Malo blato

Gornje Malo blato is a karst lake located west of the river Morača. For several years, one of its underground water sources (Bolje sestre) has been used to supply water to the Montenegrin coast.
The water of the Morača River has been polluted for many years, so the potential hydraulic connection between the river and the Bolje sestre water source was one of the most important reasons for concern at the beginning of this project. Consequently, a number of studies have been conducted to assess the risk of pollution for water intake (ESIA for WS Malo Blato, 2006: p. 41/42):

- analysis of physico-chemical and microbiological quality of water;
- measuring the flow of water at the water source;
- tracer tests;
- underwater survey of the Bolje sestre water source and the Morača river abyss;
- geophysical site survey;
- geoelectric exploration of the Morača river alluvium;
- hydrogeological research.

The aim of the study was to determine the catchment area of the water source, define possible pollution factors and prescribe protection measures. Based on various studies conducted, the following conclusions were reached:

- The water quality of Gornje Malo Blato / Bolje sestre water source is extremely good.
- The Bolje sestre water source does not receive surface water directly from the Morača River. It is supplied with groundwater which partly originates from the narrow underground watercourse between Grbavac and Kolozuba, and partly from karst water sources.

According to these results, the risk of contamination of the Bolje sestre water source with surface water from the Morača River can be excluded.

Groundwater and wells in the Zeta plain

At various locations in the Zeta plain, groundwater is extracted from the alluvial aquifer to obtain drinking water. The alluvial aquifer from the Quaternary is directly connected to the Morača River, so that polluted water from the river could affect the quality of groundwater and water supply.
However, all wells that are being used to supply water to Podgorica and other villages in the Zeta Plain are located in the eastern part of the plain, at a considerable distance from the Morača River. The directions of groundwater flow are not precisely known, but it is unlikely that water from the Morača River will affect water quality in wells.
Pathogens are thought to die out during the underground passage after 50 days at the latest. For this reason, in water supply, a distance corresponding to an underground passage of 50 days is used to demarcate the groundwater sanitary protection zone. The shortest distances from the Morača River to the well are approximately the following (following picture):

- Ćemovsko polje (well): 2,5 km
- Dinoša (well): 6 km
- Milješ (well): 7 km
- Vuksan Lekići (well): 9 km

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The theoretical flow time between different wells and the river ranges from 116 days (Ćemovsko polje) to 416 days (Dečić), so the presence of pathogens originating from the Morača River in the wells is very unlikely.
It is possible that in other places in the Zeta plain there are some private (shallow) wells used for irrigation and even local private water supply. If they are located at a distance of one kilometer or more from the river, the risk of water pollution from Morača is negligible.

Skadar lake

Skadar Lake is a National Park with a large number of protected species (birds, fish, plants, etc.). The lake also has significant tourist value. Surface water from Morača with a high concentration of pathogens could affect the value of the lake for nature and tourists.
The previous text shows that the number of fecal and total coliforms decreases by approximately a factor of 100 between the discharge site in Podgorica (Gradski kolektor) and the mouth of the Morača River in Vranjina, where the number of coliforms in the water is in the same range as in the lake center. Therefore, it is concluded that there is no significant risk for Skadar Lake in terms of microbiological contamination.
Based on the above, it can be concluded that the water of the Morača River contains significant amounts of fecal coliform bacteria and pathogens (local number up to several thousand fecal and coliform bacteria), as well as significant concentrations of ammonia, nitrate, nitrite, BOD5 and phosphate. Class A2 water quality is partially not achieved downstream of Podgorica.
With the operation of the new WWTP in Podgorica, the concentrations of many pollutants will be reduced. However, as far as fecal coliforms are concerned, it is possible that class A2 water quality will not be achieved in the river at the point of discharge. However, it can be shown that the presence of coliform bacteria and pathogens in the river does not pose a significant risk to the water intake in Gornje Malo Blato (drinking water supply of the Montenegrin coast), various water supply wells in the Zeta plain and water quality of Skadar Lake. The number of bacteria in the water of the Morača River will decrease rapidly after the discharge site and will then be significantly below the limit value for class A2.
Since there is no risk to health, disinfection of treated effluents before discharge into the Morača River is not considered necessary.

Potential contamination hazards

The main potential danger to groundwater in Podgorica is a defective or locally even non-existent sewage system in Podgorica. Nearly 60,000 residents living in individual houses do not have access to sewage services. About 6,000 people living in apartment buildings are also without sewerage services. In principle, in Podgorica, 40% of the population is not connected to the sewerage network. Most of all individual houses that are not connected to the sewage system have septic tanks. Septic tanks are often not properly constructed and do not meet the required water permeability requirements.
The risk of pollution is classified as high for areas of the city where no sewerage network has been built so far. The situation is especially critical near the water protection zones near the Zagorič and Ćemovsko Polje springs. Due to the growth of the city, both the springs and their protection zones are now within the city limits and, although not shown on the map, informal settlements have been built on both sites that are only partially connected to the sewerage network (primary sewerage network only) within the protected zone 2. In these two places, the risk of pollution is classified as very high.
Another potential danger from pollution is intensive agricultural activity in the Zeta plain. The following map shows that almost the entire plain is used for agriculture, especially vineyards. Potential contaminants include nitrates and pesticides. The risk is preliminarily assessed as moderate to high, but more water quality data are needed for a detailed assessment of the situation.

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Impact in case of accident

Impact on water quality can occur in the case of uncontrolled discharge of wastewater on / into the land and river Morača during earthquakes, war destruction, and intentional damage to the system.
It is also possible for the device or its individual parts to stop working due to various breakdowns, interruptions in the electricity supply, fires and the like, which would cause pollution of the Morača River.
In case of downtime, urgent intervention is necessary in order to eliminate the problem. This downtime can occur due to its irregular maintenance, and therefore it is necessary to build a regular maintenance procedure.
Accidents and incidents at the WWTP are occasionally possible, and their consequences are short-term and moderate in severity, so the risk to the environment in this case was assessed as acceptable.

In the event of an accident, downtimes in wastewater treatment, and uncontrolled discharge of untreated water into the Morača River, there is a possibility of impact on transboundary water pollution, given that Morača flows into Skadar Lake, which belongs to Montenegro and Albania.

6.3.4. Noise and vibration

Impact during construction

Given that there is no precise data on construction machinery that will be used for the works, it can be assumed that the noise level emitted on the construction site during the works will exceed the level of permissible noise for the population. The use of machinery and equipment as a source of noise is covered by the system of measures to protect the population from noise, which are contained in the relevant regulations.
The maximum emitted noise level that can be expected on the construction site is about 100dBA. Taking into account the distance of the nearest buildings intended for housing (300m), we can say with certainty that the works on the construction of the WWTP will not significantly cause an increase in noise levels that can negatively affect the population.
By calculating the noise attenuation, we conclude that in the most unfavorable case there will be an increase in noise levels by 12dB compared to the level prescribed by the Decision on the determination of acoustic zones in the Capital of Podgorica ("Official Gazette of Montenegro - Municipal Regulations", No. 027/15 of 05.08 .2015): Quiet zone in the agglomeration, permissible noise level where the limit noise levels during the day and evening are 40dBA, and during the night 35dBA, (works are performed in daily conditions).
Lokalno stanovništvo će biti ugroženo usled povećanog saobraćaja koji će se odvijati tokom izgradnje PPOV i buke koja nastaje usled njega.
U toku izvođenja projekta na lokaciji će biti prisutna pojava vibracija usljed rada građevinskih mašina i kretanja kamiona. Lokalno stanovništvo ne može biti ugroženo usled vibracija.

During functioning

During wastewater treatment procedures at the wastewater treatment plant, higher noise levels may occur during the operation of the compressor station and other systems at the WWTP. The expected noise level is around 65-70dBA, which is a level that, even in the cumulative impact, cannot negatively affect the nearest residential buildings (distance 300m).
Given the characteristics of the proposed WWTP and pumping stations, the presence of KAP, traffic, and the number of residents who would be bothered by noise, it is considered that this will not be a significant problem. It is therefore concluded that noise is unlikely to be a significant nuisance.

6.3.5. Terrestrial and Aquatic Biodiversity

There are no rare and endangered wild plant and animal species and their habitats in the narrower locality of the WWTP. There are also no protected natural assets near the site. The WWTP position is

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in the industrial zone. The location is on a grassy area next to the KAP border, which is inhabited by small mammals, reptiles, birds, insects, etc.
In the area of WWTP construction, there will be a permanent loss of the cover humus part of the soil, and thus a loss of habitat for some plant and animal species.
There are no protected species in the mentioned area, both flora and fauna.

The nearest internationally significant protected natural location is Skadar Lake (Ramsar site). Due to the reduction of the amount of untreated wastewater discharged into the river Morača, which flows into the lake, the organic load of the lake will be reduced, which will reduce the impact on the eutrophication of the lake.

6.3.6. Landscape and Visual (Aesthetics)

The construction of the object in question, ie the envisaged architectural and construction solution of the object will not significantly change the landscape of the space where the project is planned. The reason for this claim lies in the fact that the project is planned in the industrial zone, in the immediate vicinity of the Aluminum Plant in Podgorica.

- The location of the proposed WWTP can be seen from:
- the road connecting the villages of Srpska and Botun with Dahna (the road that stretches between KAP and the Morača River) and
- the KAP (it will be partially sheltered by low vegetation).

This area can be assessed as of little value from a landscape point of view. The construction of buffer zones with appropriate landscaping will further improve the visual impact of the new WWTP.

6.3.7. Waste

During the construction of the WWTP, smaller quantities of the following types of waste are expected:
- 17 01 concrete, bricks, tiles and ceramics
    - 17 01 01 concrete
- 17 02 Wood, glass and plastic:
    - 17 02 01 wood
    - 17 02 02 glass
    - 17 02 03 plastic
- 17 04 Metals (including their alloys):
    - 17 04 05 iron and steel
    - 17 04 07 mixed metals

Earth from excavation of the foundation of the building:
- 17 05 land (including land from contaminated sites), stone and excavated sludge waste:
    - 17 05 03 * earth and stone containing dangerous substances
    - 17 05 04 earth and stones other than 17 05 03 *.

The Rulebook on Construction Waste Management, Manner and Procedure of Construction Waste Processing, Conditions and Manner of Disposal of Cement Asbestos Construction Waste (Official Gazette of Montenegro, No. 50/12) regulates construction waste treatment, manner and procedure of construction waste processing, conditions and the manner of disposal of cement asbestos construction waste and the conditions to be met by the construction waste processing plant.
Present construction workers will also generate municipal waste (waste group 20). And due to the work of construction machinery, waste will be generated - waste from oil and liquid fuel residues (waste group 13) and finally more waste packaging of construction materials, equipment, raw materials and energy sources (waste group 15).

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Table 5. *Groups and names of waste that will be generated during construction works*

Waste catalog	Name of waste	Location - source of waste generation
17 04 05	Iron and steel	Disassembly of metal parts
17 04 07	Mixed metals	
17 05 03*	Earth and stone containing dangerous substances;	Excavation of the ground for the foundations of new facilities on site if the composition or chemical analysis determines that they contain hazardous substances: in case of accidents it will be contaminated with: oil, bituminous mixtures, or other waste or hazardous chemicals.
17 05 04	Earth and stones other than 17 05 03 *	
17 01 01	Concrete	Demolition of concrete foundations
13 02 13 01 13 08	Waste motor oils, transmission oils and lubricants (A)	Work of construction machinery.
13 07*	Waste hydraulic oils (A)	Oiled waste collected at the site.
15 01 15 01 01 15 01 02 15 01 03 15 01 04 15 01 05 15 01 06 15 01 07 15 01 10* 15 01 11*	Packaging: Paper and cardboard packaging Plastic wrapping Wooden packaging Metal packaging Composite packaging Mixed packaging Glass packaging Packaging containing residues of hazardous substances or contaminated with hazardous substances, (M) Metal packaging containing dangerous solid porous matrix (eg asbestos), including empty pressure bottles, (M)	Packaging of construction materials, equipment, raw materials and energy.

* Hazardous waste

The label (M) next to hazardous waste indicates that the waste is considered hazardous only in the following cases:

- when it has one or more of the hazardous properties H1, H2, H9, H12, H13, H14 or H15,
- or its flash point is <55°C,
- or the concentration of hazardous substances is above the permitted limit value on the basis of which waste is classified as hazardous waste in accordance with Annex 4 of the Rulebook on waste classification and waste catalog.

Label (A) next to hazardous waste indicates that the waste is considered hazardous regardless of the concentration limit value of hazardous substances on the basis of which the waste is classified as hazardous waste in accordance with Annex 4 of this Rulebook.

In case of oil or fuel spillage from working machines during the construction of facilities and due to inadequate waste treatment during the construction and operation of the project, soil contamination may occur. Due to the stated impact and generation of hazardous waste, it is necessary to develop a Waste Management Plan for waste generated during the construction and operation of the WWTP.

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6.3.8. Climate change

There is a general consensus that one of the main effects of climate change is less predictability of climate. Greater variability of precipitation is likely to occur hand in hand with more frequent extreme events (storms, floods, droughts).

The results of climate projections (Third National Report of Montenegro on Climate Change) indicate that by 2040, the annual temperature in the entire country will increase up to 1.5-2 ° C. By 2070, the average annual temperature will rise up to 3 ° C, while the projected increase to 2100 is up to 5.5 ° C. The average annual rainfall is expected to decrease, especially during the summer months, as well as the increase in precipitation in the winter months in some parts of the country. By 2070, the average annual rainfall is expected to decrease by 20% over the entire territory.
Montenegro is particularly exposed and vulnerable to climate hazards such as droughts, floods, forest fires and heat waves. Climate projections show that these climate extremes will become more frequent and pronounced in the future.
Forecasted indicators of floods and droughts are slightly reduced.
In any case, it must be borne in mind that "climate" is extremely complex and future research will undoubtedly reveal new theories and models, so that the presented results of climate models may be obsolete in a few years. This emphasizes the need to monitor meteorological, hydrological and hydrogeological conditions, in order to have a more reliable database in the future.

6.4. Social impact

Considering the fact that land acquisition and/or resettlement is not going to be carried out for the purpose of implementation of this project, social impacts are expected to be limited. Social impacts which may be expected are mostly related to the construction phase, when the local communities may be exposed to higher volumes of traffic, limited noise and dust emissions. These impacts and corresponding prevention and mitigation measures will be further elaborated on in ESMP.

Local population is dispersed in the wider project area and there are not many residential objects in the immediate project area. The closest populated residential object is located at the distance of 300m from the border of the project area. However, it is important to mention that the area which is closest to the project area is characterized by dilapidated residential objects and low value of visual environment. Pictures below show location of some of the residential objects which are located close to the project area, both abandoned and populated objects, whereby these photos are indicative of the surroundings at which the project is going to be implemented.

6.4.1. Local and National economy

Montenegrin GDP in 2019 was 4.907.9 thous. EUR in 2019[6], while tourism is recognized as one of the most prominent sectors of economic activity. Namely, contribution of the sector of tourism to Montenegrin GDP in 2019 was 10.4%. When it comes to economy in the project area, it is primarily focused on industrial production, storage and distribution of goods and materials.

Construction of the project facilities is going to provide residents of the Capital with a new system which is going to enable improvement of their living conditions in the long term. Impacts on local economy may be recognized in the fact that construction is going to be carried out in the area which is surrounded by populated settlements; thus, the construction phase may lead to opening of new job opportunities, both temporary and permanent (during operation). Employment opportunities which may be created during the construction phase may mostly lead to opening temporary job positions (e.g. construction, operation of machinery, etc.), whereby the work force may be employed both from the local settlements and from the wider area of Podgorica. When it comes to the operation phase, job

[6] Annual Macroeconomic Report, Central Bank of Montenegro, p.7

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opportunities may be linked to operation and maintenance of the installed facilities, which will be done in close cooperation with the Public Enterprise Water and Sewage Company.

6.4.2. Community demographics

As it has previously been mentioned, physical resettlement is not going to be carried out for the purpose of this project, thus implementation of the project is not going to have a direct impact on either internal or external migration in the project area. On the other hand, the facilities which are going to be built will be aimed at satisfying the needs of the entire population of Podgorica in the long term, and the facility itself is located in a remote area so that any potential disturbance of local communities would be avoided. Construction and operation of the facilities are not expected to have a direct impact on community demographics, considering the fact that the facilities are not going to attract migration in or out of the project area, since the facilities which are going to be built are going to provide the same standards and quality of living conditions to the entire population of Podgorica.

6.4.3. Infrastructure and services

Local road which connects several settlements in the wider project area is located next to the land plots which are going to be used for construction of the project facilities. This road is currently being used by both the local communities and the local businesses. All the local communities in the area have other main and alternative roads which are regularly used for local travelling, thus construction of the project facilities is not going to have a significant impact on connectivity of local and wider communities. However, a new road is being built close to the project area, and this road is going to provide another connection for all the local and wider communities.

6.4.4. Social cohesion

Local communities tend to show more propensity towards cooperation and cohesion, and local knowledge shows that local communities in the wider project area cooperate efficiently in all matters related to their shared interests. Provision of local connections and maintenance of safe conditions in the local communities is essential for ensuring social cohesion and mutual understanding among all members of the local population. Considering the fact that disturbance of local roads and habits is not expected, social cohesion is not going to be jeopardized by the project.

6.4.5. Land use and livelihoods

Land use in the project area is characterized by industrial and storage purposes, whereby the land which is going to be occupied for the purpose of construction of project facilities is owned by KAP, the Government of Montenegro and the Capital Podgorica, thus there are not going to be any impacts on land use due to project implementation.

As it has previously been mentioned, there is no baseline data regarding livelihoods of the local population. However, it is assumed that majority of people who live in the wider project area work in the companies which are located along the main road, or in companies located in the urban area of Podgorica, thus project implementation is not going to cause any disturbance in terms of existing livelihoods. However, the project may cause a positive impact on livelihoods of local population, in the event of local employment during the construction and operation phase.

6.4.6. Health and Safety

Considering the fact that there is no baseline information about community health and safety, it is not going to be possible to quantify project impacts in this regard. Impacts which may be expected in this regard are related to impacts of noise, dust, pollution, due to which people's health and wellbeing may be temporarily affected during construction. These impacts are expected during construction and they may occur during movement of heavy machinery and equipment, land excavation, transportation of

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soil and other dispersive material, etc. Impacts on community safety may be caused by moving traffic, but traffic will be controlled and managed by appropriate signalization, so as to avoid any potential undesirable scenarios in the project area. However, considering the fact that populated areas are located at a significant distance from the project area, these impacts are considered to be negligible.

6.4.7. Archaeological and Cultural Heritage

There are no archaeological nor cultural heritage sites in the project area, so the Project is not going to cause any impacts in this regard.

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7. PROJECT ALTERNATIVES

7.1. Methodology for evaluation of Alternatives

Location

The subject location is clearly determined for the construction of a new municipal wastewater treatment plant for the city of Podgorica in the adopted and valid DUP "Industrial Zone - Aluminum Plant Podgorica".

Production processes or technologies

A two-stage procedure was adopted to assess potential wastewater treatment options, and to select the preferred approach.
In the first phase, an analytical review of alternative treatments and proposed treatment technology options from previous studies was conducted to determine the most economical solution for wastewater treatment. The analytical review was performed in relation to a number of criteria that include the operational characteristics and probable costs (capital and operating) of the system of the required treatment capacity and treatment efficiency.
In the second phase of the evaluation, two possible variants of the activated sludge process with anaerobic sludge digestion were selected for the conceptual design of the WWTP Podgorica, simultaneous denitrification or previously applied denitrification (A2 / O) with advanced biological phosphorus removal (EBPR).

Results of the first phase of the analytical review

The consultant confirms the analysis of options conducted by WYG, which recommended as the most feasible technological solution, a single-phase conventional activated sludge process (CAS) for BNR (biological nutrient removal) - without advanced treatment options - and a process of conventional anaerobic sludge decomposition (without sludge disintegration) using digester gas (CHP / CCHP), sludge thickening and sludge dehydration.
The consultant will follow the WYG proposal for an updated Feasibility Study but will also consider additional project variations of the biological wastewater treatment process, ie. piston flow bioreactor (nitrification) with previously applied denitrification (and Bio-P for EBPR) or simultaneous / intermittent denitrification.

The basic process options are as follows:

- Wastewater treatment: Conventional activated sludge treatment (CAS) for biological wastewater treatment, BNR with EBPR + CPR
- Sludge treatment: Anaerobic digestion of sludge
- Gas purification and reuse: Digester gas storage and purification with energy recovery via CCHP (trigeneration = CHP + refrigeration production)
- Sludge dehydration: Thickening and dehydration of sludge with flocculation
- Odor treatment: Bio-filter for plants for mechanical treatment and dehydration of sludge

The second phase of option evaluation

The result of the first phase of the assessment confirmed the recommendation from the WYG study (2011) and clearly identified the CAS process with separate anaerobic sludge digestion as the most feasible solution to the process. The contracting authority's comments on the interim report were, as appropriate, clarified and considered for the second phase of the evaluation.
Based on the framework design calculations for the example of the projected capacity of 200,000 PE, an additional assessment of possible process variants for the selected treatment process technology was performed in order to confirm the results of the first phase of the assessment.

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Conventional activated sludge treatment (CAS) offers several commonly used process variants for the biological treatment process, such as:

- bioreactor with piston flow (nitrification with pulse aeration) with previously applied denitrification (both Bio-P for EBPR and CPR);
- complete mixing for simultaneous or intermittent denitrification (separate mixing / aeration) and Bio-P for EBPR and CPR;
- sequential batch reactor (SBR) for intermittent denitrification (separate mixing / aeration) and Bio-P for EBPR and CPR;
- membrane bioreactor for advanced wastewater treatment.

Sludge processing within separate anaerobic sludge digestion (parallel or serial) with mechanical dehydration of sludge will be focused on optimized gas production from the digester for maximum energy recovery with optimized operating costs (OPEX), taking into account process variants for:

- thickening of excess sludge (WAS); combined thickening together with primary sludge (PS);
- Mechanical thickening of excess sludge (WAS) with separate gravitational thickening of primary sludge.

Regarding sludge dehydration, variants for the dehydration system could be assessed in relation to energy consumption, by considering:

- centrifuges and screw presses;
- Belt filter presses.

Selected purification process options

Based on the two-phase evaluation of process options and variants, the following process technologies were determined for consideration:

- Basic solution: simultaneous or intermittent denitrification (complete mixing) with EBPR (Bio-P) + CPR, digestion and dehydration of sludge, reuse of gas from the digester for energy recovery.
- Alternative solution: A2 / O process (piston flow with previously applied denitrification) with EBPR (Bio-P) + CPR, with digestion and dehydration of sludge, reuse of gas from the digester for energy recovery.

Simultaneous denitrification was chosen as the basic solution having in mind a simpler and more stable process of biological purification.

The basic solution - simultaneous denitrification
Simultaneous denitrification with EBPR (Bio-P) + CPR with separate sludge digestion and dehydration with reuse of gas from the energy recovery digester as a variant of the conventional activated sludge (CAS) process, was chosen as the basic solution having in mind a simpler and more stable biological purification process(relative to A2 / O).

An alternative solution - piston flow with previously applied denitrification
The A2 / O process (piston flow with previously applied denitrification) with EBPR (Bio-P) + CPR with separate digestion and dehydration of sludge with reuse of gas from the digester for energy recovery was considered as a variant and potential modification of the process for future WWTP upgrade.

Sludge treatment

One of the by-products of wastewater treatment is sludge, which must be treated and in some way either utilized or disposed of. Sludge disposal is also a problem in the existing WWTP, and in the future it will become even more worrying as the amount of treated wastewater will increase by about 3 times. All evaluated treatment processes produce stabilized sludge and all WWTPs have mechanical

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sludge dehydration to obtain “solid” sludge with a dry matter content of 20 to 30%. At full designed capacity and assuming a dry matter content of 30%, the proposed activated sludge treatment plant will produce about 48 tons of dehydrated sludge per day. This amount can be smaller because it is proportional to the served population, ie. will depend on the degree of construction of the collector and the connection to the network.

Standard options considered for the use or removal of sludge are:

- Agriculture and forestry / silviculture
- Rehabilitation or restoration of land
- Composting
- Landfill disposal
- Incineration
- Energy recovery
- Gasification
- Alternative technologies

Each of these options has its advantages and disadvantages and there are environmental risks associated with each of these options. Amounts of dehydrated sludge in Podgorica may mean that options such as incineration, gasification and energy production may be considered in the future but these are not considered to be feasible options at the moment. However, the potential of feasible options must be considered in the context of providing a safe and cost-effective short-term and long-term outcome for the WWTP sludge problem.

7.2. Alternative 1 – ‘do nothing scenario’

This alternative means doing nothing. The current negative impacts in the area of inadequate capacity and treatment of the existing wastewater treatment plant in Podgorica will continuously pose a risk to the environment and the population.

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8. MITIGATION MANAGEMENT PLAN

8.1. Measures provided by law and other regulations, norms and standards

Environmental protection implies permanent protection of valuable natural and created values in order to maintain and improve the quality of the environment of the project territory and the wider environment.

This chapter will list the measures for the assessed and potential impacts listed in this document, as well as possibly other measures.

Also, all measures on safety at work and construction sites will be envisaged, as well as all previously mentioned domestic and international standards, conventions and norms and instructions related to these areas.

In order to protect the environment, it is necessary to adhere to the applicable legal regulations and norms, which cover the following areas: urban ecology, fire protection, noise protection and protection against soil and air pollution. The technology of performing the works and the use of the necessary mechanization must be adjusted to the communal decisions that protect the conditions of the planned facilities, preservation of the environment and sanitary-hygienic measures for the preservation of space.

During the implementation and operation of the project it is necessary to comply with applicable laws in Montenegro (we list the basic laws: Law on Waste Management, Law on Spatial Planning and Construction, Law on Environment, Law on Occupational Safety, Law on Air Protection, Law on waters and the Law on Air Protection.). The mentioned legal acts, as well as by-laws specify the measures to be followed in the direction of protection of people and the environment.

According to the Law on Waste Management ("Official Gazette of Montenegro", No. 64/11 and 39/16), the producer of sewage sludge is obliged to keep records that contain in particular:

1) name and address, ie name and seat of the sludge producer;
2) the amount of sludge that has been produced or delivered for further use;
3) composition and characteristics of delivered sludge;
4) technological characteristics of the applied process;
5) name and address, ie name and seat of the person using the sludge;
6) location of use, ie sludge treatment.

Also, according to this Law, the sludge producer is obliged to submit the data from the records to the competent body of the local self-government unit on whose territory the sludge is generated by March 31 of the current year for the previous year.

The Occupational Health and Safety Study and the Fire Protection Project will define protection measures in the area of their obligations. The Investor is obliged to adhere to the stated measures in the phase of functioning of the facility and the contractor during the construction.

8.2. Environmental protection plans and solutions

During the operation of the wastewater treatment plant in order to ensure optimal operation, protection of the environment and human health from the possible harmful effects of this project, it is necessary to implement measures to prevent or eliminate possible pollution.

The aim of determining measures to reduce or prevent pollution is to examine the possibilities of eliminating pollution or reducing the identified impacts.

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At the operational level, by constant comparison of analyzes and design, it is necessary to define terms for verification that would enable the project plan, on the one hand, to use information related to the environment, and on the other to determine compliance with environmental requirements.

The conditions for environmental protection should be met at three levels: in the design phase, in the construction phase and in the phase of use.

The management of the technological process implies the organization of work by which all actions and procedures will take place at any time so as to achieve the goals of the construction of the WWTP. This includes the control of incoming and outgoing water from individual technological units, as well as the control of the quality and quantity of sludge.

Waste sludge must be managed in accordance with the provisions of the Law on Waste Management ("Official Gazette of Montenegro", No. 64/11 and 39/16).
Sludge treatment is performed by biological, chemical or thermal treatment, storage for a period of not less than six months or any other procedure that reduces its susceptibility to fermentation and mineralization and eliminates the danger to human health and the environment.
The treated sludge may, in accordance with the law, be used:

- in agriculture;
- on green areas and parks;
- for land reclamation, including bare afforestation;
- on landfills as a cover layer;
- for the needs of bringing land for special purposes, based on waste management plans and regulations on spatial planning;
- for energy recovery by incineration and / or co-incineration;
- for the rehabilitation of unregulated landfills and other similar areas that need to be brought to use.

The use of sludge is prohibited:

- on land where there is a danger of leaching sludge into surface waters and protected natural resources;
- on karst field soil, shallow or skeletal soil and gravelly soil;
- on soil with a pH value lower than 5.0;
- on land with salinity higher than 800 ms / cm, flood valleys, partially submerged areas and wetlands;
- in sanitary protection zones of springs that are used or can be used for drinking water supply;
- on pastures or in the production of fodder plants, if the time between the use of treated sludge and the harvest of fodder plants or the beginning of grazing is less than 21 days;
- on areas intended for the production of fruits and vegetables that are in direct contact with the soil and that can be eaten raw, in the period of 10 months before the start of the harvest.

8.2.1. Envisaged measures - water

No negative impacts on water supply are expected with the execution of the project.

The practice of good maintenance of the complex must be imposed by the investor and applied by the contractor.

When it comes to treated water (water discharged from treatment plants), in previous chapters is reported the quality of the effluent on the basis of which it is possible to monitor the operation of the WWTP.

It is necessary in the phase of functioning of the WWTP to perform constant control of the processed water that is discharged into the river Morača.

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Disinfection of treated wastewater is not considered necessary due to the lack of risk of bacteriological contamination of water sources used to supply drinking water (especially the Bolje sestre water sources) and Skadar Lake. In addition, there is no need to meet the conditions prescribed for bathing water quality downstream of the outlet of a wastewater treatment plant at least at a distance of 1km. It is very unlikely that the Morača River will be used for swimming at this location because process water from the Podgorica Aluminum Plant is discharged at the same location.

Measurement of the quantity and testing of wastewater quality, as well as testing of the impact on the receiver must be performed in accordance with the Law on Waters (Official Gazette of the Republic of Montenegro, No. 27/07, Official Gazette of Montenegro, No. 32/11, 47/11, 48 / 15, 52/16, 55/16 and 2/17) and "Rulebook on quality and sanitation - technical conditions for discharge of wastewater into the recipient and public sewer, the manner and procedure of testing the quality of wastewater, the minimum number of tests and the content of the Report on determined wastewater quality ("Official Gazette of Montenegro", No. 45/08, 09/10, 26/12, 52/12 and 59/13) ".

According to the Law on Waters, a company, other legal entity and entrepreneur who has wastewater treatment devices and measuring device, is obliged to maintain them in good condition, to ensure their regular functioning and to keep a log of wastewater treatment plants.

In order to prevent and mitigate the consequences of possible incidents, it is necessary to make an Operational Plan of intervention measures for water protection in case of sudden pollution.

The Water Inspector, in accordance with the Law on Waters, supervises the functioning, correctness and efficiency of wastewater treatment plants.

8.2.2. Intended measures - air

During construction on the site of the complex, appropriate control and management measures will be introduced to control dust emissions. Construction operations will be defined in such a way that there are no unnecessary movements of materials and equipment that are potential sources of dust generation.

In general, mitigation measures will be implemented wherever practicable:

- Removal of accumulated material;
- Dust emission control during excavation;
- Site cleaning, leveling and waste management;
- Covering material on trucks during transport and
- Visual control of pollutant emissions from propulsion equipment and construction vehicles.

The vehicles and machinery used should be selected so that they are subject to the latest pollutant emission standards. Also, during construction works, these vehicles and machines should be constantly maintained in good condition.

Unpleasant odors during the operation of the WWTP mainly occur as waste air from anaerobic decomposition processes in the area of the mechanical sludge treatment and drainage plant. Unpleasant odors will be eliminated from work areas by imposed ventilation / pressure ventilation into a humus air filter. In addition, constructive measures will be applied, such as covering open canals and reservoirs, fencing machines and equipment.

<u>Biofilter</u>

The conceptual solution envisages the installation of a biofilter to remove unpleasant odors.
The odor control system as a compact unit contains wet, vertical cross humus filters, a horizontal fan with suction pipes and a water spray system for installation on a concrete base box.

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Biological air purification in an organic filter (humus filter) with natural micro flora is the most modern and economical way of eliminating odors and purifying air of low or undefined concentration. The biofiltration process is based on the natural decomposition of air pollutants into harmless products.

Digester gas purification

The gas from the digester will be used to produce heat and energy that will be reused in the WWTP. The biogas produced by the anaerobic digestion process will be stored and used to heat the sludge and digester during the cold period, the excess gas from the digester requires disposal using a gas combustion torch.

The gas from the digester will primarily be used for CHP combined heat and power generation, the electricity produced will be reused on site or will be routed to the public grid during the year, and waste heat can be used to heat the building during the cold period

8.2.3. Planned measures-climate

Climate proofing is a term that describes the assessment of the potential impacts of climate change on project objectives.

Increasing precipitation variability could lead to more frequent extreme events, such as droughts, floods and flooding. The WWTP is designed accordingly. Measures include:

- Capacity building to mitigate the impact of excess water in case of heavy rainfall (eg retention basins, infiltration basins);
- Sizing of pipes, pumping stations, WWTP capacities taking into account these extreme values;
- Protection of sensitive parts of the system from floods.

In the case of Montenegro, the available models do not predict a significant increase in extreme events. Therefore, it is not necessary to define mitigation measures that go beyond the usual standards.

The rise in temperature can lead to a change in the behavior of the local population, which generally results in slightly higher water consumption. The system design must take these consequences into account. In this case, the system capacities are calculated with sufficient reserves, so no additional mitigation measures are recommended.

Perhaps the rise in temperature will also slightly modify the purification process. The WWTP project should ensure that the treatment process is still operating under these different climatic conditions (ie higher temperatures) and that changes in operation and maintenance may become necessary.

8.2.4. Noise protection measures envisaged

In order to minimize the impact of noise during the execution of works, the selection of construction equipment with good acoustic characteristics will be made; Working hours will be limited, from Monday to Friday from 8 am to 5 pm, on Saturdays from 8 am to 1 pm.

During the operation of the project, aeration systems will be developed as a compressed air aeration system that includes a compressor station with FC controlled Roots or turbo compressors, air supply and distribution pipes and membrane aerators for fine bubble aeration.

The compressors will have a noise protection hood, which is installed in the compressor room with walls for sound insulation and sufficient ventilation to remove waste heat from the room. Ventilation system with acoustic cascades.

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8.2.5. Envisaged measures - land

The activities that will be performed on the site during the construction will lead to soil damage. There will be a constant control of possible oil and fuel leaks from the machines working on this project.
In case of heavy rains, it is obligatory to stop the works and protect the existing locations of works from wash-out.

Excavated and unused material is not allowed to be disposed of in forest and agricultural areas, and "wild" landfills, but in a pre-determined place.
Construction waste must be treated (construction waste processing) in accordance with the Law on Waste Management ("Official Gazette of Montenegro", No. 64/11 and 39/16) and the Rulebook on the detailed content and manner of drafting the waste management plan of waste producers („Official Gazette of Montenegro", No. 5/13).

It is necessary to protect all parts of the terrain outside the immediate work zone, which means that outside the planned, other areas cannot be used as permanent or temporary material dumps, as borrowings, and as plateaus for parking and repairing machines.

All manipulations with oil and its derivatives during the process of construction, supply of machines, must be performed in a specially defined place and with maximum protection measures to prevent spillage.

In the construction phase, it is necessary to respect the Rulebook on construction waste management, manner and procedure of construction waste processing, conditions and manner of disposal of cement asbestos construction waste ("Official Gazette of Montenegro", No. 50/12). In accordance with Article 4 of the Ordinance, construction waste on the construction site is stored separately by type of construction waste in accordance with the waste catalog and separately from other waste, in a way that does not pollute the environment.

It is necessary to develop a Waste Management Plan for waste resulting from the execution of works and the operation of the WWTP.

8.2.6. Envisaged measures - local population

Measures to mitigate the negative impact of unpleasant odors and noise are described in the chapters relating to air and noise.

8.2.7. Envisaged measures - ecosystems and geological environment

Given the type and location of the project, there is no need for ecosystem protection measures.

8.2.8. Envisaged measures - visual impacts

Measures to mitigate the negative visual impacts are reflected in the landscaping, ie planting different plant species that will serve as buffer zones.
In addition to autochthonous plant species, when choosing plant material, introduced species can also be used, which, in addition to being decorative, also have resistance to ecological environmental conditions.
Seedlings must be healthy, nurseries properly nurtured, standard dimensions, with sod. Landscaping will be done with the choice of the following types.

Coniferous trees: *Cupressus sempervirens var. pyramidalis, Cupressus arizonica 'Glauca', Pinus maritima, Cedrus deodara, Cedrus atlantica 'Glauca', Cupressocyparis leylandii, Ginkgo biloba*.

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Deciduous trees: *Quercus pubescens, Celtis australis, Ficus carica, Albizzia julibrissin, Platanus acerifolia, Tilia cordata, Tilia argentea, Acer pseudoplatanus, Acer platanoides, Aesculus hippocastanum, Fraxinus americana, Lagerstroemi aindica, Liriodendron tulipifera, Morus sp., Cercis siliquastrum, Melia azedarach, Prunus pisardii.*
Evergreen trees: *Quercus ilex, Olea europaea, Ligustrum japonicum, Magnolia grandiflora.*

Shrubby species: *Arbutus unedo, Callistemon citrinus, Laurus nobilis, Ligustrum ovalifolium, Nerium oleander, Pittosporum tobira, Pyracantha coccinea, Prunus laurocerassus, Berberis thunbergii 'Atropurpurea', Forsythia suspense, Spirea sp., Buxus sempervirens, Cotoneaster dammeri, Viburnum tinus, Yucca sp*.
Climbing plants: *Hedera helix 'Variegata', Lonicera caprifolia, L. implexa, Rhyncospermum jasminoides, Tecoma radicans, Wisteria sinensis, Parthenocissus tricuspidata, P. quinquefolia*.
Perennial plant: *Lavandula spicata, Rosmarinus officinalis, Santolina viridis, Santolina chamaecyparissus, Hydrangea hortensis.*

8.2.9. Health and safety measures during construction and transport of materials

The Law on Safety and Health on work ("Official Gazette of Montenegro", No. 34/14) prescribes the obligation to develop norms and instructions for safety when performing all work that may have a risk to the life and health of workers.

During construction, the possible impact on construction workers is expressed through physical danger. A risk assessment and health and safety (H&S) plan will be prepared for site workers and visitors. The risk assessment and H&S plan include safety rules that must be implemented on site, training, issuance and use of personal protective equipment, hazard labels, provision of toilets and clean rooms for eating and drinking.

Measures during the construction of facilities

Prior to the construction of the facilities, a Construction Site Development Project will be prepared, which will define the necessary facilities for the execution of this project. The project will define the landscaping during construction with places for temporary disposal of excavated earth, construction waste and materials that will be used for the construction of facilities.

When working on the construction of a facility, the provisions of the Rulebook on technical norms for this type of work and safety measures at work must be strictly applied. General protection measures refer to compliance with special safety measures at work with applied types of construction operations. Construction machine operators must be suitably qualified, and work machine operating instructions must be followed during operation. Before starting loading work, the working space of the machine must be cleared to protect the running gear from damage.

Vehicles must have a fire extinguisher.

The inspection of construction machines is performed by the operators themselves at the beginning of the work and the deficiencies in terms of technical malfunction are entered in the inspection book and notified directly to the manager. A faulty construction machine must not be used until the observed defects have been fixed. The operator of the construction machine must be provided with all protective equipment.

Protective measures during transport

Motor vehicles used for transport and refueling must be registered for public transport. All vehicles must be technically completely correct. Drivers of vehicles can be a person who is declared fit for the job by the medical commission, and who has passed the exam for a qualified driver and other conditions in accordance with the ADR.

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Vehicles that will transport the excess excavated material should be washed regularly, in order to maintain the cleanliness of the roads.

Personal protective equipment

At workplaces where workers are exposed to dangers, and there is no possibility of implementing technical protection measures, workers must be provided with personal protective equipment: protective suit, safety shoes, protective leather gloves, safety belt, safety helmet, safety goggles. on autogenous apparatus, belts with rivets, protective hand paste. All workers at the facility are given fur waistcoat, fur coats or windbreakers, raincoats and hats as needed as protective equipment for the winter period. A more precise description of personal protective equipment will be defined by the Occupational Safety and Health Study.

8.2.10. Waste disposal

Construction waste must be treated (construction waste processing) in accordance with the Law on Waste Management ("Official Gazette of Montenegro", No. 64/11 and 39/16) and the Rulebook on the detailed content and manner of drafting the waste management plan of waste producers (" Official Gazette of Montenegro ", No. 05/13).

Hazardous waste that may occur due to the construction of the project and during operation, will be regularly collected in watertight containers and handed over to an authorized waste collector.

The Waste Record (waste records) will be kept on the delivery of waste in all respects according to the Rulebook on the manner of keeping waste records and the content of the waste transport form “Official Gazette. list Crne Gore, no. 50/12 “.

Municipal waste at the project site is disposed of in containers, which will be emptied by the competent utility company. All municipal waste that occurs is collected in containers and regularly taken to the city landfill „Livade".

Management of chemicals and other hazardous waste must be in accordance with the relevant laws (Law on Chemicals, "Official Gazette of Montenegro" No. 18/12).

8.2.11. Accidental release measures

Accident situations during construction are defined by inadequate waste treatment and accidental spillage of hazardous substances on the land of the WWTP site.

In order to prevent incidental measures, it is necessary to strictly control work discipline and implement all measures listed in this chapter.

An accidental situation that may occur is the malfunction of the WWTP. In this case, urgent intervention is necessary for the purpose of repair.

An accident situation can also occur in the event of a fire in a building or location. In this case, urgent intervention is necessary in accordance with the fire protection project. The project plot can be approached from two sides, which represents a sufficient infrastructure for possible firefighting.

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9. MONITORING PLAN

The environment includes the natural environment: air, land, water, flora and fauna; phenomena and actions: climate, ionizing and non-ionizing radiation, noise and vibration, as well as man-made environment: cities, settlements, cultural and historical heritage, infrastructure, industrial and other facilities, and is a complex and interdependent system, and it is very important to establish complete environmental monitoring with reliable and accurate information and data.
Monitoring the condition of the basic segments of the environment is an obligation arising from legal regulations.

Monitoring is carried out by systematic measurement, testing and evaluation of environmental indicators and includes monitoring of natural factors, changes in the state and characteristics of the environment, including cross-border monitoring.

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

Parameters on the basis of which harmful effects on the environment can be determined are defined by:

- Law on Waters (Official Gazette of the Republic of Montenegro, No. 27/07, Official Gazette of Montenegro, No. 32/11, 47/11, 48/15, 52/16, 55/16 and 2/17) which regulates legal status and manner of integrated water management, land and water along the coast, water facilities, conditions and manner of water activity, as well as other issues of importance for water and water resources management. This law is based on the EU Water Framework Directive,
- Rulebook on quality and sanitary-technical conditions for wastewater discharge into the recipient and public sewerage, manner and procedure of wastewater quality testing, minimum number of tests and content of the report on determined wastewater quality ”(Official Gazette of Montenegro, 45/08, 09/10, 26/12, 52/12 and 59/13),
- Law on Air Protection ("Official Gazette of Montenegro", No. 25/10),
- Decree on limit values of emissions of pollutants into the air from stationary sources ("Official Gazette of Montenegro", No. 10/2011),
- Law on Waste Management ("Official Gazette of Montenegro", No. 64/11 and 39/16),
- Law on Environmental Noise Protection (“Official Gazette of Montenegro”, No. 28/11 and 1/14),
- Rulebook on limit values of noise in the environment, the manner of determining noise indicators and acoustic zones and methods of assessing the harmful effects of noise, ("Official Gazette of Montenegro", No. 60/11),
- Decision on the determination of acoustic zones on the territory of the Capital City of Podgorica (“Official Gazette of Montenegro - Municipal Regulations”, No. 027/15 of 05.08.2015)

9.2. Locations, manner and frequency of measurement of determined parameters

The locations and method of measurement, as well as the frequency are as follows:

- In the phase of technical acceptance of the facility, it is necessary to test the quality of the effluent and compare the obtained values with the permitted values and in accordance with them make a decision on the correctness of the treatment plant.
- To monitor the impact on the environment:
  - o It is necessary to ensure the measurement of the amount of processed water that are dischared into the Morača River, in accordance with Article 51 of the Law on Waters.
  - o The project holder is obliged to perform continuous control of water quality after leaving the treatment plant. The method of monitoring is defined by standard methods of testing these types of water.
  - o Test results should be compared with the "Rulebook on quality and sanitary conditions for wastewater discharge into the recipient and public sewer, the manner and procedure of testing wastewater quality, the minimum number of tests and the content of the report on

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the determined wastewater quality" (Fig. list Crne Gore, 45/08, 09/10, 26/12, 52/12 and 59/13) and the project parameters shown in the table 4.

- It is necessary to perform air quality tests in the vicinity of the WWTP. Air quality testing should be performed in accordance with the Rulebook on the manner and procedure of measuring emissions from stationary sources ("Official Gazette of Montenegro", No. 39/13) and the Regulation on emission limit values for pollutants into the air from stationary sources (Official Gazette of Montenegro). CG ", No. 10/11) which prescribes emission limit values for pollutants, as a method of measurement.
- It is necessary to test the noise level due to the operation of the WWTP. Tests should be performed in accordance with the Decision on the determination of acoustic zones in the capital of Podgorica ("Official Gazette of Montenegro - Municipal Regulations", No. 027/15 of 05.08.2015) and the Rulebook on methods of calculating and measuring noise levels in the environment ("Official Gazette of Montenegro", No. 27/14).
- According to the Law on Waste Management ("Official Gazette of Montenegro", No. 64/11 and 39/16), the producer of sewage sludge is obliged to keep records that contain in particular:
    - name and address, ie name and seat of the sludge producer;
    - the amount of sludge that has been produced or delivered for further use;
    - composition and characteristics of delivered sludge;
    - technological characteristics of the applied process;
    - name and address, ie name and seat of the person using the sludge;
    - location of use, ie sludge treatment.

Also, according to this Law, the sludge producer is obliged to submit data from the records to the competent body of the local self-government unit on whose territory the sludge is generated by March 31 of the current year for the previous year.

9.3. Content and dynamics of submitting reports on performed measurements

The content of the Report on performed measurements is defined by the standards of accredited organizations.

9.4. Obligations to inform the public about the results of performed measurements

All data on the performed tests must be available to the interested public.

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10. PUBLIC CONSULTATION, STAKEHOLDER ENGAGEMENT AND INFORMATION DISCLOSURE

This project follows KfW's Sustainability Guideline (2019), according to which stakeholder engagement represents one of the main principles of successful project development and implementation. The Project Developer is going to maintain an ongoing participative process of stakeholder engagement, in the form of public hearings and public consultation during all project phases. This process is aimed at collecting comments, inputs and views of the local communities, interested stakeholders, relevant NGOs and other organisations in regards to environmental and social aspects of the project. Inputs and comments collected during the stakeholder engagement process will be used by the Project Developer for the purpose of aligning all aspects of the project with requirements of the relevant stakeholders, whereby the ultimate aim of the process is to ensure acceptance and approval of the project by all the relevant stakeholders.

Public consultation and stakeholder enagement

When it comes to this project, local population was engaged in the process of development of the Preliminary Design in the form of unofficial meetings which were held between representatives of the relevant local communities and Public Enterprise Water and Sewage. Inputs and comments provided at these meetings were used as some of the guiding principles for development of the Preliminary Design. Consequently, the local communities are going to be communicated with and engaged with on an ongoing basis during finalization of the Main Design, as well as during construction and operation. Finally, in order to ensure efficient and effective process of informing the relevant stakeholders, all the official environmental and social impact assessment reports (including all the accompanying documentation, e.g. ESMP) will be publicly disclosed.

Stakeholder engagement is an ongoing process which encourages active participation of the relevant stakeholders during all project phases. Stakeholder engagement during construction is going to include at least 2 public consultation meetings, whereby one meeting is going to be held prior to commencement of construction, while the second public consultation meeting is going to be held during the final stage of construction. If necessary (e.g. if any significant issues are raised by the relevant stakeholders during construction) additional public consulation meetings will be held. The meetings shall be organised by the Project Developer and attended by representatives of the Contractor, so as to ensure full and meaningful process of information of stakeholders.

Grievance mechanism

In order to ensure that all stakeholders are included in the process of active communication, the Project Developer is going to establish a grievance mechanism, which will be aligned with the FC measures. The grievance process is to be developed for the purpose of collecting comments, concerns and complaints from the local communities and project workers (Appendix 1 - grievance form). This procedure shall rely on principles of availability and transparency.

The stakeholders will have the opportunity to submit their grievances via phone, email and/or mail. Due to the current and ongoing circumstances related to COVID-19 pandemic, the stakeholders shall not be encouraged to submit their grievances in person. Once an official grievance is made, the Project Developer shall provide an official confirmation of receipt within 7 working days, whereby they will have 30 days to provide a response. In case the grievance submitter is not satisfied with the response provided, they may file an official complaint to the Project Developer, upon which they will have 15 days to resolve the issue efficiently.

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11. APPENDIXES

Appendix 1 - Grievance form

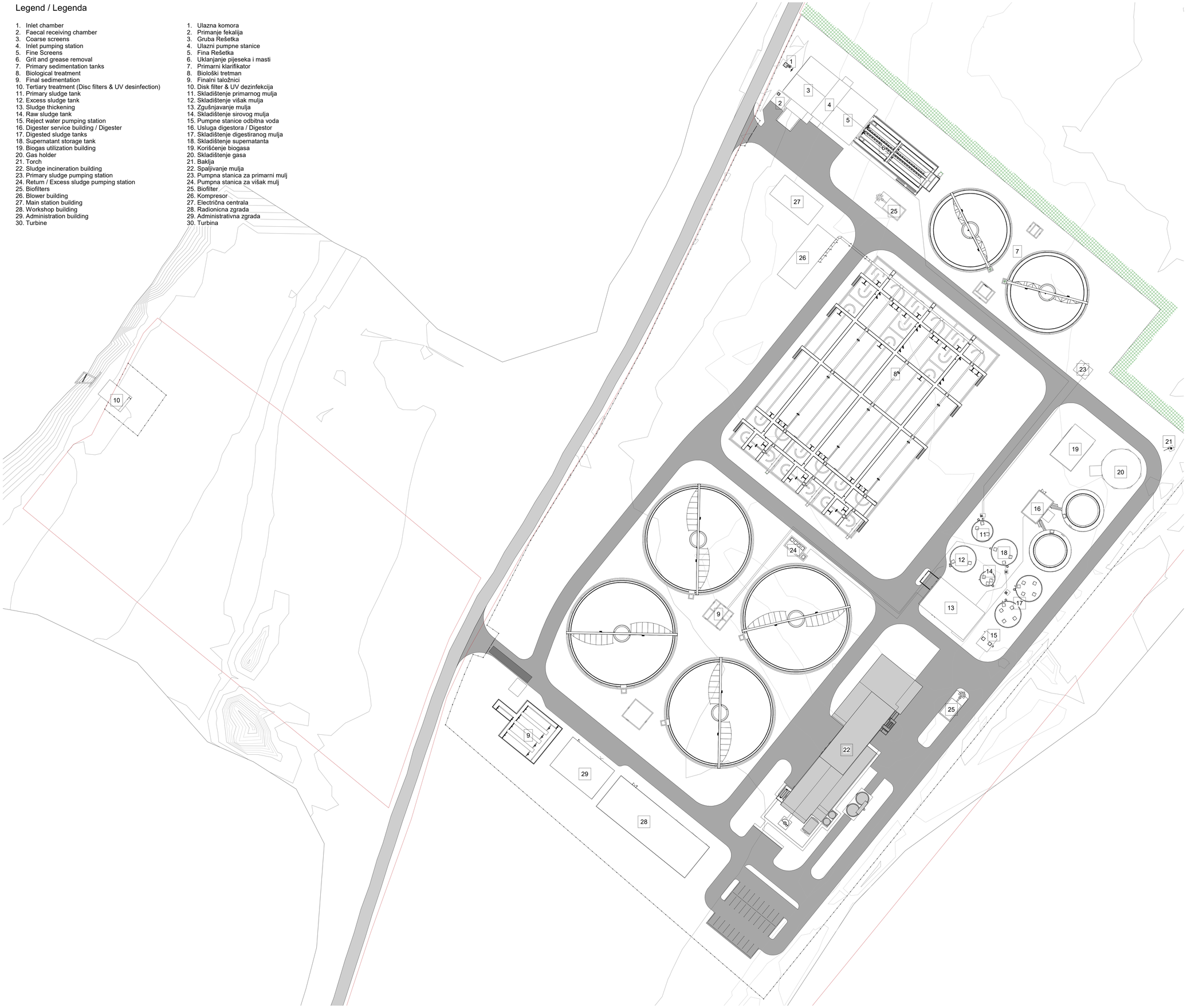
Reference No:	
Date:	
Full Name and Surname: *(Grievance form can be filled anonymously)*	
Contact information: Please mark how you wish to be contacted (mail, telephone, e-mail)	• **By Post:** Please provide postal address _____ _____ • **By phone:** _____ • **By e-mail:** _____
Description of incident/grievance:	• What is your subject of concern/grievance? • Where did it happen? • Who did it happen to? • What is the source and duration of the problem?

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Legend / Legenda

1. Inlet chamber
2. Faecal receiving chamber
3. Coarse screens
4. Inlet pumping station
5. Fine Screens
6. Grit and grease removal
7. Primary sedimentation tanks
8. Biological treatment
9. Final sedimentation
10. Tertiary treatment (Disc filters & UV desinfection)
11. Primary sludge tank
12. Excess sludge tank
13. Sludge thickening
14. Raw sludge tank
15. Reject water pumping station
16. Digester service building / Digester
17. Digested sludge tanks
18. Supernatant storage tank
19. Biogas utilization building
20. Gas holder
21. Torch
22. Sludge incineration building
23. Primary sludge pumping station
24. Return / Excess sludge pumping station
25. Biofilters
26. Blower building
27. Main station building
28. Workshop building
29. Administration building
30. Turbine

1. Ulazna komora
2. Primanje fekalija
3. Gruba Rešetka
4. Ulazni pumpne stanice
5. Fina Rešetka
6. Uklanjanje pijeseka i masti
7. Primarni klarifikator
8. Biološki tretman
9. Finalni taložnici
10. Disk filter & UV dezinfekcija
11. Skladištenje primarnog mulja
12. Skladištenje višak mulja
13. Zgušnjavanje mulja
14. Skladištenje sirovog mulja
15. Pumpne stanice odbitna voda
16. Usluga digestora / Digestor
17. Skladištenje digestiranog mulja
18. Skladištenje supernatanta
19. Korišćenje biogasa
20. Skladištenje gasa
21. Baklja
22. Spaljivanje mulja
23. Pumpna stanica za primarni mulj
24. Pumpna stanica za višak mulj
25. Biofilter
26. Kompresor
27. Električna centrala
28. Radionicna zgrada
29. Administrativna zgrada
30. Turbina



DESCRIPTION OF COLORS AND LINE TYPES
OPIS BOJA I LINIJE

Property Line	Linija imovine
Fence	Ograda
Small DN pipes	Cevi malog prečnika
Contaminated area	Kontaminirana zona
Existing road	Postojeći put
Designed roads and parking areas	Planirani putevi i parkirališta
Traffic Scale	Vaga za vozila

Coordinate Reference System: / Referentni koordinatni sistem: MGI-1901 Balkans zone 6
Vertical Reference System: / Vertikalni koordinatni sistem:

Index / Broj	Description of amendment / Opis izmjene	Date / Datum	Name / Ime

Client: / Klijent:
MONTENEGRO
CRNA GORA
VODOKANAL I KANALIZACIJA DOO PODGORICA

Funding Agency: / Investitor:
KFW · Western Balkans Investment Framework · WBIF

Consultant: / Konsultant:
FICHTNER WATER & TRANSPORTATION
In association with / u saradnji sa
WA CONSULT Ltd. Water, Sewerage and Engineering
wandschneider + partjahr ingenieurgesellschaft mbh

Project: / Projekat:
DESIGN, CONSTRUCTION AND APPROVAL OF DESIGN PARAMETERS, TECHNOLOGY AND CAPACITIES OF WASTEWATER TREATMENT PLANT, SLUDGE TREATMENT AND INCINERATION PLANT AND SEWER EXTENSIONS
PROJEKTOVANJE, IZGRADNJA I ODOBRENJE PROJEKTNIH PARAMETARA, TEHNOLOGIJE I KAPACITETA POSTROJENJA ZA PREČIŠĆAVANJE OTPADNIH VODA, POSTROJENJE ZA OBRADU I SPALJIVANJE MULJA I PROŠIRENJE KANALIZACIJE

Preparation of Final Design, Tender Documents and Construction supervision
Priprema Glavnog projekta, tenderske dokumentacije i nadzor nad radovima

Measure: / Mjera:
WASTEWATER TREATMENT PLANT
POSTROJENJE ZA PRERADU OTPADNIH VODA

Drawing Title: / Naziv crteža:
GENERAL LAYOUT
GENERALNI PLAN

Drawn by: / Projektovao:	Levon Vardanyan	
Checked by: / Kontrolisao:	Rüdiger Böckle	
Approved by: / Odobrio:	Stéphane Meistermann	
Scale: / Razmjera:	1 : 500	Drawing no.: / Crtež br.: A-0-00-LP-03
Date: / Datum:	January 2020	

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(viii) Other Documents

- Construction Site Plan
- Urban-Technical Conditions (Urbanisticko-Tehnicki Uslovi)
- Environmental and Social Impact Assessment (ESIA)
- Environmental and Social Management Plan (ESMP)
- **Geotechnical Survey Report**
- Reports on Soil Contamination
- KAP Well Water Analyses Data

G E O P R O J E K T
D.O.O. ZA PROJEKTOVANJE, INŽENJERING, PROMET I USLUGE EXPORT-IMPORT
Adresa:Studentska br.4, 81000 Podgorica, Montenegro; Tel/fax: +382 20 269 221;Mob: +38269 301 801,+38268 885 571
e-mail: geoprojekt@t-com.me, www.geoprojekt.me , PDV: 30/31-01373-8, PIB: 02132346, žiro račun: 520-105105-10

FINAL REPORT

GEOTECHNICAL CONDITIONS FOR CONSTRUCTION OF NEW WASTE WATER TREATMENT PLANT, THE MAIN TRANSFER COLLECTOR FROM LOCALITY OF EXISTING TO THE NEW TREATMENT PLANT, WASTE WATER PRE-TREATMENT PLANT AT THE LOCATION OF WINERY 13 JUL AND EXTENSION OF SECONDARY SEWER NETWORK

P o d g o r i c a,

April, 2019

G E O P R O J E K T
D.O.O. ZA PROJEKTOVANJE, INŽENJERING, PROMET I USLUGE EXPORT-IMPORT
Adresa:Studentska br.4, 81000 Podgorica, Montenegro; Tel/fax: +382 20 269 221;Mob: +38269 301 801,+38268 885 571
e-mail: geoprojekt@t-com.me, www.geoprojekt.me , PDV: 30/31-01373-8, PIB: 02132346, žiro račun: 520-105105-10

FINAL REPORT

GEOTECHNICAL CONDITIONS FOR CONSTRUCTION OF NEW WASTE WATER TREATMENT PLANT, THE MAIN TRANSFER COLLECTOR FROM LOCALITY OF EXISTING TO THE NEW TREATMENT PLANT, WASTE WATER PRE-TREATMENT PLANT AT THE LOCATION OF WINERY 13 JUL AND EXTENSION OF SECONDARY SEWER NETWORK

D i r e c t o r,

Popović Milica dipl.inž.geol.

P o d g o r i c a,

April, 2019

Site:	**New waste water treatment plant (WWTP), Existing waste water treatment plant, the Main transfer collector, Waste water pre-treatment plant (WWPTP) and Secondary sewer network**
Title of the Report:	**FINAL REPORT on geotechnical conditions for construction of the new Waste Water Treatment Plant, the Main Transfer Collector from the location of existing to location of the new Waste Water Treatment Plant, Waste Water Pre-Treatment Plant at the locality of the Winery 13 Jul and extension of Sewer network**
Investor:	**“VODOVOD I KANALIZACIJA “ d.o.o. –Podgorica**
Employer:	**FICHTNER Water & Transportation GmbH– IWA Consalt**
Project organization:	**D.O.O. «GEOPROJEKT» - PODGORICA**
Author:	**Milica Popović, dipl. inž. geol.**
Associates:	**Marija Matović, dipl. inž. geol.** **Maksim Matović, dipl. inž. geol.** **Mila Krulanović, dipl. inž. geol.** **Nikola Međedović, dipl. inž. geol.** **Marina Međedović, dipl. inž. geol.** **Sergej Poleksić, dipl. inž. geol.** **Ana Vojinović dipl. inž. geol.**
Time of reporting:	**March- April, 2019**

D i r e c t o r,

Popović Milica, dipl.inž.geol.

I GENERAL DOCUMENTATION

Certificate of Registration for Company
Licence to prepare technical documentation
Authorization to design
Certificate of licence exam

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GENERAL PART

IZVOD IZ CENTRALNOG REGISTRA PRIVREDNIH SUBJEKATA PORESKE UPRAVE

Registarski broj 5 - 0015834 / 013 Datum registracije: 26.07.2002.
PIB: 02132346 Datum promjene podataka: 21.11.2013.

"GEOPROJEKT" D.O.O., ZA PROJEKTOVANJE, INŽINJERING, PROMET I USLUGE, EXPORT- IMPORT

Broj važeće registracije: /013

Skraćeni naziv: GEOPROJEKT
Telefon:
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Datum zaključivanja ugovora: 26.02.1999.
Datum donošenja Statuta: 17.07.2002. Datum promjene Statuta: 19.11.2013.
Adresa glavnog mjesta poslovanja:
Adresa za prijem službene pošte: UL.STUDENSKA BR. 4 PODGORICA
Adresa sjedišta: UL.STUDENSKA BR. 4 PODGORICA
Pretežna djelatnost: 7112 Inženjerske djelatnosti i tehnicko savjetovanje
Obavljanje spoljno-trgovinskog poslovanja: NIJE UNEŠENO
Oblik svojine:
Porijeklo kapitala:
Upisani kapital: 0,00Euro (Novčani Euro, nenovčani Euro)
Stari registarski broj: 1-6323-00

OSNIVAČI:

RAJKA RADULOVIĆ - JBMG/Broj Pasoša zaštićeni zakonom
Uloga: Osnivač
Udio: % Adresa: Lični podatak zaštićen zakonom

LICA U DRUŠTVU:

MAKSIM MATOVIĆ - JMBG/Broj Pasoša zaštićen zakonom

Adresa: Lični podatak zaštićen zakonom
Uloga: Tehnički direktor
Ovlašćenja u prometu: Neograničeno ( )
Ovlašćen da djeluje: POJEDINAČNO ( )

MILICA POPOVIĆ - JMBG/Broj Pasoša zaštićen zakonom

Adresa: Lični podatak zaštićen zakonom
Uloga: Izvršni direktor
Ovlašćenja u prometu: Neograničeno ( )
Ovlašćen da djeluje: POJEDINAČNO ( )

RAJKA RADULOVIĆ - JMBG/Broj Pasoša zaštićen zakonom

Adresa: Lični podatak zaštićen zakonom
Uloga: Ovlašćeni zastupnik
Ovlašćenja u prometu: ( )
Ovlašćen da djeluje: POJEDINAČNO ( )

Izdato: 05.06.2018 godine u 11:24h

MP

CRNA GORA - MINISTARSTVO FINANSIJA - PORESKA UPRAVA - 9/1 - PODGORICA

NAČELNICA

Dušanka Vujisić

CRNA GORA
MINISTARSTVO FINANSIJA CRNE GORE
PORESKA UPRAVA
CENTRALNI REGISTAR PRIVREDNIH SUBJEKATA
U Podgorici, dana 5.6.2018. god.

Podaci o registovanom privrednom subjektu

Registarski broj:	**50015834**
Matični broj:	**02132346**
Broj izmjene:	**13**
Naziv:	**"GEOPROJEKT" D.O.O., ZA PROJEKTOVANJE, INŽINJERING, PROMET I USLUGE, EXPORT- IMPORT**
Status:	**Aktivan**
Stari registarski broj:	1-6323-00
Djelatnost:	7112 Inženjerske djelatnosti i tehnicko savjetovanje
Skraćeni naziv:	GEOPROJEKT
Adresa za prijem službene pošte:	UL.STUDENSKA BR. 4 PODGORICA PODGORICA
Adresa sjedišta:	UL.STUDENSKA BR. 4 PODGORICA PODGORICA

Datum registracije: 26.7.2002. god.
Datum promjene: 21.11.2013. god.

Izdato: 5.6.2018. god.

CRNA GORA - MINISTARSTVO FINANSIJA PORESKA UPRAVA 9/1 PODGORICA

M.P.

NAČELNICA
Dušanka Vujisić

Crna Gora

DECENIJA
OBNOVE
NEZAVISNOSTI
HILJADU GODINA
DRŽAVNOSTI
2016

Da je vječna Crna Gora

VLADA CRNE GORE
Ministarstvo ekonomije

Broj: 01 – 2236/4
Podgorica, 12.10.2016. godine

Ministarstvo ekonomije, rješavajući po zahtjevu DOO ''Geoprojekt'' – Podgorica, br. 01-451 od 27.09.2016. godine, arhiviran u ovom ministarstvu pod brojem 07-2236/1 od 27.10.2016. godine, koji se odnosi na izdavanje Licence za izradu projekata geoloških istraživanja, vršenje više vrsta geoloških istraživanja i izradu elaborata o rezultatima geoloških istraživanja, na osnovu člana 12a stav 2 i 3 Zakona o geološkim istraživanjima, (''Sl.list RCG'', br. 28/93, 27/94,42/94 i 26/07 i „Sl.lis CG", br.28/11) i člana 165 Zakona o opštem upravnom postupku (''Sl.list RCG'', br. 60/03 i „Sl.list CG", br.32/11), **izdaje**

L I C E N C U

Društvu sa ograničenom odgovornošću „Geoprojekt'' – Podgorica za izradu projekata geoloških istraživanja, vršenje više vrsta geoloških istraživanja i izradu elaborata o rezultatima geoloških istraživanja, i to:

- **inženjersko-geološka i geotehnička istraživanja i**
- **hidrogeološka istraživanja.**

Licenca se izdaje na period od pet godina, a ovjerava se svake godine.

Obradila: Vesna Vujačić, dipl.inž.geologije

MINISTAR
dr Vladimir Kavarić

Crna Gora
Ministarstvo ekonomije

Podgorica, 08.10.2018. godine
Broj: 970-338/2018-4

Ministarstvo ekonomije, rješavajući po zahtjevu DOO „Geoprojekt" – Podgorica, br. 01-453, od 25.09.2018. godine, arhiviran u Ministarstvu ekonomije pod br. 970-338/2018-1, od 25.09.2018. godine, za godišnju ovjeru Licence, br. 01-2236/4, od 12.10.2016. godine, na osnovu čl. 12 i 12a Zakona o geološkim istraživanjima (''Sl.list RCG'', br. 28/93, 27/94, 42/94 i 26/07 i „Sl.list CG, br.28/11 i 42/11), Uslova za izdavanje licenci za vršenje poslova geoloških istraživanja („Sl.list CG", br. 23/08), čl. 18 i 106 Zakona o upravnom postupku („Sl. list CG", br. 56/14, 20/15, 40/16 i 37/17), kao i mišljenja Komisije za ocjenu ispunjenosti uslova za ovjeru Licence za izradu projekata i vršenja više vrsta geoloških istraživanja i izradu elaborata o rezultatima geoloških istraživanja, DOO „Geoprojekt" – Podgorica, donosi

RJEŠENJE

1. Ovjerava se Licenca DOO „Geoprojekt" – Podgorica, br. 01-2236/4, od 12.10.2016. godine.

2. Ovjera Licence važi do 12. oktobra 2019. godine.

Obrazloženje

DOO „Geoprojekt" – Podgorica podnio je zahtjev, br. 01-453, od 25.09.2018. godine, arhiviran u ovom Ministarstvu pod br. 970-338/2018-1, od 25.09.2018. godine, za godišnju ovjeru Licence, br. 01-2236/4, od 12.10.2016. godine.

Rješenjem Ministarstva ekonomije, br. 970-338/2018-2, od 02.10.2018. godine, obrazovana je Komisija za ocjenu ispunjenosti uslova za ovjeru Licence, br. 01-2236/4, od 12.10.2018. godine, za izradu projekata i vršenja više vrsta geoloških istraživanja i izradu elaborata o rezultatima geoloških istraživanja, čiji je zadatak bio da ocijeni ispunjenost uslova za ovjeru Licence za izradu projekata i vršenja više vrsta geoloških istraživanja i izradu elaborata o rezultatima

geoloških istraživanja, DOO „Geoprojekt“ – Podgorica, o čemu će dati svoje mišljenje, koje će se zapisnički konstatovati.

Komisija je u Zapisniku, br. 970-338/2018-3, od 08.10.2018. godine, nakon ocjene dokaza od zadnjeg izdavanja Licence, koje je u zahtjevu podnio DOO „Geoprojekt“ – Podgorica, kao i na osnovu dokumentacije koja se nalazi u Ministarstvu ekonomije, dala svoje mišljenje:

„Komisija je nakon pregleda dostavljenih podataka i na osnovu uvida u dokumentaciju koja se nalazi u Ministarstvu ekonomije, utvrdila da DOO „Geoprojekt“ – Podgorica ispunjava uslove za ovjeru Licence za izradu projekta geoloških istraživanja, za vršenje više vrsta geoloških istraživanja i izradu elaborata o rezultatima geoloških istraživanja.

Komisija, u skladu sa utvrđenim činjenicama, preporučuje Ministarstvu ekonomije da ovjeri Licencu, br. 01-2236/4, DOO „Geoprojekt“ - Podgorica za izradu projekata geoloških istraživanja, vršenje više vrsta geoloških istraživanja i izradu elaborata o rezultatima geoloških istraživanja, i to:

- **inženjersko-geološka i geotehnička istraživanja i**
- **hidrogeološka istraživanja.“**

Član 12 Zakona o geološkim istraživanjima propisuje da poslove projektovanja, vršenja više vrsta istraživanja i izrade elaborata o rezultatima geoloških istraživanja može obavljati privredno društvo, odnosno drugo pravno lice, na osnovu Licence.

Članom 12a Zakona o geološkim istraživanjima, propisano je da Licencu iz člana 12 ovog zakona izdaje Ministarstvo, na osnovu zahtjeva i istu ovjerava svake godine.

Uslovima za izdavanje licenci za vršenje poslova geoloških istraživanja predviđeno je da ispunjenost uslova za dobijanje Licence za vršenje poslova geoloških istraživanja, utvrđuje Komisija, koju formira Ministarstvo posebnim rješenjem, i dužna je da dostavi mišljenje o ispunjenosti uslova za izdavanje Licence, kao i da se Licenca izdaje na osnovu mišljenja Komisije, za period od pet godina i ovjerava se svake godine.

Članom 18 stav 1 Zakona o upravnom postupku propisano je da o pravu, obavezi ili pravnom interesu stranke u upravnoj stvari javnopravni organ odlučuje rješenjem, dok je članom 106 ovog zakona predviđeno da javnopravni organ može u skraćenom upravnom postupku riješiti upravnu stvar:

1) ako se činjenično stanje može utvrditi na osnovu podataka iz službenih evidencija;
2) ako je stranka u svom zahtjevu navela činjenice ili podnijela dokaze na osnovu kojih se može utvrditi stanje stvari ili ako se to stanje može utvrditi na osnovu optšepoznatih činjenica ili činjenica koje su poznate javnopravnom organu.

S obzirom da je Licenca, br. 01-2236/4, izdata 12. oktobra 2016. godine, čija ovjera se vrši svake godine, ista važi do 12. oktobra 2019. godine.

Na osnovu izloženog, odlučeno je kao u dispozitivu.

Uputstvo o pravnom sredstvu: Protiv ovog rješenja može se podnijeti tužba Upravnom sudu Crne Gore u roku od 20 dana od dana prijema ovog rješenja.

MINISTARKA

Dragica Sekulić

Crna Gora
Ministarstvo ekonomije

Broj: 01-1693/5
Podgorica, 28.07.2011. godine

Ministarstvo ekonomije, na osnovu člana 20. Pravilnika o programu i načinu polaganja stručnog ispita radnika koji rade na poslovima geoloških istraživanja ("Sl. list RCG", br. 1/94), izdaje

U V J E R E NJ E
o položenom stručnom ispitu

Milica Radulović, dipl. inž. geologije, rođena 17.07.1985. godine u Podgorici, položila je dana 27.07.2011. godine stručni ispit za radnike koji rade na poslovima geoloških istraživanja.

PREDSJEDNIK KOMISIJE
Goran Vušović
Goran Vušović

M I N I S T A R
dr Vladimir Kavarić

TEXTUAL PART

1. INTRODUCTION

Following the request of the Employer, " FICHTNER Water & Transportation GmbH– IWA Consalt", the ***Final report on geotechnical conditions for construction of new Waste water treatment plant, the Main Transfer Collector from the existing to the new Treatment Plant, Waste water pre-treatment plant at the location of Winery 13 Jul and extension of secondary Sewer network has been prepared.***

Construction of the new WWTP (components 1, 2 and 3) in vicinity of the KAP manufacture includes also the construction of the main transfer collector from the locality of existing to the locality of new WWTP (component 4), with a pedestrian bridge across the Moraca river (component 5, the bridge is a subject of different Report), extension of secondary sewer network (component 6 and 8) and construction of WWPTP at the location of Winery 13 Jul (component 7). With respect to local conditions, it has been required to define engineering-geological-geotechnical properties of soil as well as geotechnical requirements for construction of the above facilitites. Geotechnical survey and Final report were performed in accordance with the previously developed Project of detailed geotechnical investigations for the General construction design of new waste water plant, the main transfer collector from the locality of the existing to locality of new WWTP, WWPTP at the location of Winery 13 Jul and extension of secondary sewer network.

This Report elaborating the geological-geotechnical properties of soil and geotechnical setting for construction of planned facilities is based on the available geological-geotechnical documentation and works recently implemented. The scope of works has been adjusted to the present exploration degree of wider area, technical accessibility of the location and information familiar about the subject facilities.

The geotechnical Report is prepared with respect to all available results of engineering-geological surveys carried out in the studied area as well as on *Law on geological investigations (O.J.RM No 28/93, 27/94, 42/94, 26/07, 28/11) and Law on Construction of Facilities (O.J.RM No 55/00).*

The Final report is prepared by"Geoprojekt's expert team as follows:

- Milica Popović, dipl.inž.geol.;
- Marija Matović, dipl.inž.geol.;
- Maksim Matović, dipl.inž.geol.;
- Nikola Međedović, dipl.inž.geol.;
- Mila Krulanović, dipl.inž.geol;
- Ana Vojinović, dipl.inž.geol.;
- Marina Jovanović, dipl.inž.geol.;
- Sergej Poleksić, dipl.inž.geol.

The Final report has been prepared in April 2019, in 3 hard copies. It is consisted of a general part, 26 textual pages and 10 appendices (8 drawings and 2 documentary reports).

2. SCOPE AND EXTENT OF WORKS

The following scope of works was performed for ***Final report on geotechnical conditions for construction of new WWTP, the Main Transfer Collector from the existing to the new WWTP, WWPTP at the location of Winery 13 Jul and extension of secondary Sewer network***:

- Analysis of available documentation,
- Field works,
- Laboratory tests,
- Data processing.

2.1. Analysis of available documentation

Detailed study of available geological-geotechnical documentation was undertaken to find out the engineering-geological properties of wider investigation area.

Wider investigation area was repeatedly studied for various levels of planning and design whereby a number of exploratory works were carried out.

All findings relating the geological composition and tectonic pattern of this part of the field are summarized into the OGK map, sheet Titograd 1:100 000 with a related Legend (Zivaljevic M, et.al, 1966, Research Survey – Titograd).

Below is the list of available documentation used:

1. *Basic hydrogeological map, sheet Titograd 1:100 000,* (V.Radulović and M. Radulović, 1982, Geological Survey of Montenegro.);
2. *Seismo-geological bases and seismic micro-zonation of urban Titograd* (V.Radulović, 1981, Geological Survey -Titograd and IZIS Skopje, 1981);
3. *Geotechnical reports for foundation of bridges across the Moraca river: „Union Bridge" and „Millenium"* (Faculty of Civil Engineering Podgorica);
4. *Geotechnical reports for construction of commercial-trade center „Atlas Center" Podgorica, DUP „Atlas Center", Urbanistic plots Nos. 1, 2 and 3* (2010, Geoprojekt – Podgorica);
5. *Geotechnical reports for foundation of the bridge across the Ribnica, on the Podgorica bypass road* (2010, Geoprojekt – Podgorica);
6. *Geotechnical reports for construction of bridge across the Moraca, as a part of South Bypass road* (2013, Geoprojekt – Podgorica);
7. *Geotechnical reports for construction of pedestrian bridge crossing for hydrotechnical installations over the Moraca riverbed in Podgorica* (2013, Geoprojekt – Podgorica);
8. *Geotechnical reports for reconstruction of existing bridge across the Moraca river and construction of new bridge in parallel to the existing bridge in the Street Vojislavljeviceva Podgorica* (2018, Geoprojekt – Podgorica).
9. *Geotechnical report for planned channels K1, K2, K5, K6, K7, K8, K10, K14, K15 and K16, in area of Podgorica* (2012, Geoprojekt-Podgorica).

A number of laboratory tests results were taken from the above documents and used in defining the strain and classification properties of soil.

The wider investigation area was also subject to seismic surveys, inclusive of micro-zonation of the concerned ground. The results of these surveys are used in assessing the seismicity of the studied area.

All findings from the geological-geotechnical documentation specified above are absolutely usable; still insufficient for preparation of this Report. Therefore, detailed engineering-geological investigations described below were applied.

2.2. Field investigations

The field investigations primarily included the preliminary site inspection, assessment of general geological conditions of the site and suitability of the planned works.

The field works comprised:

- *Field reconnaissance,*
- *Completion of boreholes, with engineering-geological mapping of cores,*
- *Soil sampling for laboratory tests,*
- *SPT tests,*
- *Permeability tests,*
- *Dynamic penetration tests – DPH.*

2.2.1. Field reconnaissance

The field reconaissance was required for more rational planning of exploratory works and assessment of engineering-geological structure in general.

2.2.2. Completion of boreholes

Boreholes were completed in order to define a lithological column, thickness of certain lithotypes building up the column, thickness and properties of filled soil, characteristics/properties of the Quaternary sediments, hydrogeological properties and soil sampling for laboratory tests.

Following boreholes were completed:

- 8 (eight) boreholes at the location of the existing plant, depth 2.0 – 6.0 m, in total 31,0 m'. Drilling of boreholes ended when natural soil was encountered. The boreholes at the site of existing plant are marked as BH-WO-02 through BH-WO-09, appendix # 5.1 – 5.8;
- 7 (seven) boreholes at the location of new plant: two 5 m deep (BH-WN-01 and BH-WN-02), two 8 m deep (BH-WN-04 and BH-WN-05), two 10 m deep (BH-WN-03 and BH-WN-

07) and one 20 m deep (BH-Wn-06), in total 66,0 m'. The boreholes at the location of new plant are marked as BH-WN-01 through BH-WN-07, appendix # 6.1-6.7;
- 1 (one) borehole at the location of micro-turbine, depth 15 m (BH-WN-08), appendix #6.8;
- 4 (four) boreholes located along the route of the main collector, depth 7 m, in total 28,0 m'. The boreholes are marked as BH-SP-05 through BH-SP-08, appendix # 7.1-7.4;
- 10 (ten) boreholes located along the route of secondary sewer network, depth 5 m, in total 50,0 m'. The boreholes are marked as BH-01 through BH-10, appendix # 8.1-8.10;
- 1 (one) borehole at the location of WWPTP within the Windery 13 Jul, depth 6 m. The borehole is marked as BH-PL-01, appendix # 8.11.

The drilling was mechanical by using a drill rig BA-150, with a rotary system with continuous coring, drill diameter 146 mm.

Locations of the boreholes as well as elevations and coordinates are shown in the layouts with the position of performed boreholes or prognostic engineering-geological map (*appendix #3).*

Drilling activities were accompanied by detailed engineering-geological mapping of borehole cores in length of 181,0 m', as well. The engineering-geological mapping enabled to define lithotypes, their thickness as well as macroscopic assessment of basic geomechanical characteristics.

Results of the engineering-geological mapping of cores are presented onto the geological profiles of related boreholes with photos (*appendix #5-8).*

Once the cores were logged and photographed, representative samples were collected for laboratory tests. Roughly, one sample was taken out from each meter of length, and representative samples for tests were selected in the laboratory. The samples were packed into an alu foil, then put into a PVC bag, chermetically closed with an adhesive tape and marked with a label containing the name of the site, borehole's code and sampling depth. Total of 162 samples were taken from the boreholes for geomechanical laboratory tests. As for the existing WWTP as well as location of the new plant – boreholes BH-WN-01 and BH-WN-02, sampling and in-situ measurements for possible presence of contamination were carried out by specialized personnel of the Environmental Laboratory under surveillance of the Employer's representative.

2.2.3. SPT test

SPT testing was undertaken to assess indirectly the parameters of strength and deformability. SPT tests were applied in each borehole, with exception of the location of existing plant, at every 2 m of the studied depth or till the ground water level in the borehole BH-WN-06, and to 12m in the borehole BH-WN-08. Results of the SPT tests are given in the engineering-geological profiles of the boreholes (appendix# 5-8). Analysis of the SPT tests shows that the subject rock mass is extremely compact and has relatively favorable physical-mechanical parameters.

2.2.4. Permeability tests

In-hole permeability tests were deployed in order to define filtration coefficients for the glacio-fluvial sediments.

The testing was performed in such a way that water was infiltrated into soil through an uncased section of a cased borehole, whereby a casing was lowered to around 1.0m from the borohole's bottom. The tested benches were located above the ground water table. The testing was carried out at constant head (Lefranc method). Water was supplied into the borehole at a constant flow rate through a hose equipped with a water gauge and control valve (Figure 1).



Figure 1. Gauge with a control valve

Once the water level became steady at a certain flow rate, the testing stopped and related information were recorded in appropriate forms.

Three permability tests were carried out, as designed:

- In the borehole BH-VN-06 at interval 3,0-4,0 m;
- In the borehole BH-VN-07 at interval 6,0-7,0 m;
- In the borehole BH-VN-08 at interval 3,0-4,0 m

2.2.5. DPH tests

Total of three dynamic penetration type DPH tests were carried out: two at the location of new WWTP and one test at the location of micro-turbine. The apparatus type UMSD was used for testing. All the tests were complied with the standards ENISO 22476-2:2005, ENISO 22476-3:2005 and EN 1997-2:2009. Results of DPH tests show that the rock mass is very compact and has relatively good physical-mechanical parameters.

Locations of the DPH tests are given in the drawing #3.2.

The results are presented in detail within the appendix #9.

Table 1: DPH data

DPH	Depth (m)	Unit where the penetration ended	Y	X	Z (masl)
DPH-WN-01	0.9	Loosely to highly bound sandy gravel – the conglomerate	6 600 714	4 695 091	29.5
DPH-WN-02	0.8	Loosely to highly bound sandy gravel – the conglomerate	6 600 819	4 695 264	30.0
DPH-WN-03	1.7	Loosely to highly bound sandy gravel – the conglomerate	6 600 473	4 695227	24.6



Figure 2. Locations of DPH tests: DPH-WN-01 (figure 1a) and DPH-WN-03 (figure 1b)

2. 3. Laboratory geomechanical tests

Laboratory tests were applied to representative soil samples extracted from the boreholes in order to check already defined physical-mechanical parameters of the Quaternary sediments (defined during the previous investigations in surrounding areas with similar properties). Geomechanical

laboratory tests on soil samples were carried out in the in-house geomechanical laboratory of GEOPROJEKT ltd. Podgorica in compliance with applicable standards for geomechanical testing of soil samples JUS U.B1.

Total of fourty seven (47) samples were tested. Results of the tests are shown in the standardized tables and charts (*appendix #10).*

2. 4. Data processing

On the basis of available documentation, field investigations and laboratory tests, the Final report on results of geological survey of the concerned sites has been prepared. It provides the following information:

- Geological structure,
- Hydrogeological properties,
- Seismogeological properties,
- Engineering-geological properties,
- Geomechanical properties of detected units,
- Geotechnical conditions for construction.

3 NATURAL PROPERTIES OF THE SITE

3.1 Geographical location

Geographical location of the site is presented in the topographic map at a scale R 1 : 25 000 (*appendix #1*).

The concerned micro-locations of the existing and future WWTP are presented at the situation plans, appendix # 3.1, scale 1:1000 and 3.2 scale 1:2000, bordered by coordinate points 1 – 4. The route of the main collector is shown at the situation of appendix #3.3, while the route of secondary sewer network and location of Winery 13 Jul are shown in the appendix # 3.4.

3.2 Morphological properties of the site

In a wider context, the concerned location of the existing WWTP covers the area close to the Moraca's bed, and its right bank, which belongs to the middle and high river terrace (t2 and t3), made of fluvio-glacial sediments – sandy gravels and loosely to firmly bound conglomerates, with elevations from cca 33 masl to cca 38 masl. Ground of the very micro-location has been shaped by actions of watercourses and anthropogenic impact. The right bank of the Moraca's bed has to a certain extent milder slope than that of the left bank in its upper part, as well as steep slope in lower part of the valley side. The left bank of the bed is steep or even with vertical slope. As a consequence of fluvial actions of the watercourses, this part of the field is locally characterized by pooling areas with typical morphological creations in form of cave rock-shelters and collapsing dm- or m -sized blocks. In time, some unstable blocks of loosely bound conglomerates used to tear off, which is now more apparent on the left valley side. The right bank is more stable, though. This will continue to happen in future at the entire stretch, along the Moraca's banks, especially under dynamic conditions.

When it comes to the main collector's route and new plant, the ground belongs to the highest river terrace (t3), made of fluvio-glacial sediments – sandy gravels and loosely to firmly bound conglomerates, with very mild slope toward the south, from the pedestrian bridge over the Moraca river toward the new WWTP, with elevations of around 39 masl in the area of pedestrian bridge to around 28.5 masl in the location of new plant.

In the area of planned extension of secondary sewer network, the ground is with mild slope. The planned extension of the network will take place on the section mostly made of glacio-fluvial sediments, and, at small part of the field, south from Velje brdo, within the area of Sitnica river, represented by limnoglacial and alluvial sediments, while fluvio-glacial and delluvial sediments are represented by clayey and sandy gravel and terra rosa and are present along the entire rim of Velje brdo and Gorica hills.

3.3 Climate conditions

Area of Podgorica is characterized by sub-Mediterraean climate, with very long, hot and arid summers and mild and rainy winters. Mean annual temperature is 15,5° C; the coldest month is January with 5° C and the hottest is July with 26.7° C.

When it comes to insolation, July is the month with greatest number of sunny days and December is the least sunny. The mean multi-annual precipitation rate is 1669 mm. The north wind blows at rate of maximum 34.8 m/s.

3.4 Geological setting of the Site

3.4.1 Geological composition

The wider investigation area is composed of the Quaternary glacio-fluvial, limnoglacial and alluvial sediments, which are deposited over the Upper Cretaceous carbonate rocks (layered and banked limestones, dolomitic limestones and dolomites).

The Quaternary glacio-fluvial sediments P,Šlj,Kg (gl,f) are represented by sandy gravels and loosely to firmly bound conglomerates in various thickness, even up to 60 m.

Clays, sands and gravels – glaciofluvial sediments G,P,Šlj (gl,f). They are found in the area of Tolosko polje, Ljeskopolje as well as in area of Radovina, at south from the Sitnica. These will possibly be encountered at the section of channel's route within the secondary sewer network – appendix # 3.4, at south from Velje brdo and the Sitnica, as well as a small section along the channel's route within the Sitnica's area. Thicknes of this complex ranges between 15 and 30m.

Clays, sands and gravels – glaciofluvial and deluvial sediments G,P,Šlj (ts,glf). These sediments are mostly represented by clayey sandy gravel and terra rosa and are detected along the entire southern rim of Velje brdo and Malo brdo as well as Gorica hills. They compose fields from Vranici to Luzani as well as along the edge of Gorica hill.

Clays, sands and gravels – alluvial sediments G,P,Šlj (al), which are detected at the short sections along the route of one of the channels within the secondary sewer network (channel 1, appendix # 3.4) in the area of Sitnica bed, at south from Komanski bridge. The ground is made up of the Quaternary sediments represented by clays in the surface area which gradually with depth transit into gravels and sands. Thickness of this complex is 5-10 m.

The topper part of the field might be, less or more, covered by anthropogenic formations.

3.4.2 Tectonic pattern of the site

From geotectonic point of view and according to data of map OGK sheet Titograd 1:100 000, the wider investigation area belongs to the geotectonic unit Old Montenegro Overthrust. General dip and strike of limestones and dolimites within this geotectonic unit is north – west – southeast, with fall to northeast.

3.5 Hydrogeological properties of the Site

With regard to hydrogeological properties and functions of rock masses, the wider investigation area is distinguished by:

- **dense aquifier**, present in glacio-fluvial sediments represented by sandy gravel (with and without clay) and loosely to firmly bound conglomerates and alluvial sediments,

- **karst aquifier,** present in limestones along the rim area and foot of glacio-fluvial sediments.

Dense aquifier is distributed throughout the wider investigation area, i.e. in the entire Zeta plain, and is considered as a valubale water resource, notably during the hydrological minimum. This aquifier is formed partly within the alluvial sediments of the Moraca and partly in glacio-fluvial sediments (area exceeding 200 km^2, thiskness ranges within 30 and 100 m) that are deposited over the paleorelief limestones.

This aquifier is re-charged by storm water, rivers Moraca and Cijevna as well as by underground inflow from a karst aquifer of the surrounding limestone fields. The aquifier discharges directly into the Skadar Lake. The dense aquifer of the Zeta plain is characterized by good filtration properties, average filtration coefficient around Kf = 5,0 x 10^{-3} m/s and transmissibility coefficient T = 1,79 x 10-2 m^2/s.

According to approximative calculations, the minimum mean flow rate of the aquifer (dynamic reserves) through the Zeta plain profile wide 12 km is 12 – 15 m^3/s.

The studied site is built up of fluvio-glacial sediments which can be sorted into a complex of highly permeable, poorly permeable to impermeable rocks, of intergranular porosity, with filtration coefficient (according to available documentation) of K_f=1,0x10^0 x 1x10^{-5} cm/s. The unbound sandy gravel is poorly permeable, and highly bound conglomerate is poorly permeable to impermeable.

General direction of ground water motion is north - south. The Moraca watercourse recharged the aquifier at the moment of these investigations (March 2019), which was the most remarkable nearby the river.

Alluvial sediments in the area of Sitnica bed are moderately to highly permeable, filtration coefficient Kf = 1x10^{-2} - 1x10^{-5} cm/s. Permeability depends on percentual content of silt-clay component.

As designed, three in-hole permeability tests were carried out:
- borehole BH-VN-06 at 3,0-4,0 m;
- borehole BH-VN-07 at 6,0-7,0 m;
- borehole BH-VN-08 at 3,0-4,0 m.

In the borehole BH-VN-06, the tested zone was at 2.55-3,55 m from ground surface (L=1m). Water was supplied at a constant flow rate of Q=160 l/min=2,66l/s, whereby the water table

became steady at 2,9 m from ground surface, i.e. the constant head of water column during the water supply was H_c=0,65 m. The borehole was cased with a casing dia.D=128mm=0,128m.

In the borehole BH-VN-07, the tested zone was at 6,0-7,0 m from ground surface (L=1m). Water was supplied at a constant flow rate of Q=145 l/min=2,42 l/s, whereby the water table became steady at 4.40 m from ground surface, i.e. the constant head of water column during the water supply was H_c=2,6 m. The borehole was cased with a casing dia. D=128mm=0,128m.

In the borehole BH-VN-08, the tested zone was at 2,7-3,7 m from ground surface (L=1m). Water was supplied at a constant flow rate of Q=120 l/min=2,0 l/s, whereby the water table became steady at 3.15 m from ground surface, i.e. the constant head of water column during the water supply was H_c=0,55 m. The borehole was cased with a casing dia. D=128mm=0,128m.

Data processing was performed in accordance with Lefranc and Hvorslev methods.

According to Lafranc method,

$$K = \frac{\mathrm{Q}}{2\pi \mathrm{HL}} ln \frac{L}{D}$$

wherein,

K – coefficient of filtration for the tested zone;

Q – constant flow rate;

H –constant head of water column during supply;

L – tested zone length;

D – tested zone diameter.

According to Hvorslev method,

$$K = \frac{\mathrm{Q}}{\mathrm{FH}}$$

Where for the said case, the following is adopted: $F = \frac{2\pi \mathrm{L}}{\ln\left(\left(\frac{\mathrm{L}}{\mathrm{D}}\right)+\sqrt{\left(1+\left(\frac{L}{D}\right)^2\right)}\right)}$.

According to Nasberg method,

$$K = \frac{0{,}423\mathrm{Q}}{\mathrm{H}^2} log \frac{2H}{D/2}$$

The condition for application of this equation is the ratio 12,5 <H/r< 50.

Information on filtration properties of the tested zones are given in the table below.

Table 2. Filtration properties of the tested zones

Borehole	Tested zone (m)	Constant flow rate Q (l/s)	Constant head of water column during a flow H (m)	Diameter of tested zone D (m)	Filtration coefficient as calculated by Lefranc equation K(m/s)	Filtration coefficient as calculated by Hvorslev equation K(m/s)	Filtration coefficient as calculated by Nasberg equation K(m/s)
BH-VN-06	2,55-3,55	2,66	1,10	0,128	**$7{,}90x10^{-4}$**	**$1{,}06x10^{-3}$**	**$1{,}42x10^{-3}$**
BH-VN-07	6,00-7,00	2,42	2,60	0,128	**$3{,}04x10^{-4}$**	**$4{,}08x10^{-4}$**	**$2{,}8x10^{-4}$**
BH-VN-08	2,70-3,70	2,00	0,55	0,128	**$1{,}19x10^{-3}$**	**$1{,}59x10^{-3}$**	**$3{,}45x10^{-3}$**

Filtration coefficients obtained from the permeability tests range within $7{,}9x10^{-4}$ - $3{,}45x10^{-3}$ m/s. The calculated values are related to the above-aquifer zone where the sandy gravel is bound into conglomerates in some places. It should be noted that zones with firmly bound sandy gravels are poorly permeable, however these zones alternate with unbound zones in a horizontal and vertical direction. Sandy gravel present within the aquifer zone is mainly bound and is characterized by good fitration characteristics with filtration coefficients $K_f = 10^{-1}$-10^{-3}m/s.

3.6 Seismo-geological properties of the site

Seismological properties of the local geotechnical unit were studied in detail within seismological, geomechanical and geophysical investigations for seismogeological bases and seismic micro-zonation of urban area of Titograd municipality (1986).

According to the map of seismic micro-zonation of urbanized Titograd area, the field of the studied site belongs to zone C_2 9th degree of MCS scale. Seismic zone C_1 involves grounds made up of Quaternary sediments, gravels and sand, with and without clay, over 35m thick, mostly bound into conglomerates. Seismic zone C_2 involves grounds made up of Quaternary sediments, gravels and sand, with and without clay, over 35m thick, mostly bound into conglomerates. The typical seismic parameters are given on the basis of data from earlier seismogeological bases and seismic micro-zonation of ground of urbanized area of Podgorica.

Table 3. Seismic parameters for various return periods

Representative area	Return period T (god)	*Ground acceleration on basic rock a_o (g) %*	*Faktor amplifikacije* *DAF*	Max acceleration of ground a_{max}(g)
Grounds of quaternary sediments – gravels and sands, with and without clay, over 35m thick, mostly bound into conglomerates	**50**	0.122	1.7	0,207
	100	0,148		0,252
	200	0,172		0,292
	500	0,265		0,451

Dynamics coefficient Kd, as determined in accordance with article 25 of the Rulebook on technical standards for construction of structures in seismic areas, is: 1,0 > Kd > 0,47.

4 ENGINEERING-GEOLOGICAL PROPERTIES IN THE ZONE OF NEW WWTP, EXISTING WWTP AND WWPTP – WINERY 13 JUL

On basis of analysis of the available documentation and completed investigations, the following geotechnical units are distinguished at the studied locations (planned WWTP, existing WWTP, Jul 13):

Geotechnical Unit 1 – nt – Filled materials. In the location of existing WWTP, the filled material is represented partly by a silty - clayey material with a content of boulders and subrounded debris, brown in colour. At certain intervals, the content of silt – clay component is increased. As found in majority of the boreholes, below this zone is heterogenous material, dark gray in colour – sludge and silt – clay material with content of boulders, subrounded debris and locally with garbage, of unpleasant smell and with increased humidity content. On the basis of boreholes mapping, the filled material in the location of existing plant is concluded to be a poorly condolidated unit which must completely removed in case of construction at this part of the studied location.

On the very ground surface of the planned WWTP location there is a silty – sandy clay, with content of debris or gravel, in the surface area it is imbued by veins of plants and roots **gl – geotechnical unit (2).** Thickness of the layer is around 0,3 – 1,5 m. Due to relatively small thickness it is irrelevant to the subject facilities. According to construction standard GN-200, they belong to II – III excavation category.

Geotechnical Unit 3 - P,ŠLj,Kg - Sandy gravel and conglomerate is found below the surface layer of silty – sandy clay with debris content at the location of the planned WWTP (Figure 3a), at depth 0.3 – 1.3 m from ground surface, and further, below the fill at the location of existing WWTP at depth of 0.8 – 6.2 m from ground surface, and finally until the level of foundation, and deeper. These are grained sediments, with content of boulders, coarse size up to 10 cm. From **engineering-geological point of view,** this is the complex of mainly unbound and loosely to firmly bound rock masses (Figure 3b). The unbound part of the complex is made up of sandy gravels with interlayers of fine-grained sand, while the complex of bound rocks includes the conglomerates, in irregular alternation with gravels, both in horizontal and vertical directions. Thickness of glacio-fluvial sediments in the site usually exceeds 35 m. They belong to category of highly compact soils, with equable physical-mechanical properties. They **make up the stable soils, suitable for direct laying of foundations.**



(a)



(b)

Figure 3. Sandy gravel and conglomerate, as found below the surface layer of silty and sandy clay with a content of debris at the location of new WWTP – a; loosely to firmly bound sandy gravel in the zone of existing WWTP and planned bridge

Lenses and interlayers of clay or fine-grained sand/sandy silt may occur within this complex, and will mostly be of local character. This should be taken into account during excavation, as materials may collapse from steeper sides of the excavations. If in the foundation excavation, at foundation level, silty sand / sandy silt is encountered it needs to be substituted in order to reduce the difference in soil settlements below the foundation footings.

Also, underground voids have been detected in the grouted parts of the gravel complex (conglomerates) in certain localities of Podgorica. Such phenomena are rare and not common in vicinity of the studied location.

From hydrogeological point of view, the ***glacio-fluvial sediments*** (of importance for the site and planned facilities) are classified as a complex of highly permeable, poorly permeable to impermeable rocks, of intergranular porosity, with filtration coefficient (as according to available documentation) K_f=1,0x10^0 x 1x10^{-5} cm/s. The unbound sandy gravel is highly permeable, the highly bound gravels are poorly permeable to impermeable (conglomerates).

According to construction standard GN-200, sandy gravels belong to II-III excavation category, while excavation category in areas of loosely to highly bound gravel is IV-V.

Limestones of Upper Cretaceous age build up the surrounding hills as well as the base of the studied location. According to GN-200, the limestones belong to V-VI excavation category. **For the planned facilities they are irrelevant, as they are present at depths much greater than the foundation depth of planned facilities will be.**

Geotechnical units detected along the route of the main collector and secondary sewer network are specified in a separate chapter below (Chapter 7).

5 GEOMECHANICAL PROPERTIES OF ROCK MASSES

Relevant values of physical – mechanical parameters, estimated on the basis of available geological – geotechnical documentation as well as results of investigations performed at the concerned locations (planned WWTP, existing WWTP, Jul 13), are as follows:

The Units 1 and 2 – The fill (nt) and silty – sandy clays, with content of debris or gravel, brown (gl) – **These units should be removed.** Having in mind their relatively small thickness and technical specification of the facilities, these units will have no impact onto foundations and therefore will be removed.

density (estimated)	γ = 18,0-19,5 kN/m^3

The Unit 3 – Sandy gravel and conglomerate. They are classified into category of „highy compact" soils, with equable physical-mechanical properties, which build up stable terrains:

Water content	ω = 1-4,5 %
Density (for sandy gravels)	γ = 19,5-21,0 kN/m^3
Density (for conglomerates)	γ = 21-23 kN/m^3
Unit weight	γ_s = 26,8-27,5 kN/m^3
Angle of internal friction (estimated value for sandy gravels)	φ = 30-34°
cohesion (estimated value for sandy gravels)	c = 0,0 kN/m^2
(estimated value for loosely bound sandy gravels - conglomerates)	c = 5-15 kN/m^2
(estimated value for firmly bound sandy gravels - conglomerates)	c = 30-45 kN/m^2
Compressibility modulus (estimated)	Ms > 12 000 kN/m^2
Velocity of longitudinal elastic waves	Vp= 1400-3100m/s
Velocity of transverse elastic waves	Vs=400-1350m/s
CBR value for subsoil (at minimum 1,0m from ground surface)	10-13%

Due to relatively favorable resistance-deformability properties, the sandy gravels set a suitable base for direct laying of foundations, notably when it comes to conglomerates bound by $CaCO_3$ binder.

6 REQUIREMENTS FOR FOUNDATION OF PLANNED FACILITIES AT LOCATION OF NEW WWTP AND WWPTP WITHIN THE WINERY 13 JUL

6.1 General information about the Plants

The studied location is intended for construction of several facilities:

- waste water inlet pumping station – planned depth of foundation 9 m, load from the station on soil σ=400kN/m^2;
- primary sedimentation tanks – two units, diameter 31 m – planned depth of foundation 6 m, load from the tanks on soil σ=80kN/m^2;
- aeration tank – three units, size 20x94, 5.5m depth- planned depth of foundation 5 m, load from the tank on soil σ=80kN/m^2;
- sludge digestros (2 units, diameter 17.0m, height 17.5 m) – planned depth of foundation 4 m, load from the digestros on soil: (wall) σ=700kN/m^2; (inner part) σ=200kN/m^2;
- secondary clarifiers (4 units, diameter 42 m) – planned depth of foundation 7,5 m, load from the clarifiers on soil σ =100kN/m^2;
- WWPTP within the Winery 13 Jul, size of the plant 20x10x 2.5m;
- civil structure of the microturbine – concrete manhole, size approx. 4x4 m, with a micro-turbine installed at the bottom, 0,55 m above the minimal level of the Moraca river.

6.2 Analysis of geotechnical field model – facility interaction

Having in mind the established engineering-geological properties of soil and known information about the planned facilitites, the facility-ground contact would be realized within the **geotechnical unit 3 – complex of sandy gravels, unbound and loosely bound by $CaCO_3$ binder, with relatively good physical-mechanical properties.** The unbound part of the complex is made up of sandy gravels with interlayers of fine sand, while the complex of bound rocks involves conglomerates, in irregular alternation with gravels, both in horizontal and vertical directions. Drilling acitivities at the location of new WWTP showed that the surface area, till around 10 m below the ground surface, is dominated by conglomerates – loosely to firmly bound sandy gravels which alternate with gravels with no rule, both in horizontal and vertical directions. Deeper in soil, unbound to loosely bound sandy gravel is mostly present. At the location of WWPTP within the Winery Jul 13, also detected is the presence of loosely to firmly bound sandy gravel.

Sandy gravels and conglomerates have favorable reistance-deformability properties. That is why they make a suitable basis to direct reliance of the foundation. This complex is characterized by presence of fine silty sand and sandy silts, in thin interlayers. Despite not being found in the boreholes, their occurence is possible.

No ground water was detected at the interaction area of facilities and soil, with exception to location of the micro-turbine which will be installed at 0.55 m above the minimal level of the Moraca's course meaning it will be in line with the oscillating level or below the water level.

Applicable values of physical-mechanical parameters of found complex (as assessed on basis of analysis of available geological-geotechnical documentation and performed investigations) are shown in the *table 4.*

Due to irregular alternation of loosely and firmly bound sandy gravels, for the surface area of new plant's location and within the Winery 13 Jul parameters for loosely bound gravel are adopted, in order to be on the safe side. For waste water inlet pumping station, parameters for unbound sandy gravel are adopted.

Table 4. *Adopted values of physical-mechanical parameters for geostatic calculations*

Lithotype	γ (kN/m^3)	φ $(^o)$	c (kN/m^2)	M_s (kN/m^2)
sandy gravels – loosely to firmly bound (around 10 m from ground surface)	21,0-22,0	32	8	>20 000
Unbound sandy gravels	20,0	32	0	>12 000

6.3 Geostatic calculations

For thorough assessment of the facility-ground interaction, **preliminary c**alculations of allowable load onto soil and settlement analysis were undertaken.

6.3.1 Calculation of allowable bearing capacity

Allowable load to be transferred via foundation onto ground will be computed in compliance with the ***Rulebook on technical norms*** for case of vertical load on soil.

The calculatons of allowable bearing capacity were done for foundation of various shapes – isolated and strips of various depths (given in the tables below) and adopted effective depth of foundation depths d_f=1,0m as well as for foundation slab, sizes aligned with the area of aplanned facilities and foundation depth in dependence on ground surface. Calculations included the partial safety factors Fc = 2.5 and Fφ = 1.5.

With adopted values of physical – mechanical parameters for real geotechnical field model, with respect to given conditions, the values of allowable bearing capacity of soil are obtained as shown in the tables below.

Table 5. Calculated values of bearing capacity for ***waste water inlet pumping station*** *(subsoil mostly made up of unbound to loosely bound sandy gravel)*

Foundation shape	***Foundation size A xB / B(m)***	***Effective foundation depth d_{ef}(m)***	***Allowable bearing capacity of soil q_{doz} (kN/m^2)***
Isolated	1,5 x 1,5	1,0	286,32
	2,0 x 2,0		292,55
	3,0 x 3,0		315,25
Strip	1,2		276,58
	1,6		286,54
	2,0		301,11
Slab	12 x 25	9.0	2 537,58

Table 6. Calculated values of bearing capacity for other facilitites within the location of new WWTP and WWPTP within the Winery 13 Jul) (subsoil mostly made up of loosely bound to firmly bound sandy gravel)

Foundation shape	***Foundation size A xB / B(m)***	***Effective foundation depth d_{ef}(m)***	***Allowable bearing capacity of soil q_{doz} (kN/m^2)***
Isolated	1,5 x 1,5	1,0	398,25
	2,0 x 2,0		401.16
	3,0 x 3,0		422,20
Strip	1,2		378.69
	1,6		386.03
	2,0		398.95
Slab	15 x 15 (sludge digestors)	4.0	1 551.69

As seen from the above tables, the allowable bearing capacity of soil is **q_{doz}=286,32 – 2 537,58 kN/m^2** depending on shape and size of foundation. It is recommended not to exploit the allowable load in total. On basis of performed investigations and analyzed results for planned facilities, foundations can be RC foundation strips, isolated foundation or RC foundation slabs. For facilitites with greater loads (waste water inlet pumping station; sludge digestors), RC foundation slabs are recommended.

6.3.2 Analysis of settlement

As foundation of the facilities will take place within the unbound or loosely to firmly bound sandy gravels – conglomerates, calculation of settlement is not required because the rocks are slightly compressible to incompressible. Soil settlements below foundation which may possibly occur due to frequent alternation of unbound, loosely and firmly bound sandy gravels and due to low compressibility of unbound sandy gravels, will be relatively small and will mostly occur during the construction of the facilitites.

6.4 Foundation requirements

Construction of the planned facilities will include excavations with sides up to **9,0 m** high. The limit height to which lateral sides of foundation excavation could be built at steep gradient is 3,0 m, which implies that possible greater excavations should be protected by using proper measures (adequate slope or bracing). For deeper excavations (over 3,0 m) within the loosely to firmly bound sandy gravels in alternation without rule, slope up to 2:1 is recommended, given that consent from the geotechnical supervisor is obtained for stable and safe excavation. Special attention should be devoted to silty – sand interlayers and unbound to loosely bound sandy gravel, as collapsing may occur in those zones. Excavation works require presence of geotechnical supervisor who is to approve the excavation technology and slope gradients after the control. Excavations should be done in campades, given that length of the campades and completion periods should be reduced to technologically reasonable level.

Protection method for the excavation should be specified in the General civil design.

Facilities on the geotechnical field model can be laid on foundations in shape of **criss-crossed strips, isolated foundations or on foundation slabs.** For facilities with greater loads (waste water inlet pumping station; sludge digestors), RC foundation slabs are recommended.

After excavating till the design level and prior to laying foundations, it is needed to elevate the base by using a subbase materials in **thickness 20-30 cm a**nd with proper compaction (Ms=50000 kN/m^2) or layer of lean concrete in thickness 15-20 cm.

If sand / silt / clay interlayers occur at the foundation excavation, at foundation level, it is required to substitute the materials with grained gravel and proper compaction, in order to reduce difference in soil settlements below the foundation foots. Also, underground voids are found in grouted parts of gravel complex (conglomerates) within certain locations in Podgorica. Such phenomena are rare and uncommon to adjoining areas of the studied location. They cannot be foreseen and in case they are encountered this should be reported to a geological supervisor as well as to undertake adequate measures (after cleaning and washing, the empty space should be filled with concrete).

Foundation excavation will be prepared within units of **II – III category** (sandy gravels) and **IV – V category** of soil (bound sandy gravels – conglomerates).

It is recommended to excavate during **arid seasons,** with no delays and within the shortest possible period of time.

All buried parts of the bridge should be equipped with **waterproof protection.**

Foundation excavating must be supervised by a technical geological supervisor.

The Moraca's water level has been drastically changed throughout a year. Prior to preparation of the General Design it is preferrable to check data on minimum and maximum river level in area of the microturbine.

7 ENGINEERING-GEOLOGICAL PROPERTIES AND REQUIREMENTS FOR LAYING OF THE MAIN COLLECTOR AND SECONDARY SEWER NETWORK

The field of the main collector's route belongs to the highest river terrace (t3), made up of fluvio-glacial sediments – sandy gravels and loosely to firmly bound conglomerates P,Šlj (glf), with very mild gradient toward the south, from the pedestrian bridge over the Moraca toward the new WWTP, with elevations of around 39 masl in the area of the pedestrian bridge to around 28.5 masl toward the new WWTP, elevations around 39 masl in the area of pedestrian bridge to around 28.5 masl at the location of new WWTP.

The field in the area of planned extension of secondary network is slightly inclined. The planned extension of the secondary sewer network will mostly take place at the section dominated by glacio-fluvial sediments and at a small section southerny from Velje brdo, in the area of Sitnica, dominated by glaciofluvial G,P,Šlj (glf), limnoglacial G,P,Šlj (gl,l) and alluvial sediments G,P,Šlj (al). Clays, sands and gravels – glaciofluvial and deluvial sediments G,P,Šlj (ts,glf), are represented by clayey sandy gravel and terra rosa and are distributed throughout the entire southern edge of Velje brdo and edge of Gorica hill. They compose one section along the channel 2, in length of around 450 m, as well as area from Vranici to Luzani and one section of the channel along the edge of Gorica hill (section of the channels 3, 18, 17).

As these are the urbanized parts of the city, the road pavements with a thin subbase and/or fill with heterogenic properties are the most common along the route of the main collector and secondary sewer network. The subbase is, as found in the boreholes, represented by subrounded limestone debris and gravel with content of silt – sand – clay component, in thickness of around 0.5m, or locally even more. Having in mind the depth of planned excavations of 3-4 m for secondary network and 5-7 m for the main collector, they will have no impact and will be completely removed.

Clays, sands and gravels – glaciofluvial sediments G,P,Šlj (gl,f). They are distributed at the region of Tolosko polje, Ljeskopolje, as well as in area of Radovina, south from the Sitnica watercourse. Their occurence is expected at the section of secondary sewer network's route – a section of the channel 1 (appendix 3.4) southernly from Velje brdo and Sitnica, as well as at a small section along the channel 3 route and area of the Sitnica. Thickness of this complex ranges within 15-30 m. This field is slightly inclined towards the south, elevations from 32,5 – 32,0 masl. From engineering-geological aspect, they are classified into a complex of semibound and unbound rocks, permeability of which depends on percentual content of clays. According to data of seismogeological bases and seismic micro-zonation of urban area of Podgorica,which was also inclusive of creation of various maps 1:5000 (hydrogeological, engineering-geological, eligibility for urbanization map, etc.), **soil along the route of channel made up of these sediments belongs to II category: soil with negligible limitations for urbanization:**

- slope 0-5º;
- Litogenetic type: clays, gravels, sands;

- Depth to water table during hydrological maximum: from 1,5 to 4,0 m at the area of Tolosko polje, at south from Velje brdo and the Sitnica, and deeper than 4,0 m in areas of Radovina and Paovine;
- Bearing capacity of soil 150-200 kN/m^2;
- Soil stability: stable to conditionally stable in conditions of construction in the area with high water table. Excavations can be constructed with steep gradient to 2.0 m. All excavations deeper than 2 m should be protected by appropriate measures (proper slope or bracings). Recommended slope is up to 1:1, given that consent is obtained from geotechnical supervisor after the control, in order to get stable and safe excavation. It is recommended to perform excavations in arid season, with no delays and within shortest possible period of time.
- Seismicity VIIIº MCS;
- According to GN-200, they belong to II – III excavation category.

Parameters of physical-mechanical properties for this geotechnical unit, as according to data from available documentation, are as follows:

- Density γ = 19 - 21 kN/m^3
- cohesion c = 5 - 15 kN/m^2
- angle of internal friction φ = 26 - 27 ^{0}
- velocity of Vp waves Vp = 1100 - 2250 m/s
- velocity of Vs waves Vs = 300 - 670 m/s
- filtration coefficient Kf = 1x10^{-3} – 1x10^{-5} cm/s.

Clays, sands and gravels – glaciofluvial and deluvial sediments G,P,Šlj (ts,glf). These sediments, which are mostly represented by clayey and sandy gravel and terra rosa - silty-sandy clay with content of gravel and debris, are distributed at the entire southern rim of Velje brdo and Malo brdo and rim of Gorica hill. They make up a section of ground along the channel 2 in length of around 450m, i.e. the area from Vranici to Luzani as well as section of ground along the channel at the rim of Gorica hill (sections of channels 3, 18, 17). From engineering-geological aspect, they are classified into a complex of semibound and unbound rocks, permeability of which depends on percentual content of terra rosa. Along the channel 2, a section of the field with low elevations has been periodically flooded during hydrological maximum, or depth to water table is below 1,5 m. Thickness of this complex ranges within 5 and 15 m.According to the map of eligibility for urbanization, **the area of Vranici and partly of Luzine along the route of channel 2 made up of these sediments belongs to II category: soils with negligible limitations for urbanization, and partly to category IC – soila illeligible for urbanization.** Limiting factor is high water table during hydrological maximum and periodical flooding. This category is characterized by:

- slope <5º and 5-10º;
- lithogenetic type: clays (terra rosa) with and without debris, gravels, sands;
- depth to water table during hydrological maximum: <1,5m and periodical flooding;
- bearing capacity of soil 100-200 kN/m^2;

- Soil stability: stable to conditionally stable in conditions of construction whereby water table is high. Excavating can be done at steep slopes up to 2.0 m. All excavations deeper than 2 m should be protected by taking adequate measures (proper slope or bracings). Recommended slope is up to 1:1, given that consent from geotechnical supervisor is obtained after control, so as to get stable and safe excavations. Excavations should be done in **arid seasons**, with no delays and within shortest period of time.
- Seismicity VIIIº MCS;
- According to GN-200, they belong to II excavation category.

According to the map of eligibility for urbanization, the area along route of the channel, at the rim of Gorica hill made of these sediments, belongs to II category: soils with negligible limitations for urbanization, characterized by:

- slope 0-5º and 5-10º;
- lithogenetic type: clays (terra rosa) with and without debris, gravels, sands;
- depth to water table in hydrological maximum : >4,0m;
- bearing capacity of soil 150-200 kN/m^2;
- Soil stability: stable. Excavating can be done at steep slopes up to 2.0 m. All excavations deeper than 2 m should be protected by taking adequate measures (proper slope or bracings). Recommended slope is up to 1:1, given that consent from geotechnical supervisor is obtained after control, so as to get stable and safe excavations. Excavations should be done in arid seasons, with no delays and within shortest period of time
- Seismicity VIIIº MCS;
- According to GN-200, they belong to II – III excavation category.

Parameters of physical-mechanical properties for this geotechnical unit, according to available documentation, are as follows:

- Density γ = 19 – 20.5 kN/m^3
- cohesion c = 5 - 15 kN/m^3
- angle of internal friction φ = 18 - 26 ^{0}
- compressibility modulus $Ms_{100\text{-}200}$ = 5 000-8 000 kN/m^2
- CBR value for subsoil (min 1,0m from ground surface) 5-8%.

Sands, gravels, conglomerates – glaciofluvial sediments P,Šlj (gl,f) has the largest distribution, and are present along the main collector's route and mostly along the route of secondary sewer network. Thickness of glacio-fluvial sediments most commonly ranges within 40-70 m. On the surface there is a thin layer of terra rosa/clay with debris or gravel in thickness of 0.3 – 1.5 m mostly. According to the eligibility map for urbanization, **the area along the channel's route made of these sediments belongs to I category: soils with constraints for urbanization, characterized by:**

- slope 0-5º;
- lithogenetic type: sands, gravels, conglomerates;

- depth to water table: >4,0m, mostly in range of 10,0-20m ;
- bearing capacity of soil > 200 kN/m^2;
- soil stability: stable in case of vertical cutting in height of 3 m without support;
- seismicity VIII^o MCS;
- according to GN – 200 they belong to III-V excavation category.

Parameters of physical-mechanical properties for this geotechnical unit, as according to available documentation, are as follows:

- density γ = 19.5 - 23 kN/m^3
- cohesion c = 0 - 45 kN/m^3
- angle of internal friction φ = 32 - 34 ^{0}
- compressibility modulus $Ms_{100\text{-}200}$ > 12 000 kN/m^2
- velocity of Vp waves Vp = 1400 - 3100 m/s
- velocity of Vs waves Vs = 400 - 1350 m/s
- filtration coefficient Kf = 1x10^0 - 1x10^{-5} cm/s
- CBR value for subsoil (minimum 1,0m from ground surface) 10-13%.

All deep excavations need to be secured by appropriate measures (proper slope or bracings). For deeper excavations (over 3,0 m) within the complex of alternating unbound and loosely to firmly bound gravels, which alternate in an irregular pattern, slope 1:1 to 2:1 is recommended (for zones where they are firmly bound), given that consent from the geotechnical supervisor is obtained after the control, for stable and safe excavation. Special attention should be devoted to silty – sand interlayers and to unbound to loosely bound sandy gravel, as collapsing may occur in those zones. Excavation works require presence of geotechnical supervisor who is to approve the excavation technology and slope gradients. Excavations should be done in campades, given that length of the campades and completion periods should be reduced to technologically reasonable level.

***

In brief, the geotechnical conditions for construction of the channels are relatively favourable, especially at the stretch made of glacio-fluvial sediments P,Šlj,Kg (gl,f). Ground of this stretch is flat, with good bearing capacity and is dtable, with depth of more than 4,0 m to the water table.

At a short section along the secondary sewer network (a section of route of channel 1, southernly from Velje brdo and Sitnica, and at a short section of channel 3 route, also in the area of Sitnica, where glacio-fluvial and alluvial sediments are present, as well as a section of the channel 2 route in length of 450 m, and area from Vranici to Luzani where clayer and sandy gravel and terra rosa are present) excavation works should be done in arid seasons of year due to high water table during the hydrological maximum. Depending on the season / hydrological conditions and excavation depth, water may possibly penetrate the excavation and thus aggrevate the works. For that reason, it is required to prepare the site for possible aggrevating conditions and apply appropriate meliorating measures for water elimination.

8 CONCLUSION

According to the results of recent engineering-geological survey and geotechnical analysis, it is concluded that the construction of the new WWTP, the main trasfer collector from the location of existing to location of new WWTP, WWPTP at location of Winery 13 Jul and extension of secondary sewer network is possible from geotechnical point of view, given that all recommendations specified in this Final report, notably those given in the **chapter 6 and 7**, are complied with.

The works (excavation works, subsoil preparation) must be completed in presence of a geological supervisor so as to detect the actual geotechnical conditions as well as to resolve possible issues in a professional and effective manner.

Podgorica, April 2019

A u t h o r s,

Matović Marija, dipl.inž.geol.

Krulanović Mila, dipl.inž.geol.

Popović Milica, dipl.inž.geol.

GRAFIČKI PRILOZI / GRAPHIC APPENDICES

trasa sekundarne kanalizacione mreže / route of the secondary collector

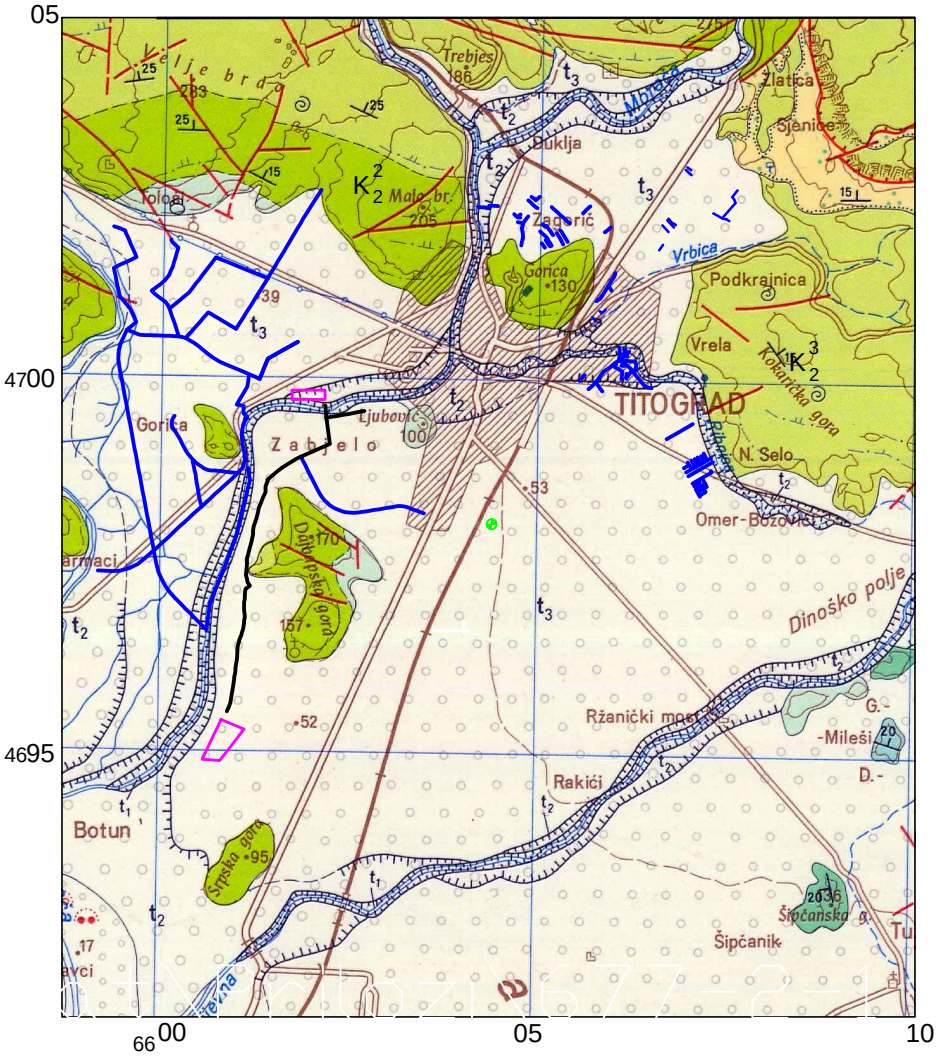
Postojeće postrojenje za prečišćavanje / Existing wastewater treatment plant

Novo postrojenje za prečišćavanje / New wastewater treatment plant

Trasa glavnog kolektora / Route of main collector

GP "GEOPROJEKT" D.O.O. za projektovanje, inženjering, promet i usluge export-import			
Objekat:	Novo postrojenje za prečišćavanje; Postojeće postrojenje za prečišćavanje; Trasa sekundarne kanalizacione mreže i lokacija u okviru vinarije 13.Jul Plantaže / New wastewater plant; Existing wastewater plant; Route of ecodary collector and lokation of winery 13. Jul Plantaže		
Naziv Elaborata:	*Projekat detaljnih geotehničkih istraživanja terena za potrebe izrade Glavnog projekta izgradnje novog postrojenja za prečišćavanje otpadnih voda, glavnog prenosnog kolektora sa lokacije postojećeg do novog postrojenja za prečišćavanje, postrojenja za predtretman otpadnih voda na lokaciji vinarije 13. jul i proširenja sekundarne kanalizacione mreže.*		
Autor:	Ime i prezime: M. Popović dipl.ing.geol.	Potpis:	Naziv priloga: Geografski položaj istraživane lokacije / Geographical location of the Site
Saradnici:	M.Matović dipl.ing.geol. M. Krulanović dipl.ing.geol. M.Z.Matović dipl.ing.geol.		Razmera / Scale: 1 : 25 000 Broj priloga / App. No.: 1. Datum / Date: mart 2019.g.

GEOLOŠKA KARTA ŠIREG PODRUČJA
1:100 000
(izvod iz OGK, list Titograd, 1:100 000)

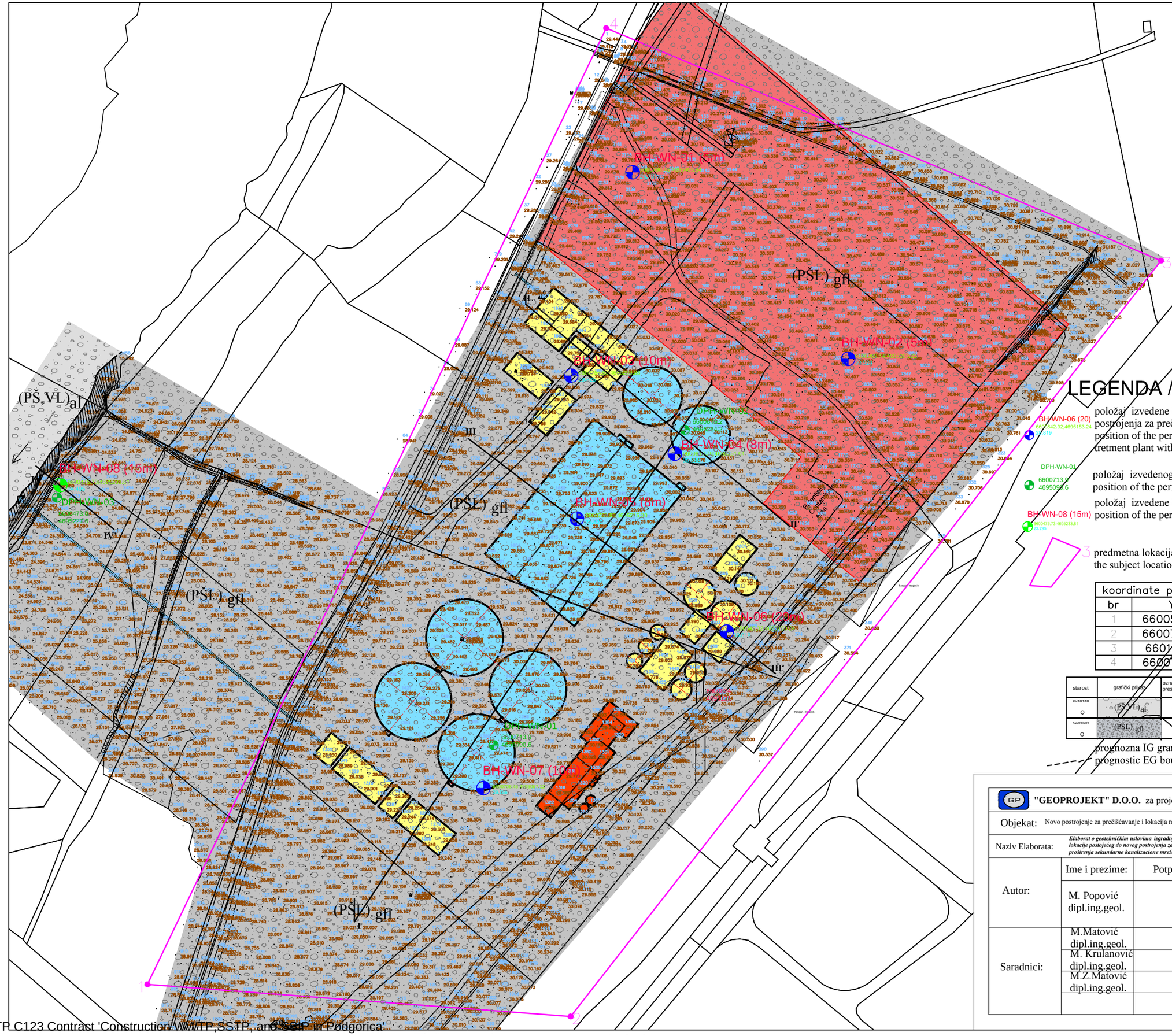


LEGENDA:

- t_1 Najniža terasa
- t_2 Srednja terasa
- t_3 Najviša terasa
- E_2 Fliš: konglomerati, pješčari, pjeskoviti krečnjaci i laporci-srednji eocen
- K_2^3 Sivobeličasti krečnjaci, dolomitični krečnjaci i dolomiti-senon
- K_2^2 Dolomiti, dolomitični krečnjaci i krečnjaci-turon
- $K_{1,2}$ Dolomiti, dolomitični krečnjaci i krečnjaci-alb-cenoman

- trasa sekundarne kanalizacione mreže / route of the secondary collector
- Postojeće postrojenje za prečišćavanje / Existing wastewater treatment plant
- Novo postrojenje za prečišćavanje / New wastewater treatment plant
- Trasa glavnog kolektora / Route of main collector

Prilog 2



LEGENDA / LEGEND:

položaj izvedene istražne bušotine u zoni novog postrojenja za prečišćavanje sa dubinom / position of the performed borehole on site of the new wastewater tretment plant with depth

BH-WN-06 (20)
6600342.32;4695153.24
23.819

položaj izvedenog DPH opita / position of the performed DPH test

DPH-WN-01
6600713.9
4695090.6

položaj izvedene istražne bušotine u zonimikroturbine / position of the performed borehole on site of microturbine

BH-WN-08 (15m)
6600475.73;4695233.81
23.295

predmetna lokacija ograničena koordinatama tačaka 1-4 / the subject location limited by the coordinates of points 1-4

koordinate predmetne lokacije		
br	Y	X
1	6600524.0	4694959.2
2	6600756.4	4694941.5
3	6601081.1	4695357.2
4	6600775.9	4635485.1

starost	grafički prikaz	oznaka na ig presjecima	TEKSTUALNI PRIKAZ
KVARTAR Q	(PŠ,VL)al	(2)	peskoviti šljunak sa valucima do 20 cm aluvijalnog porijekla / sandy gravel with pebbles up to 20 cm, alluvial sediments
KVARTAR Q	(PŠL) gfl	(3)	peskoviti šljunak mjestimično slabije do jače vezan CaCO3 vezivom / Sandy gravel, weaker to strongly bound with CaCO3 binder - glaciofluvial sediment

prognozna IG granica / prognostic EG boundary

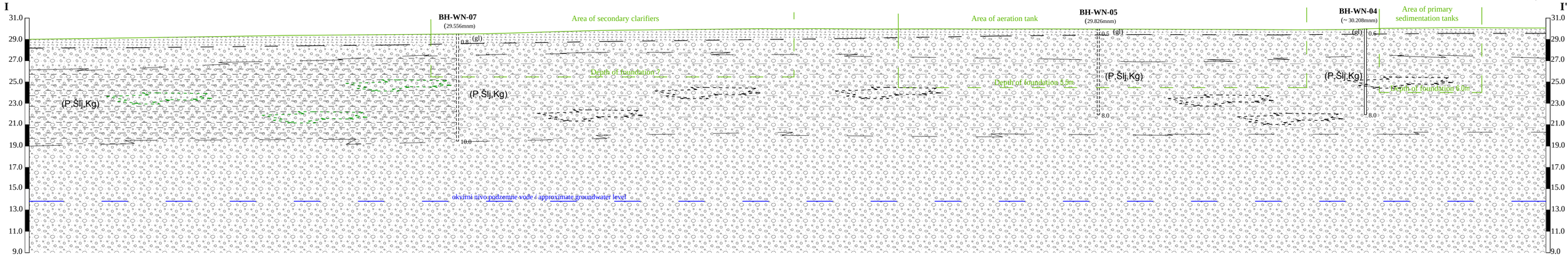
"GEOPROJEKT" D.O.O. za projektovanje, inženjering, promet i usluge export-import

Objekat: Novo postrojenje za prečišćavanje i lokacija mikroturbine / New wastewater treatment plant and Microturbine

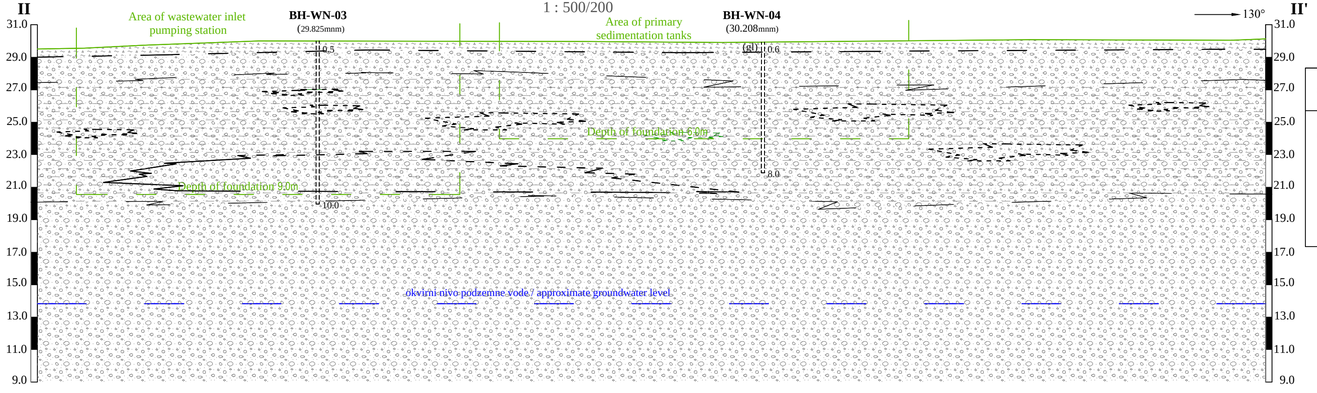
Naziv Elaborata: ***Elaborat o geotehničkim uslovima izgradnje novog postrojenja za prečišćavanje otpadnih voda, glavnog prenosnog kolektora sa lokacije postojećeg do novog postrojenja za prečišćavanje, postrojenja za predtretman otpadnih voda na lokaciji vinarije 13. jul i proširenja sekundarne kanalizacione mreže.***

	Ime i prezime:	Potpis:	Naziv priloga:
Autor:	M. Popović dipl.ing.geol.		Prognozna inženjerskogeološka karta sa položajem izvedenih istražnih radova u zoni novog postrojenja za prečišćavanje i mikroturbine/ Prognostic EG map with the position of the performed investigative work in area of new wastewater treatment plant and Microturbine
Saradnici:	M.Matović dipl.ing.geol.		
	M. Krulanović dipl.ing.geol.		
	M.Z.Matović dipl.ing.geol.		
			Razmera / Scale: 1 : 2000
			Broj priloga / App. No.: 3.2
			Datum / Date: april 2019.g.

Prognozni inženjerskogeološki presek terena I-I'
1 : 500/200



Prognozni inženjerskogeološki presek terena II-II'
1 : 500/200



LEGENDA:

starost	grafički prikaz	oznaka na ig preseku	TEKSTUALNI PRIKAZ
KVARTAR Q		(gl)	Prašinasto - peskovita glina, sa sadržajem drobine, proženta žilicama biljaka i korenjem. Slabo konsolidovana sredina. Braon boje. / Silty - sandy clay, with content of debris. With veins of plants and roots. Under-consolidated unit. Brown.
		(P,Šlj,Kg)	Glaciofluvijalni sedimenti - peskoviti šljunak, nevezan do slabije vezan, sa zaobljenim do poluzaobljenim valucima veličine i do 10cm. Sivkaste boje. / Glacio-fluvial sediments - sandy gravel, unbound to loosely bound, with rounded to subrounded boulders. sized up to 10 cm. Grayish.
			Glaciofluvijalni sedimenti - peskoviti šljunak, slabije ili jače vezan kalcijum karbonatnim (CaCO3) vezivom- konglomerat, sa zaobljenim do poluzaobljenim valucima veličine i do 10cm, koji se neravilno smjenjuju sa nevezanim do slabo vezanim peskovitim šljunkovima, kako u horizontalnom, tako i u vertikalnom pravcu. Sivkaste boje. / Glacio-fluvial sediments - sandy gravel, loosely or firmly bound by calcium carbonate (CaCo3) binder - the conglomerate, with rounded to subrounded boulders in size of up to 10 cm, which alternate irregularly with unbound to loosely bound sandy gravels, both in horizontal and vertical direction. Graysih.

- inženjerskogeološka granica - pretpostavljena / EG boundary-assumed
- BH-WN-01 — istražna bušotina sa kotom terena i litološkim stubom / borehole, with ground level and lithologic column
- postojeća linija terena / ground line, as it is now
- 34 ° azimut inženjerskogeološkog preseka terena / azimuth of engineering-geological section of soil
- okvirni nivo podzemne vode / approximate groundwater level

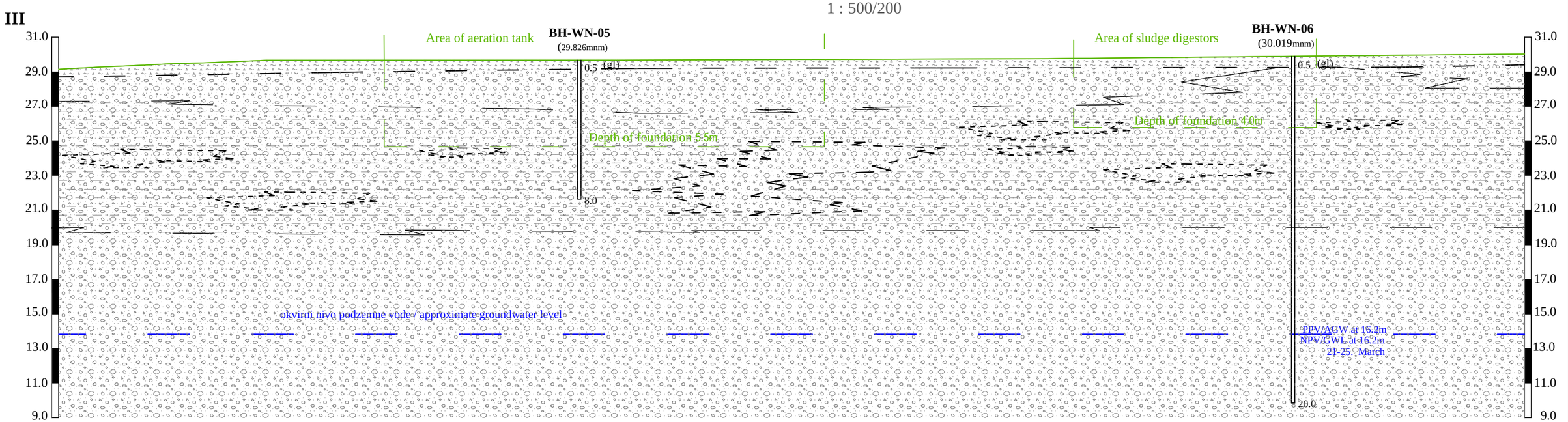
"GEOPROJEKT" D.O.O. za projektovanje, inženjering, promet i usluge export-import

Objekat: Novo postrojenje za pročišćavanje i lokacija mikroturbine / New wastewater treatment plant and Microturbine

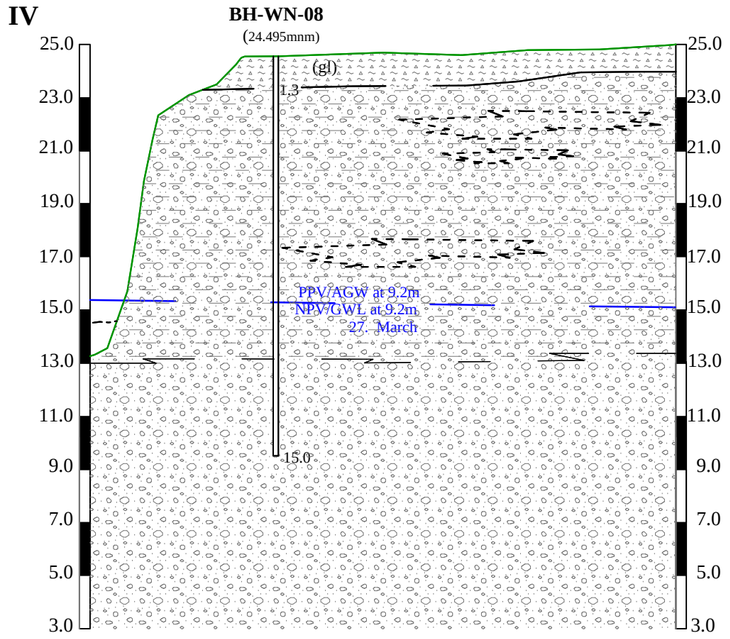
Naziv Elaborata: *Elaborat o geotehničkim uslovima izgradnje novog postrojenja za pročišćavanje otpadnih voda, glavnog prevodnog kolektora sa lokacije postojećeg do novog postrojenja za pročišćavanje, postrojenja za predtretman otpadnih voda na lokaciji vinarije 13. jul i prošrenje sekundarne kanalizacione mreže.*

	Ime i prezime:	Potpis:	Naziv priloga:
Autor:	M. Popović dipl.ing.geol.		Prognozni inženjerskogeološki preseci terena I-I' i II-II' Prognostic engineerin-geological sections I-I' i II-II'
Saradnici:	M.Matović dipl.ing.geol.		
	M. Mededović dipl.ing.geol.		Razmera: 1 : 500/200
	M.Z.Matović dipl.ing.geol.		Broj priloga: 4.1
	M.Krulanović dipl.ing.geol.		Datum: April 2019.g.

Prognozni inženjerskogeološki presek terena III-III'
1 : 500/200



Prognozni inženjerskogeološki presek terena IV-IV'
1 : 500/200



LEGENDA:

starost	grafički prikaz	oznaka na ig preseku	TEKSTUALNI PRIKAZ
KVARTAR Q		(gl)	Prašinasto - peskovita glina, sa sadržajem drobine, prožeta žilicama biljaka i korenjem. Slabo konsolidovana sredina. Braon boje. / Silty - sandy clay, with content of debris. With veins of plants and roots. Under-consolidated unit. Brown.
		(P,Šlj,Kg)	Glaciofluvijalni sedimenti - peskoviti šljunak, nevezan do slabije vezan, sa zaobljenim do poluzaobljenim valucima veličine i do 10cm. Sivkaste boje. / Glacio-fluvial sediments - sandy gravel, unbound to loosely bound, with rounded to subrounded boulers in size up to 10 cm Grayish.
			Glaciofluvijalni sedimenti - peskoviti šljunak, slabije ili jače vezan kalcijum karbonatnim ($CaCO_3$) vezivom- konglomerat, sa zaobljenim do poluzaobljenim valucima veličine i do 10cm, koji se nepravilno smjenjuju sa nevezanim do slabo vezanim peskovitim šljunkovima, kako u horizontalnom, tako i u vertikalnom pravcu. Sivkaste boje. / Glacio-fluvial sediments - sandy gravel, loosely or firmly bound by calcium carbonate ($CaCO_3$) binder - the conglomerate, with rounded to subrounded boulders in size up to 10 cm, which alternate irregularly with unbound to loosely bound sandy gravels, both in horizontal and vertical direction. Grayish.

— — — inženjerskogeološka granica - pretpostavljena / EG boundary-assumed

BH-WN-01 istražna bušotina sa kotom terena i litološkim stubom / borehole with ground level and lithologic column

postojeća linija terena / ground line, as it is now

→ 34 ° azimut inženjerskogeološkog preseka terena / azimuth of engineering-geological section of soil

– – – – okvirni nivo podzemne vode / approximate groundwater level

"GEOPROJEKT" D.O.O. za projektovanje, inženjering, promet i usluge export-import				
Objekat: Novo postrojenje za prečišćavanje i lokacija mikroturbine / New wastewater treatment plant and Microturbin				
Naziv projekta: *Elaborat o geotehničkim uslovima izgradnje novog postrojenja za prečišćavanje otpadnih voda, glavnog prenosnog kolektora sa lokacije postojećeg do novog postrojenja za prečišćavanje, postrojenja za predtretman otpadnih voda na lokaciji vinarije 13. jul i proširenja sekundarne kanalizacione mreže.*				
Autor:	Ime i prezime:	Potpis:	Naziv priloga:	
	M. Popović dipl.ing.geol.		Prognozni inženjerskogeološki preseci terena III-III' i IV-IV' Prognostic engineerin-geological sections III-III' i IV-IV'	
Saradnici:	M. Z.Matović dipl.ing.geol.		Razmera	1 : 500/200
	M. Krulanović dipl.ing.geol.		Broj priloga	4.2
	M. Matović dipl.ing.geol.		Datum	April 2019.

INŽENJERSKOGEOLOŠKI PROFILI IZVEDENIH ISTRAŽNIH BUŠOTINA SA FOTODOKUMENTACIJOM

ENGINEERING-GEOLOGICAL PROFILES OF BOREHOLES WITH PHOTOS

Prilozi br. 5 - 8
Appendices # 5-8

Razmernik / Ruler	Kota / Elevation (m)	Završna dubina End depth (m)	Debljina / Thickness (m)	Litološka oznaka / lithol. denotation	Opis litološko-strukturnog sastava / Description of lithological-structural composition	Grafički prikaz jezgra / Graphic presen.of core	RQD (%)	SPT(N)	Uzeti uzorci (GP) / Samples (GP)	Uzeti uzorci (CETI) / Uzeti uzorci (CETI)	Razmernik / Razmernik /	NPV/PPV GWL/AGW	Fotografije / Photos	Koordinate bušotine / Borehole's coordinates
0	29.8										0			
0.5	29.3	0.5	0.5	gl	Prašinasto - peskovita glina, sa sadržajem drobine. Braon boje. Sredina koja mora u potpunosti biti uklonjena pri izgradnji objekta, platoa i pristupnih saobraćajnica. / Silty - sandy clay, with debris. Brown. This unit needs to be removed completely during the construction of the facility, platform and access roads.						0.5			
1											1			
1.5											1.5			
2					Od 0.5-5.0m zastupljen peskoviti šljunak, slabije ili jače vezan - konglomerat. Do dubine 2.0m slabije vezan peskoviti šljunak, dok je u nastavku, do dubine istraživanja jače vezan , sa zaobljenim do poluzaobljenim valucima veličine i do 10cm. Sivkaste boje. Sredina zbijena do vrlo zbijena i povoljna za fundiranje. U površinskoj zoni gde su slabije vezani imaju nepovoljnija fizičko-mehanička svojstva u odnosu na jače vezanu zonu, ali u svakom slučaju predstavljaju povoljnu sredinu za fundiranje. / From 0.5-5.0m there is sandy gravel, slightly or firmly bound - conglomerate. Till depht of 2.0m the sandy gravel is slightly bound, while further, until the studied depth, it is firmly bound, with rounded to subrounded boundaries in size up to 10 cm. Grayish. This unit is very compressed and suitable for foundation. In the surface area, where they are slightly bound, they have more adverse physical - mechanical properties in comparison to the firmly bound area. In any case, they represent an eligible area for foundation,			50 / 7cm	U-1 / U-2 / U-3 / U-4 / U-5		2			
2.5			4.5	P,Šlj,Kg							2.5			
3											3			
3.5											3.5			
4								50 / 9cm	U-3 / U-4 / U-5	U-6 / U-7	4			
4.5											4.5			
5	24.8	5.0									5			
5.5											5.5			
6											6			
6.5											6.5			
7											7			
7.5											7.5			
8											8			
8.5											8.5			
9											9			
9.5											9.5			
10											10			
10.5											10.5			
11											11			
11.5											11.5			
12											12			
12.5											12.5			
13											13			

LEGEND

gl - Silty - sandy clay, with content of debris. Brown,

P,Šlj,Kg - Sandy gravel, mostly slightly to firmly bound (conglomerate)

0.00-5.00 m



X	4695405.844
Y	6600790.482
Z	29.787

INŽENJERSKO-GEOLOŠKI PROFIL BUŠOTINE BH-WN-01
Razmjera 1:50

ENGINEERING-GEOLOGICAL PROFILE OF BOREHOLE BH-WN-01
Scale 1:50



Prečnik bušenja / Diametar of borehole:
Ø 146 mm
Vreme bušenja / Date of drilling:
18. March 2019.

Bušio / Drilled: GEOMIP inženjering
Kartirao / Mapped: M.Matović, M. Z. Matović

Prilog br. 6.1
Appendix No. 6.1

Razmernik / Ruler	Kota / Elevation (m)	Završna dubina End depth (m)	Debljina / Thickness (m)	Litološka oznaka / lithol. denotation	Opis litološko-strukturnog sastava / Description of lithological-structural composition
0	30.5				
	30.2	0.3	0.3	gl	Prašinasto-peskovita glina, sa sadržajem drobine, humificirana. Slabo konsolidovana sredina. Braon boje. Sredina koja mora u potpunosti biti uklonjena pri izgradnji objekta, platoa i pristupnih saobraćajnica. / Silty - sandy clay, with debris. Humified. Under-consolidated unit. Brown. This unit needs to be removed completely during the construction of the facility, platform and access roads.
			4.7	P,Šlj,Kg	Od 0.3-5.0m zastupljen peskoviti šljunak, slabije ili jače vezan - konglomerat. Do dubine oko 2.0m slabije vezan peskoviti šljubak, dok je u nastavku, do dubine istraživanja jače vezan , sa zaobljenim do poluzaobljenim valucima veličine i do 10cm. Sivkaste boje. Sredina zbijena do vrlo zbijena i povoljna za fundiranje. U površinskoj zoni gde su slabije vezani imaju nepovoljnija fizičko-mehanička svojstva u odnosu na jače vezanu zonu, ali u svakom slučaju predstavljaju povoljnu sredinu za fundiranje. / From 0.3-5.0m there is sandy gravel, slightly or firmly bound - conglomerate. Till depht of 2.0m the sandy gravel is slightly bound, while further, until the studied depth, it is firmly bound, with rounded to subrounded boulders in size up to 10 cm. Grayish. This unit is compressed to very compressed and suitable for foundation. In the surface area, where they are slightly bound, they have more adverse physical - mechanical properties in comparison to the firmly bound area. In any case, they represent an eligible area for foundation.
5	25.5	5.0			
13					

Grafički prikaz jezgra / Graphic presen.of core	RQD (%)	SPT(N)	Uzeti uzorci (GP) / Samples (GP)	Uzeti uzorci (CETI) / Uzeti uzorci (CETI)	Razmernik / Razmernik /	NPV/PPV GWL/AGW
				U-1	0	
				U-2	0.5	
			U-1	U-3	1	
				U-4	1.5	
		50 10cm	U-2		2	
				U-5	2.5	
			U-3		3	
				U-6	3.5	
		50 9cm	U-4		4	
				U-7	4.5	
			U-5	U-8	5	
					5.5	
					6	
					6.5	
					7	
					7.5	
					8	
					8.5	
					9	
					9.5	
					10	
					10.5	
					11	
					11.5	
					12	
					12.5	
					13	

LEGEND

gl - Silty - sandy clay, with content of debris. With veins of plants and roots. Under-consolidated unit. Brown.

P,Šlj,Kg - sandy gravel, in general slightly to firmly bound (conglomerate)

Fotografije / Photos

0.00-5.00 m



Koordinate bušotine / Borehole's coordinates

X	4 695 303.224
Y	6 600 909.140
Z	30.524

INŽENJERSKO-GEOLOŠKI PROFIL BUŠOTINE BH-WN-02
Razmjera 1:50

ENGINEERING-GEOLOGICAL PROFILE OF BOREHOLE BH-WN-02
Scale 1:50

Prečnik bušenja / Diametar of borehole:
Ø 146 mm
Vreme bušenja / Date of drilling:
20. March 2019.

Bušio / Drilled: GEOMIP inženjering
Kartirao / Mapped: M.Matović, M. Z. Matović

Prilog br. 6.2
Appendix No. 6.2

Razmernik / Ruler	Kota / Elevation (m)	Završna dubina End depth (m)	Debljina / Thickness (m)	Litološka oznaka / lithol. denotation	Opis litološko-strukturnog sastava / Description of lithological-structural composition
0	29.8				
0.5	29.3	0.5	0.5	gl	Prašinasto-peskovita glina, humificirana, prožeta žilicama biljaka i korenjem. Slabo konsolidovana sredina. Braon boje. Sredina koja mora u potpunosti biti uklonjena pri izgradnji objekta, platoa i pristupnih saobraćajnica. / Silty - sandy clay, Humified. With veins of plants and roots. Under-consolidated unit. Brown. This unit needs to be removed completely during the construction of the facility, platform and access roads.
1					
1.5					
2					
2.5					Od 0.5-10.0m zastupljen peskoviti šljunak, uglavnom slabije ili jače vezan kalcijum karbonatnim ($CaCO_3$) vezivom - konglomerati, sa zaobljenim do poluzaobljenim valucima veličine i do 10cm. Sivkaste boje. Sredina zbijena do vrlo zbijena i povoljna za fundiranje. U intervalima 3.0-3.2; 4.0-4.5; 7.0-9.9 salbije vezani, a u intervalu od 8.0-9.9m i sa povećanim sadržajem prašinasto-glinovite komponente. U zonama gde su slabije vezani imaju nepovoljnija fizičko-mehanička svojstva u odnosu na jače vezane zone, ali u svakom slučaju predstavljaju povoljnu sredinu za fundiranje. / From 0.5-10.0m there is sandy gravel, in general slightly or firmly bound by a calcium carbonate ($CaCO_3$) binder - conglomerate, with rounded to subrounded boulders sized even up to 10 cm. Grayish. This unit is compressed to very compressed and suitable for foundation. At the intervals 3.0-3.2; 4.0-4.5; 7.0-9.9 they are slightly bound, and 8.0-9.9m even with increased content of silt-clay component. In areas where they are slightly bound, they have more adverse physical - mechanical properties in comparison to the firmly bound area. In any case, they represent an eligible area for foundation.
3					
3.5					
4					
4.5					
5			9.5	P,Šlj,Kg	
5.5					
6					
6.5					
7					
7.5					
8					
8.5					
9					
9.5					
10	19.8	10.0			
10.5					
11					
11.5					
12					
12.5					
13					

Grafički prikaz jezgra / Graphic presen.of core

RQD (%)

SPT(N)	Uzeti uzorci (GP) / Samples (GP)	Uzeti uzorci (CETI) / Uzeti uzorci (CETI)	Razmernik / Razmernik /
		U-1	0
		U-2	0.5
	U-1	U-3	1
		U-4	1.5
50 / 11cm	U-2		2
			2.5
	U-3		3
50 / 11cm	U-4		3.5
			4
	U-5		4.5
		U-5	5
			5.5
50 / 8.5cm	U-6		6
			6.5
	U-7		7
			7.5
50 / 4cm	U-8		8
			8.5
	U-9		9
			9.5
50 / 5cm	U-10		10
			10.5
			11
			11.5
			12
			12.5
			13

NPV/PPV GWL/AGW

Fotografije / Photos

0.00-10.00 m

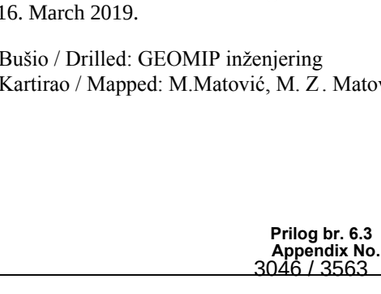


Koordinate bušotine / Borehole's coordinates

X	4 695 293.876
Y	6 600 756.688
Z	29.825

INŽENJERSKO-GEOLOŠKI PROFIL BUŠOTINE BH-WN-03
Razmjera 1:50

ENGINEERING-GEOLOGICAL PROFILE OF BOREHOLE BH-WN-03
Scale 1:50



LEGEND

gl - Silty - sandy clay, with content of debris and with veins of plants and roots. Under-consolidated unit. Brown.

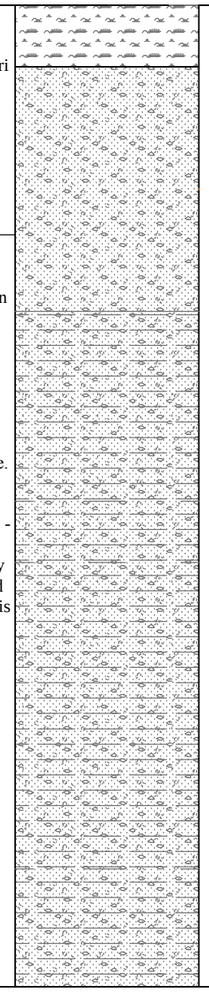
P,Šlj,Kg - sandy gravel, in general slightly to firmly bound (conglomerate)

Prečnik bušenja / Diametar of borehole:
Ø 146 mm
Vreme bušenja / Date of drilling:
16. March 2019.

Bušio / Drilled: GEOMIP inženjering
Kartirao / Mapped: M.Matović, M. Z. Matović

Prilog br. 6.3
Appendix No. 6.3

Razmernik / Ruler	Kota / Elevation (m)	Završna dubina End depth (m)	Debljina / Thickness (m)	Litološka oznaka / lithol. denotation	Opis litološko-strukturnog sastava / Description of lithological-structural composition
0	30.2				
0.5	29.6	0.6	0.6	gl	Prašinasto-peskovita glina, sa sadržajem drobine, prožeta žilicama biljaka i korenjem. Slabo konsolidovana sredina. Braon boje. Sredina koja mora u potpunosti biti uklonjena pri izgradnji objekta, platoa i pristupnih saobraćajnica. / Silty - sandy clay, with content of debris. With veins of plants and roots. Under-consolidated unit. Brown. This unit needs to be removed completely during the construction of the facility, platform and access roads.
1					
1.5					
2					
2.5					Od 0.6-8.0m zastupljen peskoviti šljunak, slabije ili jače vezan - konglomerat. Do dubine 2.5m slabije vezan peskoviti šljubak, dok je u nastavku, do dubine istraživanja jače vezan kalcijum karbonatnim ($CaCO_3$) vezivom, sa zaobljenim do poluzaobljenim valucima veličine i do 10cm. Sivkaste boje. Sredina zbijena do vrlo zbijena i povoljna za fundiranje. U površinskoj zoni gde su slabije vezani imaju nepovoljnija fizičko-mehanička svojstva u odnosu na jače vezanu zonu, ali u svakom slučaju predstavljaju povoljnu sredinu za fundiranje. / From 0.6-8.0m there is sandy gravel, slightly or firmly bound - the conglomerate. There is slightly bound sandy gravel till depth of 2.5 m, while further, till the studied depth, it is firmly bound by a calcium carbonate ($CaCO_3$) binder , with rounded to subrounded boulders sized even up to 10 cm. Grayish. This unit is compressed to very compressed and suitable for foundation. In the surface area where they are slightly bound, they have more adverse physical - mechanical properties in comparison to the firmly bound area. In any case, they represent an eligible area for foundation.
3					
3.5					
4					
4.5					
5			7.4	P,Šlj,Kg	
5.5					
6					
6.5					
7					
7.5					
8	22.2	8.0			
8.5					
9					
9.5					
10					
10.5					
11					
11.5					
12					
12.5					
13					



Uzeti uzorci (GP) / Samples (GP)	Uzeti uzorci (CETI) / Uzeti uzorci (CETI)	SPT(N)	RQD (%)
	U-1		
	U-2		
	U-3		
U-1	U-4		
U-2		50 / 5cm	
	U-3		
U-4		50 / 7.5cm	
	U-5		
U-5			
U-6		50 / 4cm	
	U-7		
	U-6		
U-8		50 / 4.5cm	

Razmernik / Razmernik /
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5
5.5
6
6.5
7
7.5
8
8.5
9
9.5
10
10.5
11
11.5
12
12.5
13

NPV/PPV
GWL/AGW

Fotografije / Photos

0.00-8.00 m



Koordinate bušotine / Borehole's coordinates

X	4 695 251.041
Y	6 600 813.760
Z	30.208

INŽENJERSKO-GEOLOŠKI PROFIL BUŠOTINE BH-WN-04
Razmjera 1:50

ENGINEERING-GEOLOGICAL PROFILE OF BOREHOLE BH-WN-04
Scale 1:50



LEGEND

gl - Silty - sandy clay, with content of debris and with veins of plants and roots. Under-consolidated unit. Brown.

P,Šlj,Kg - sandy gravel, in general slightly to firmly bound (conglomerate)

Prečnik bušenja / Diametar of borehole:
Ø 146 mm
Vreme bušenja / Date of drilling:
18-19. March 2019.

Bušio / Drilled: GEOMIP inženjering
Kartirao / Mapped: M.Matović, M. Z. Matović

Prilog br. 6.4
Appendix No. 6.4

Razmernik / Ruler	Kota / Elevation (m)	Završna dubina End depth (m)	Debljina / Thickness (m)	Litološka oznaka / lithol. denotation	Opis litološko-strukturnog sastava / Description of lithological-structural composition
0	29.8				
0.5	29.3	0.5	0.5	gl	Prašinasto - peskovita glina, sa sadržajem drobine, prožeta žilicama biljaka i korenjem. Slabo konsolidovana sredina. Braon boje. Sredina koja mora u potpunosti biti uklonjena pri izgradnji objekta, platoa i pristupnih saobraćajnica. / Silty - sandy clay, with content of debris. With veins of plants and roots. Under-consolidated unit. Brown. This unit needs to be removed completely during the construction of the facility, platform and access roads.
8	21.8	8.0	7.5	P,Šlj,Kg	Od 0.5-8.0m zastupljen peskoviti šljunak, slabije ili jače vezan - konglomerat. Do dubine 3.0m slabije vezan peskoviti šljunak, dok je u nastavku, do dubine istraživanja jače vezan kalcijum karbonatnim ($CaCO_3$) vezivom, sa zaobljenim do poluzaobljenim valucima veličine i do 10cm. Sivkaste boje. Sredina zbijena do vrlo zbijena i povoljna za fundiranje. U površinskoj zoni gde su slabije vezani imaju nepovoljnija fizičko-mehanička svojstva u odnosu na jače vezanu zonu, ali u svakom slučaju predstavljaju povoljnu sredinu za fundiranje. / From 0.5-8.0m there is sandy gravel, slightly or firmly bound - the conglomerate. There is slightly bound sandy gravel till depth of 3.0 m, while further, till the studied depth, it is firmly bound by a calcium carbonate ($CaCO_3$) binder , with rounded to subrounded boulders sized even up to 10 cm. Grayish. This unit is compressed to very compressed and suitable for foundation. In the surface area where they are slightly bound, they have more adverse physical - mechanical properties in comparison to the firmly bound area. In any case, they represent an eligible area for foundation.

Grafički prikaz jezgra / Graphic presen.of core	RQD (%)	SPT(N)	Uzeti uzorci (GP) / Samples (GP)	Uzeti uzorci (CETI) / Uzeti uzorci (CETI)	Razmernik / Razmernik /	NPV/PPV GWL/AGW
			U-1	U-1	0	
				U-2	0.5	
			U-1	U-3	1	
				U-4	1.5	
		50 10cm	U-2		2	
					2.5	
			U-3		3	
					3.5	
		50 5cm	U-4		4	
					4.5	
			U-5		5	
					5.5	
		50 7.5cm	U-6		6	
					6.5	
			U-7		7	
				U-5	7.5	
		50 3cm	U-8		8	
					8.5	
					9	
					9.5	
					10	
					10.5	
					11	
					11.5	
					12	
					12.5	
					13	

LEGEND

gl - Silty - sandy clay, with content of debris and with veins of plants and roots. Under-consolidated unit. Brown.

P,Šlj,Kg - sandy gravel, in general slightly to firmly bound (conglomerate)

Fotografije / Photos

0.00-8.00 m



Koordinate bušotine / Borehole's coordinates

X	4 695 215.296
Y	6 600 759.851
Z	29.826

INŽENJERSKO-GEOLOŠKI PROFIL BUŠOTINE BH-WN-05
Razmjera 1:50

ENGINEERING-GEOLOGICAL PROFILE OF BOREHOLE BH-WN-05
Scale 1:50



Prečnik bušenja / Diametar of borehole:
Ø 146 mm
Vreme bušenja / Date of drilling:
19-20. March 2019.

Bušio / Drilled: GEOMIP inženjering
Kartirao / Mapped: M.Matović, M. Z. Matović

Prilog br. 6.5
Appendix No. 6.5

Razmernik / Ruler	Kota / Elevation (m)	Završna dubina End depth (m)	Debljina / Thickness (m)	Litološka oznaka / lithol. denotation	Opis litološko-strukturnog sastava / Description of lithological-structural composition
0	30.0				
	29.5	0.5	0.5	gl	Prašinasto - peskovita glina, sa sadržajem drobine, prožeta žilicama biljaka i korenjem. Slabo konsolidovana sredina. Braon boje. Sredina koja mora u potpunosti biti uklonjena pri izgradnji objekta, platoa i pristupnih saobraćajnica. / Silty - sandy clay, with content of debris. With veins of plants and roots. Under-consolidated unit. Brown. This unit needs to be removed completely during the construction of the facility, platform and access roads.
1–4			19.5		
5					Od 0.5-20.0m zastupljen peskoviti šljunak, u površinskoj zoni slabije ili jače vezan kalcijum karbonatnim ($CaCO_3$) vezivom-konglomerat do oko 10m, dok je u nastavku, do dubine istraživanja slabije vezan do nevezan peskoviti šljunak , sa zaobljenim do poluzaobljenim valucima veličine i do 10cm. Sivkaste boje. Sredina zbijena do vrlo zbijena i povoljna za fundiranje. U zoni gde su nevezani do slabije vezani imaju nepovoljnija fizičko-mehanička svojstva u odnosu na jače vezanu zonu površinsku zonu, ali u svakom slučaju predstavljaju povoljnu sredinu za fundiranje. / From 0.5-20.0m there is sandy gravel, at surface area it is slightly or firmly bound by a calcium carbonate ($CaCO_3$) binder- the conglomerate till cca 10m, while further, till the studied depth, there is slightly bound to loose sandy gravel , with rounded to subrounded boulders sized even up to 10 cm. Grayish. This unit is compressed to very compressed and suitable for foundation. In area where they are loose to slightly bound, they have more adverse physical - mechanical properties in comparison to the firmly bound area. In any case, they represent an eligible area for foundation.
6–9					
10				P,Šlj,Kg	
11–19					
20	10.0	20.0			
21–26					

Grafički prikaz jezgra / Graphic presen.of core	RQD (%)	SPT(N)	Uzeti uzorci (GP) / Samples (GP)	Uzeti uzorci (CETI) / Uzeti uzorci (CETI)	Razmernik / Razmernik /	NPV/PPV GWL/AGW
				U-1	0	
				U-2		
				U-3		
		50 / 9.0cm	U-1		1	
			U-2		2	
		50 / 10.5cm	U-3		3	
			U-4		4	
		50 / 9.0cm	U-5		5	
			U-6		6	
		50 / 13.0cm	U-7	U-4	7	
			U-8		8	
		50 / 1.0cm	U-9		9	
			U-10		10	
		50 / 5.0cm	U-11		11	
			U-12		12	
		50 / 7.0cm	U-13		13	
			U-14	U-5	14	
			U-15	U-6	15	
		50 / 5.0cm	U-16	U-7	16	AGW/PPV 16.2m
			U-17		17	
			U-18	U-8	18	
			U-19		19	
					20	
					21	
					22	
					23	
					24	
					25	
					26	

Fotografije / Photos

0.00-20.00 m



Koordinate bušotine / Borehole's coordinates

X	4 695 153.245
Y	6 600 842.323
Z	30.019

INŽENJERSKO-GEOLOŠKI PROFIL BUŠOTINE BH-WN-06
Razmjera 1:100

ENGINEERING-GEOLOGICAL PROFILE OF BOREHOLE BH-WN-06
Scale 1:100



LEGEND

gl - Silty - sandy clay, with content of debris and with veins of plants and roots. Under-consolidated unit. Brown.

P,Šlj,Kg - sandy gravel, at surface it is slightly or firmly bound by a calcium carbonate ($CaCO_3$) binder- the conglomerate till around 10m, while further, till the studied depth there is loosely bound to unbound sandy gravel.

Prečnik bušenja / Diametar of borehole:
Ø 146 mm
Vreme bušenja / Date of drilling:
21-25. March 2019.

Bušio / Drilled: GEOMIP inženjering
Kartirao / Mapped: M.Matović, M. Z. Matović

Prilog br. 6.6
Appendix No. 6.6

Razmernik / Ruler	Kota / Elevation (m)	Završna dubina End depth (m)	Debljina / Thickness (m)	Litološka oznaka / lithol. denotation	Opis litološko-strukturnog sastava / Description of lithological-structural composition	Grafički prikaz jezgra / Graphic presen.of core	RQD (%)	SPT(N)	Uzeti uzorci (GP) / Samples (GP)	Uzeti uzorci (CETI) / Uzeti uzorci (CETI)	Razmernik / Razmernik /	NPV/PPV GWL/AGW
0	29.6									U-1	0	
0.5										U-2	0.5	
1	28.8	0.8	0.8	gl	Prašinasto-peskovita glina do zaglinjena peskovita prašina, sa manjim sadržajem drobine, prožeta žilicama biljaka i korenjem. Slabo konsolidovana sredina. Braon boje. Sredina koja mora u potpunosti biti uklonjena pri izgradnji objekta, platoa i pristupnih saobraćajnica. /					U-3	1	
1.5					Silty - sandy clay to clayey and sandy silt, with lower content of debris. With veins of plants and roots. Under-consolidated unit. Brown. This unit needs to be removed completely during the construction of the facility, platform and access roads.					U-4	1.5	
2								50 10cm	U-1		2	
2.5					Od 0.5-10.0m zastupljen slabije do jače vezan peskoviti šljunak - konglomerat. U jezgru zastupljeni zaobljeni do poluzaobljeni valuci veličine i do 10cm. Sivkaste boje. Sredina vrlo zbijena i povoljna za fundiranje. /						2.5	
3					From 0.5 to 10.0m there is slightly to firmly bound sandy gravel - the conglomerate. Rounded to subrounded boulders sized up to 10 cm are present in the core. Grayish. This unit is very compressed and suitable for foundation.				U-2		3	
3.5											3.5	
4								50 5cm	U-3		4	
4.5											4.5	
5									U-4		5	
5.5			9.2	P,Šlj,Kg						U-5	5.5	
6								50 7.5cm	U-5		6	
6.5											6.5	
7									U-6		7	
7.5											7.5	
8								50 3cm	U-7		8	
8.5											8.5	
9									U-8		9	
9.5										U-6	9.5	
10	19.6	10.0						50 5cm	U-9		10	
10.5											10.5	
11											11	
11.5											11.5	
12											12	
12.5											12.5	
13											13	

LEGEND

gl - Silty - sandy clay, with content of debris and with veins of plants and roots. Under-consolidated unit. Brown.

P,Šlj,Kg - sandy gravel, in general slightly to firmly bound (conglomerate)

Fotografije / Photos

0.00-10.00 m



Koordinate bušotine / Borehole's coordinates

X	4 695 067.115,
Y	6 600 708.451
Z	29.556

INŽENJERSKO-GEOLOŠKI PROFIL BUŠOTINE BH-WN-07
Razmjera 1:50

ENGINEERING-GEOLOGICAL PROFILE OF BOREHOLE BH-WN-07
Scale 1:50



Prečnik bušenja / Diametar of borehole:
Ø 146 mm
Vreme bušenja / Date of drilling:
21. March 2019.

Bušio / Drilled: GEOMIP inženjering
Kartirao / Mapped: M.Matović, M. Z. Matović

Prilog br. 6.7
Appendix No. 6.7

Razmernik / Ruler	Kota / Elevation (m)	Završna dubina End depth (m)	Debljina / Thickness (m)	Litološka oznaka / lithol. denotation	Opis litološko-strukturnog sastava / Description of lithological-structural composition
0	24.5				
1	23.2	1.3	1.3	gl	Prašinasto - peskovita glina, sa sadržajem drobine, prožeta žilicama biljaka i korenjem. Slabo konsolidovana sredina. Braon boje. Sredina koja mora u potpunosti biti uklonjena pri izgradnji objekta, platoa i pristupnih saobraćajnica. / Silty - sandy clay, with lower content of debris. With veins of plants and roots. Under-consolidated unit. Brown. This unit needs to be removed completely during the construction of the facility, platform and access roads.
2			13.7		
3					
4					
5					Od 1.3-15.0m zastupljen peskoviti šljunak, u površinskoj zoni do oko 11.5m slabije ili jače vezan kalcijum karbonatnim ($CaCO_3$) vezivom- konglomerat, dok je u nastavku, do dubine istraživanja slabije vezan do nevezan peskoviti šljunak , sa zaobljenim do poluzaobljenim valucima veličine i do 10cm. Sivkaste boje. Sredina zbijena do vrlo zbijena i povoljna za fundiranje. U zoni gde su nevezani do slabije vezani imaju nepovoljnija fizičko-mehanička svojstva u odnosu na jače vezanu zonu površinsku zonu. / From 1.3-15.0m there is sandy gravel, at surface area till around 11.5m it is slightly or firmly bound by a calcium carbonate ($CaCO_3$) binder- the conglomerate , while further, till the studied depth, there is slightly bound to loose sandy gravel, with rounded to subrounded boulders sized even up to 10 cm. Grayish. This unit is compressed to very compressed and suitable for foundation. In area where they are loose to slightly bound, they have more adverse physical - mechanical properties in comparison to the firmly bound surface area .
6					
7					
8					
9					
10				P,Šlj,Kg	
11					
12					
13					
14					
15	9.5	15.0			
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					

Grafički prikaz jezgra / Graphic presen.of core	RQD (%)	SPT(N)	Uzeti uzorci (GP) / Samples (GP)	Uzeti uzorci (CETI) / Uzeti uzorci (CETI)	Razmernik / Razmernik /	NPV/PPV GWL/AGW
					0	
					1	
		50 9.0cm	U-1		2	
			U-2		3	
		50 4.0cm	U-3		4	
			U-4		5	
		50 7.0cm	U-5		6	
			U-6		7	
		50 11.0cm	U-7		8	
			U-8		9	AGW/PPV 9.2m
		50 7.0cm	U-9		10	NPW/GWL 9.2m 27. March
			U-10		11	
		50 9.0cm	U-11		12	
			U-12		13	
			U-13		14	
			U-14		15	
					16	
					17	
					18	
					19	
					20	
					21	
					22	
					23	
					24	
					25	
					26	

Fotografije / Photos

0.00-15.00 m



Koordinate bušotine / Borehole's coordinates

X	4 695 067.115
Y	6 600 475.730
Z	24.495

INŽENJERSKO-GEOLOŠKI PROFIL BUŠOTINE BH-WN-08
Razmjera 1:100

ENGINEERING-GEOLOGICAL PROFILE OF BOREHOLE BH-WN-08
Scale 1:100

LEGEND

gl - Silty - sandy clay, with content of debris and with veins of plants and roots. Under-consolidated unit. Brown.

P,Šlj,Kg - sandy gravel, at surface it is slightly or firmly bound by a calcium carbonate ($CaCO_3$) binder- the conglomerate till around 11.5m, while further, till the studied depth there is loosely bound to unbound sandy gravel.

Prečnik bušenja / Diametar of borehole:
Ø 146 mm
Vreme bušenja / Date of drilling:
27. March 2019.

Bušio / Drilled: GEOMIP inženjering
Kartirao / Mapped: M.Matović, M. Z. Matović

Prilog br. 6.8
Appendix No. 6.8

REZULTATI OPITA DPH /

RESULTS OF DPH TESTS

Prilog br. 9
Appendix # 9

Dinamička penetracija DPH
Dinamično sondiranje DPH

DYNAMIC PROBING DPH

EN ISO 22476-2:2005

Oznaka DP / DP MARK: **DPH -WN- 01**

Objekat / STRUCTURE: **Novo postrojenje za prečišćavanje**

Stacionaža / CHAINAGE:

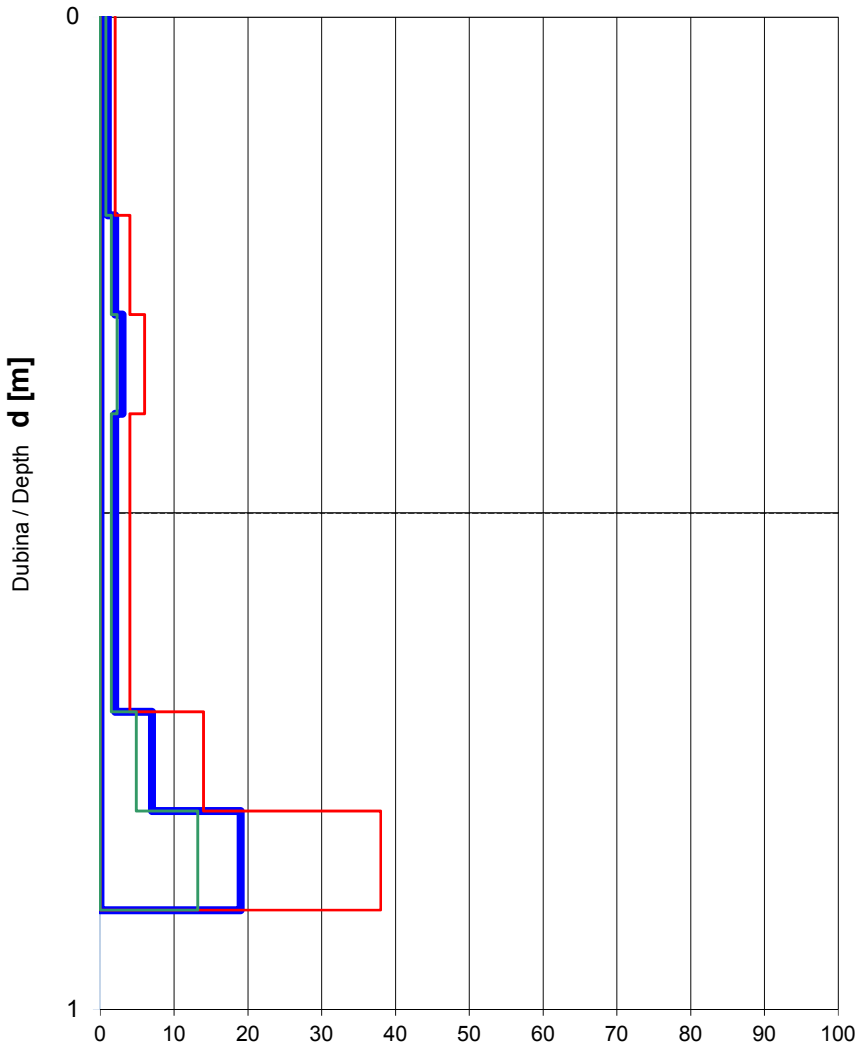
Koordinata/COORDINATE:

Pribor / EQUIPMENT: **UMSD DPH, m=50 kg/h=0.5 cm, E_n=167 kJ/m^2, E_r=68%, cone: 15 cm^2/90°**

Primjedbe / REMARKS:

Datum / DATE OF TEST: **25.4.2019**

Testirao / TESTED BY: **Maksim Matović**



N_{10} (Broj udaraca/10 cm; NUMBER OF BLOWS /10cm)

q_d [MPA] (Dinam. otpor tla, DYNAMIC POINT RESISTANCE)

N_{SPT} (Ekvivalentan br. ud. SPT; EQUIVALENT SPT NUMBER)

Obradio/PREPARED BY:

Datum / DATE: 25.4.2019

d [m]	N_{10}	q_d[MPa]	N_{SPT}
0.1	1	0.8	2.0
0.2	1	0.8	2.0
0.3	2	1.5	4.0
0.4	3	2.3	6.0
0.5	2	1.5	4.0
0.6	2	1.5	4.0
0.7	2	1.5	4.0
0.8	7	4.9	14.0
0.9	19	13.2	38.0

Dinamička penetracija DPH
Dinamično sondiranje DPH

DYNAMIC PROBING DPH

EN ISO 22476-2:2005

Oznaka DP / DP MARK: **DPH-WN-02**

Objekat / STRUCTURE: **Novo postrojenje za prečišćavanje**

Stacionaža / CHAINAGE:

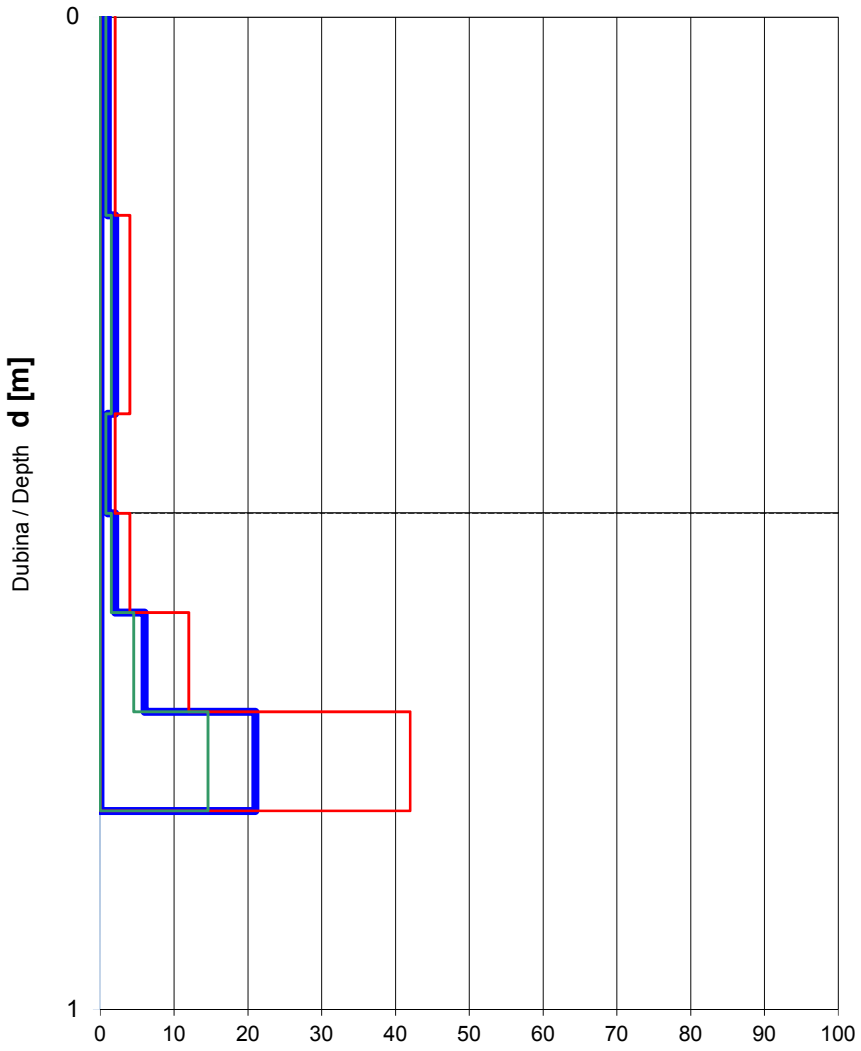
Koordinata/COORDINATE:

Pribor / EQUIPMENT: **UMSD DPH, m=50 kg/h=0.5 cm, E_n=167 kJ/m^2, E_r=68%, cone: 15 cm^2/90°**

Primjedbe / REMARKS:

Datum / DATE OF TEST: **25.4.2019**

Testirao / TESTED BY: **Maksim Matović**



N_{10} (Broj udaraca/10 cm; NUMBER OF BLOWS /10cm)

q_d [MPA] (Dinam. otpor tla, DYNAMIC POINT RESISTANCE)

N_{SPT} (Ekvivalentan br. ud. SPT; EQUIVALENT SPT NUMBER)

Obradio/PREPARED BY:S.Poleksić

Datum / DATE: 25.4.2019

d [m]	N_{10}	q_d[MPa]	N_{SPT}
0.1	1	0.8	2.0
0.2	1	0.8	2.0
0.3	2	1.5	4.0
0.4	2	1.5	4.0
0.5	1	0.8	2.0
0.6	2	1.5	4.0
0.7	6	4.5	12.0
0.8	21	14.6	42.0

Dinamička penetracija DPH
Dinamično sondiranje DPH

DYNAMIC PROBING DPH

EN ISO 22476-2:2005

Oznaka DP / DP MARK: **DPH-WN-03**

Objekat / STRUCTURE: **Novo postrojenje za prečišćavanje**

Stacionaža / CHAINAGE:

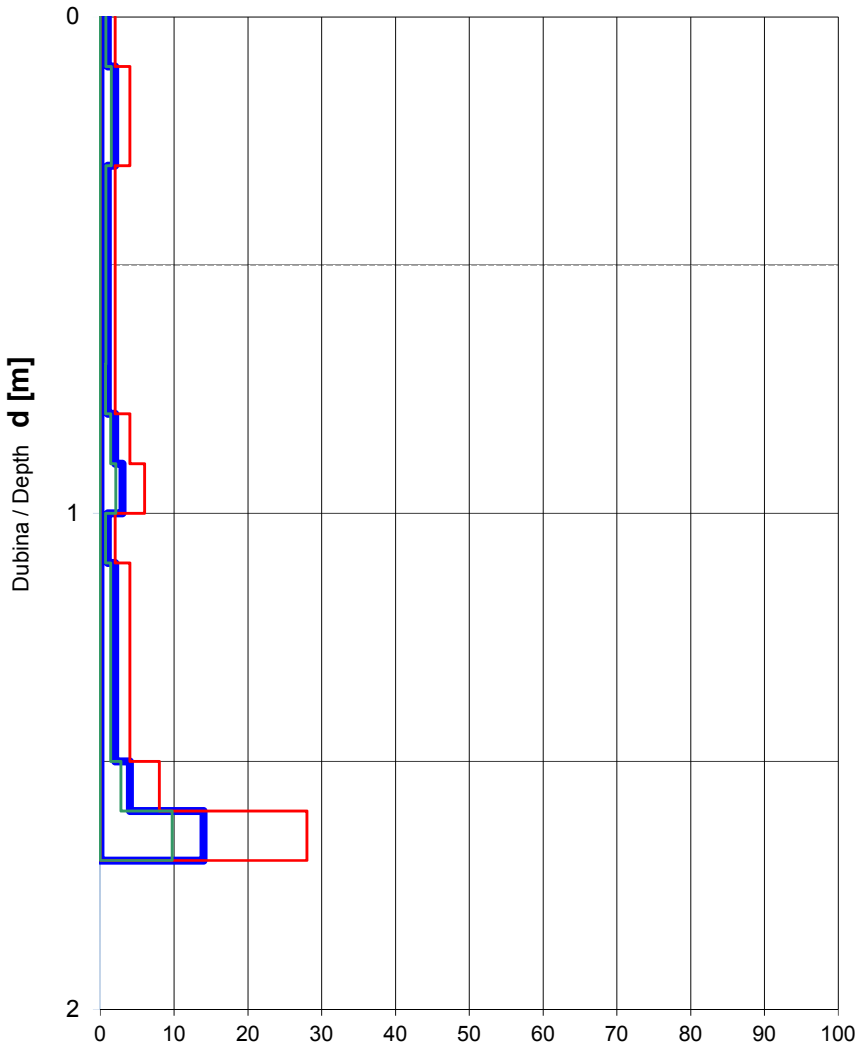
Koordinata/COORDINATE:

Pribor / EQUIPMENT: **UMSD DPH, m=50 kg/h=0.5 cm, E_n=167 kJ/m^2, E_r=68%, cone: 15 cm^2/90°**

Primjedbe / REMARKS:

Datum / DATE OF TEST: **25.4.2019**

Testirao / TESTED BY: **Maksim Matović**



N_{10} (Broj udaraca/10 cm; NUMBER OF BLOWS /10cm)

q_d [MPA] (Dinam. otpor tla, DYNAMIC POINT RESISTANCE)

N_{SPT} (Ekvivalentan br. ud. SPT; EQUIVALENT SPT NUMBER)

Obradio/PREPARED BY:S.Poleksić

Datum / DATE: 25.4.2019

d [m]	N_{10}	q_d[MPa]	N_{SPT}
0.1	1	0.8	2.0
0.2	2	1.5	4.0
0.3	2	1.5	4.0
0.4	1	0.8	2.0
0.5	1	0.8	2.0
0.6	1	0.8	2.0
0.7	1	0.8	2.0
0.8	1	0.7	2.0
0.9	2	1.4	4.0
1.0	3	2.1	6.0
1.1	1	0.7	2.0
1.2	2	1.4	4.0
1.5	2	1.4	4.0
1.6	4	2.8	8.0
1.7	14	9.7	28.0

RAZULTATI LABORATORIJSKIH ISPITIVANJA UZORAKA TLA /

RESULTS OF LABORATORY TESTS

Prilog br. 10
Appendix # 10

D.O.O. ZA PROJEKTOVANJE, INŽENJERING, PROMET I USLUGE EXPORT-IMPORT Podgorica
Studentska br.4;Tel.fax 020/269-221; 262-221;Mob.tel.069/211-667; 069/061-038

TABELARNI PREGLED REZULTATA LABORATORIJSKIH GEOMEHANIČKIH ISPITIVANJA UZORAKA
TLA / TABLE OF RESULTS OF LABORATORY GEOTEHNICAL ANALYSIS OF SOIL SAMPLES

Objekat / Object: **Novo postrojenje za prečišćavanje, glavni kolektor, postrojenje za predtretman otpadnih voda na lokaciji Vinarije 13.jul i sekundarna kanalizaciona mreža / New waste water treatment plant, the main transfer collector, waste water pretreatment plant on location of Winery 13.jul and extension of secondary sewer network, Podgorica**

Labor. broj uzorka / Lab. Num.	Oznaka istražnog rada /Mark of investigation work	Dubina uzimanja uzorka / Depth of taking samples (m)	prirodna vlažnost / moisture	Aterbergove granice / Aterberg limit				granulometrijski sastav / grain-size										Zapreminska masa / Density			Proctor-ov opit/experiment		CBR vrijednost / CBR value	opit edometarske stišljivosti / experience oedometer compressibility				direktno smicanje/direct shearing	
				Granica tečenja / Liquid limit	Granica plastičnosti / Plastic Limit	Indeks plastičnosti / Plasticity index	Indeks konsistencije / Consistency index	glina / clay < 0,002mm	prašina / silt 0,002 0,06mm	pijesak / sand 0,06-2,0 mm			šljunak / gravel 2,0-60 mm			drobina / debris > 60mm		vlažna / moisture	suva/dry	čvrstih čestica/of without pores				Modul of compressibility Ms				ugao unutraš. trenja/friction angle	kohezija / cohesion
										sitan/fine 0.06-0.2	srednji/medium 0.2-0.6	krupan/coarse 0.6-2	sitan/fine 2-6	srednji/medium 6-20	krupan/coarse 20-60									opterećenje / load					
																					w_{opt}	ρ_{dmax}		0-50	50-100	100-200	200-400	φ	c
			W (%)	LL (%)	PL (%)	Ip	Ic	(%)										(g/cm^3)			(%)	(g/cm^3)	(%)	(kN/m^2)					(°)	(kN/m^2)
87	BH-WN-03	0,80-1,00	2,4					8		20			72																
										3	8	9	14	37	21														
88	BH-WN-03	2,80-3,00						13		21			66							2,70									
								1	12	4	9	8	8	16	42														
89	BH-WN-03	5,80-6,00						6		19			61			14													
										3	11	5	9	27	25														
90	BH-WN-03																				5,43	2,31	11						
91	BH-WN-04																				6,00	2,32	13						
106	BH-WN-04	3,80-4,00						7		12			81							2,68									
										2	5	5	11	39	31														
107	BH-WN-04	7,80-8,00						7		15			78																
										3	5	7	8	25	45														
108	BH-WN-05	2,80-3,00						10		23			67																
										4	10	9	14	34	19														
109	BH-WN-05	4,80-5,00	1,03					9		15			61			15				2,69									
										3	8	4	4	20	37														
110	BH-WN-05	7,80-8,00						5		12			83																
										2	5	5	8	26	49														

Prilog br./Appendix 1.1

D.O.O. ZA PROJEKTOVANJE, INŽENJERING, PROMET I USLUGE EXPORT-IMPORT Podgorica
Studentska br.4;Tel.fax 020/269-221; 262-221;Mob.tel.069/211-667; 069/061-038

TABELARNI PREGLED REZULTATA LABORATORIJSKIH GEOMEHANIČKIH ISPITIVANJA UZORAKA
TLA / TABLE OF RESULTS OF LABORATORY GEOTEHNICAL ANALYSIS OF SOIL SAMPLES

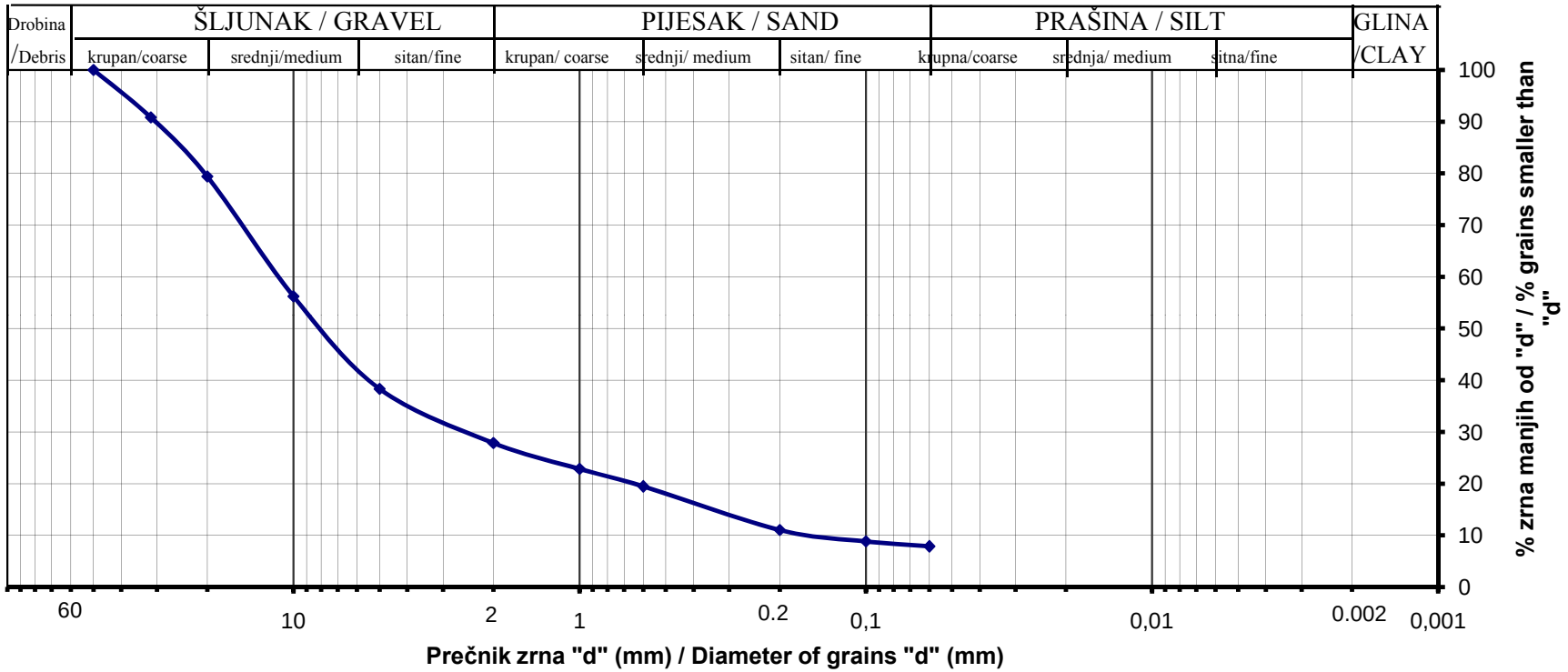
Objekat / Object: **Novo postrojenje za prečišćavanje, glavni kolektor, postrojenje za predtretman otpadnih voda na lokaciji Vinarije 13.jul i sekundarna kanalizaciona mreža / New waste water treatment plant, the main transfer collector, waste water pretreatment plant on location of Winery 13.jul and extension of secondary sewer network, Podgorica**

Labor. broj uzorka / Lab. Num.	Oznaka istražnog rada /Mark of investigation work	Dubina uzimanja uzorka / Depth of taking samples (m)	prirodna vlažnost / moisture	Aterbergove granice / Aterberg limit				granulometrijski sastav / grain-size									Zapreminska masa / Density			Proctor-ov opit/experiment		CBR vrijednost / CBR value	opit edometarske stišljivosti / experience oedometer compressibility				direktno smicanje/direct shearing	
				Granica tečenja / Liquid limit	Granica plastičnosti / Plastic Limit	Indeks plastičnosti / Plasticity index	Indeks konsistencije / Consistency index	glina / clay < 0,002mm	prašina / silt 0,002 0,06mm	pijesak / sand 0,06-2,0 mm			šljunak / gravel 2,0-60 mm			drobina / debris > 60mm	vlažna / moisture	suva/dry	čvrstih čestica/of without pores				Modul of compressibility Ms				ugao unutraš. trenja/friction angle	kohezija / cohesion
																							opterećenje / load					
										sitan/fine 0.06-0.2	srednji/medium 0.2-0.6	krupan/coarse 0.6-2	sitan/fine 2-6	srednji/medium 6-20	krupan/coarse 20-60					w_{opt}	ρ_{dmax}		0-50	50-100	100-200	200-400	φ	c
			W (%)	LL (%)	PL (%)	Ip	Ic	(%)									(g/cm^3)			(%)	(g/cm^3)	(%)	(kN/m^2)				(°)	(kN/m^2)
111	BH-WN-06	1,80-2,00						9		28			63															
										5	12	11	15	31	17													
112	BH-WN-06	9,80-10,00						3		14			83						2,68									
										2	5	7	11	29	43													
113	BH-WN-06	15,80-16,00						5		22			73															
										3	9	10	13	25	35													
114	BH-WN-06	19,80-20,00	2,5					3		12			85															
										1	6	5	10	32	43													
115	BH-WN-06																			6,11	2,30	14						
116	BH-WN-07	3,80-4,00						8		33			59															
										6	15	12	10	24	25													
117	BH-WN-07	6,80-7,00						10		38			52						2,69									
										3	16	19	12	23	17													
118	BH-WN-07	9,80-10,00						4		15			81															
										2	5	8	11	30	40													
120	BH-WN-08	4,80-5,00						7		34			59															
										7	15	12	9	17	33													
122	BH-WN-08	14,80-15,00	1,33					2		14			51			33			2,68									
										2	8	4	8	29	14													

Prilog br./Appendix 1.2

GP	OBJEKAT / OBJECT:	**Novo postrojenje za prečišćavanje, glavni kolektor, postrojenje za predtretman otpadnih voda na lokaciji Vinarije 13.jul i sekundarna kanalizaciona mreža / New waste water treatment plant, the main transfer collector, waste water pretreatment plant on location of Winery 13.jul and extension of secondary sewer network, Podgorica**	**Prilog br. / Appendix 2.1**

DIJAGRAM GRANULOMETRIJSKOG SASTAVA/GRAIN-SIZE CURVE Metoda ispitivanja/Testing method: **JUS.U.B1.018. 2005., EC 7 Part 2: 1997., BS 1377: Part 2: 1990.**



Labor.br.uzorka/Labor. No of sample:	**87**
Oznaka istražnog rada/Mark of research work:	**BH-WN-03**
Dubina uzimanja uzorka (m)/Sampling depth:	**0,80-1,00**

d_{60}	d_{10}	U	d_{30}	C_z	d_{20}	k_f
mm	mm		mm		mm	cm/s
12	0,18	**66,7**	2,6	**3,1**	0,65	1,34E-01

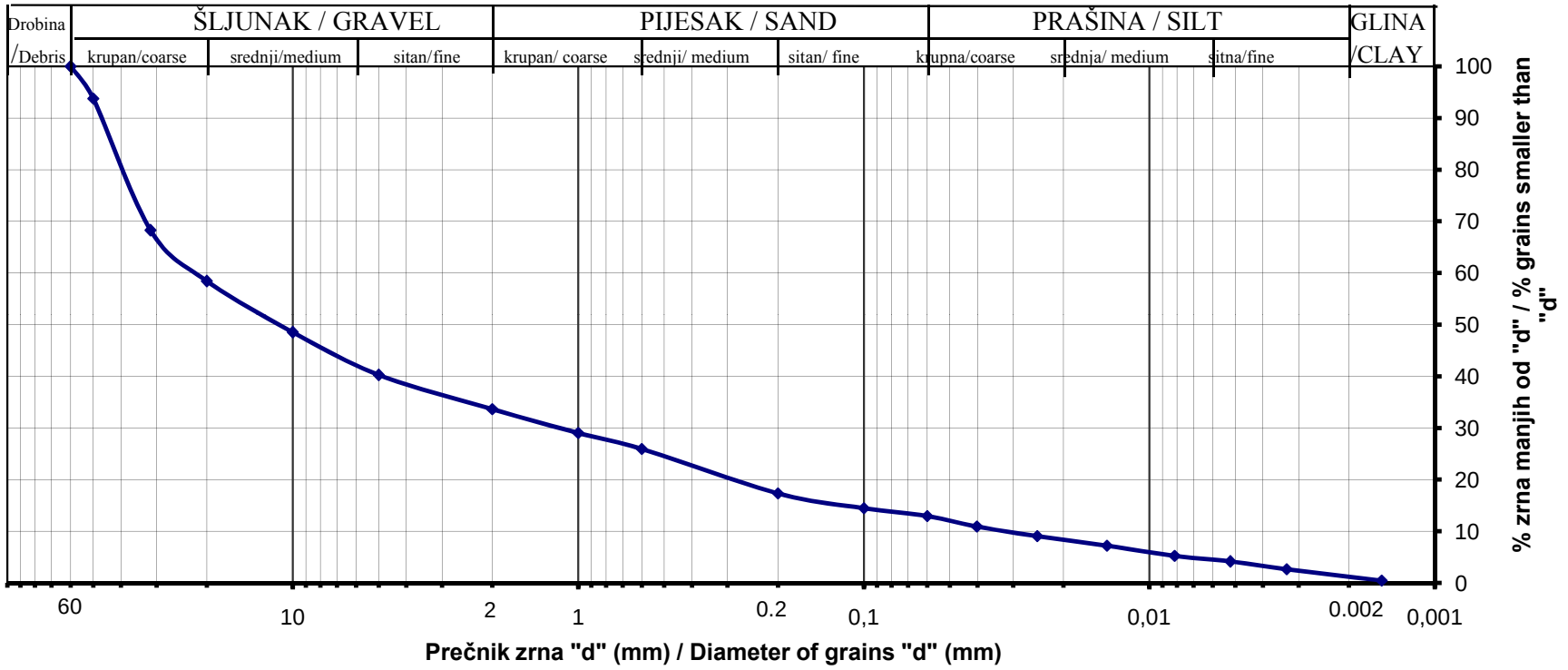
Podgorica:
maj 2019.

Ispitao/Tested by:
Ana Vojinović, dipl.ing.geol.

Odgovorni inženjer/Engineer in charge:
Milica Popović, dipl.ing.geol.

GP	OBJEKAT / OBJECT:	**Novo postrojenje za prečišćavanje, glavni kolektor, postrojenje za predtretman otpadnih voda na lokaciji Vinarije 13.jul i sekundarna kanalizaciona mreža / New waste water treatment plant, the main transfer collector, waste water pretreatment plant on location of Winery 13.jul and extension of secondary sewer network, Podgorica**	**Prilog br. / Appendix 2.2**

DIJAGRAM GRANULOMETRIJSKOG SASTAVA/GRAIN-SIZE CURVE Metoda ispitivanja/Testing method: **JUS.U.B1.018. 2005., EC 7 Part 2: 1997., BS 1377: Part 2: 1990.**



Labor.br.uzorka/Labor. No of sample:	**88**
Oznaka istražnog rada/Mark of research work:	**BH-WN-03**
Dubina uzimanja uzorka (m)/Sampling depth:	**2,80-3,00**

d_{60}	d_{10}	U	d_{30}	C_z	d_{20}	k_f
mm	mm		mm		mm	cm/s
22	0,032	**687,5**	1,2	**2,0**	0,29	2,09E-02

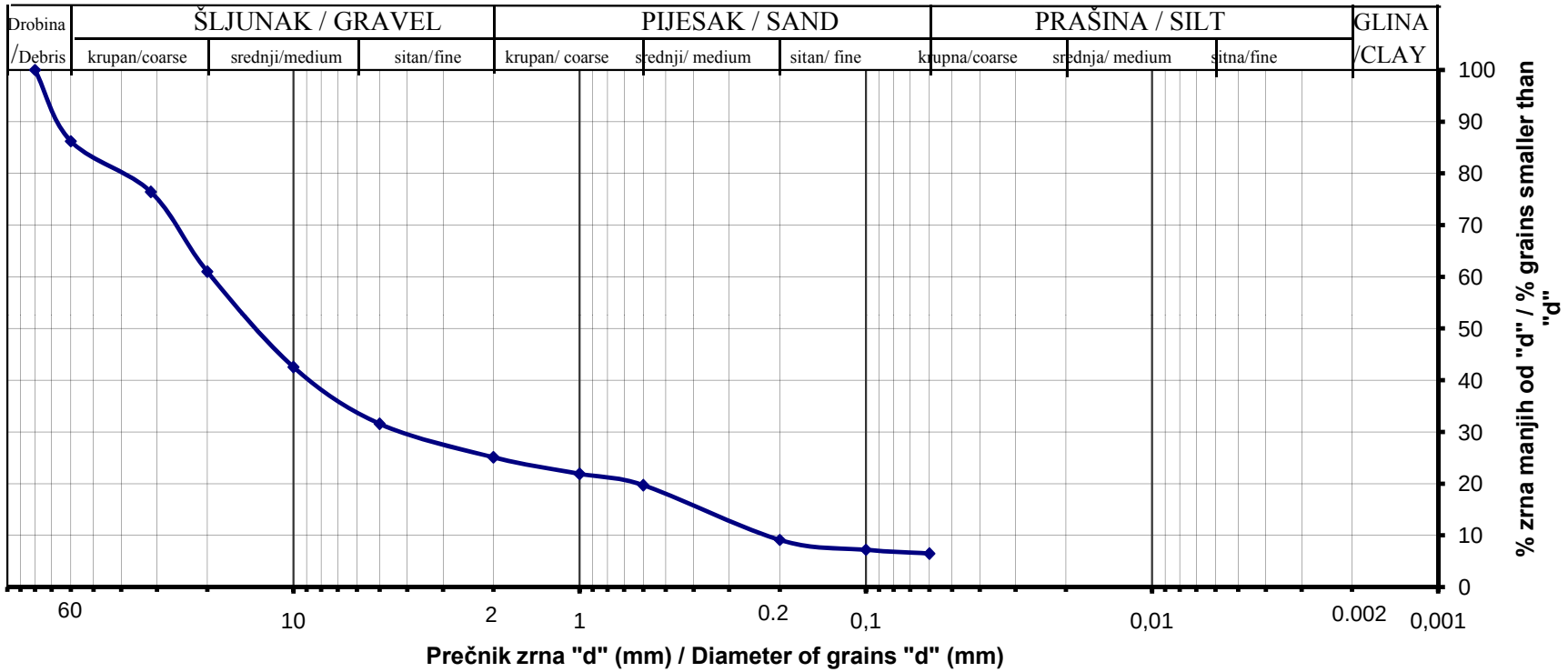
Podgorica:
maj 2019.

Ispitao/Tested by:
Ana Vojinović, dipl.ing.geol.

Odgovorni inženjer/Engineer in charge:
Milica Popović, dipl.ing.geol.

GP	OBJEKAT / OBJECT:	**Novo postrojenje za prečišćavanje, glavni kolektor, postrojenje za predtretman otpadnih voda na lokaciji Vinarije 13.jul i sekundarna kanalizaciona mreža / New waste water treatment plant, the main transfer collector, waste water pretreatment plant on location of Winery 13.jul and extension of secondary sewer network, Podgorica**	**Prilog br. / Appendix 2.3**

DIJAGRAM GRANULOMETRIJSKOG SASTAVA/GRAIN-SIZE CURVE Metoda ispitivanja/Testing method: **JUS.U.B1.018. 2005., EC 7 Part 2: 1997., BS 1377: Part 2: 1990.**



Labor.br.uzorka/Labor. No of sample:	**89**
Oznaka istražnog rada/Mark of research work:	**BH-WN-03**
Dubina uzimanja uzorka (m)/Sampling depth:	**5,80-6,00**

d_{60}	d_{10}	U	d_{30}	C_z	d_{20}	k_f
mm	mm		mm		mm	cm/s
19	0,22	**86,4**	4,2	**4,2**	0,62	1,20E-01

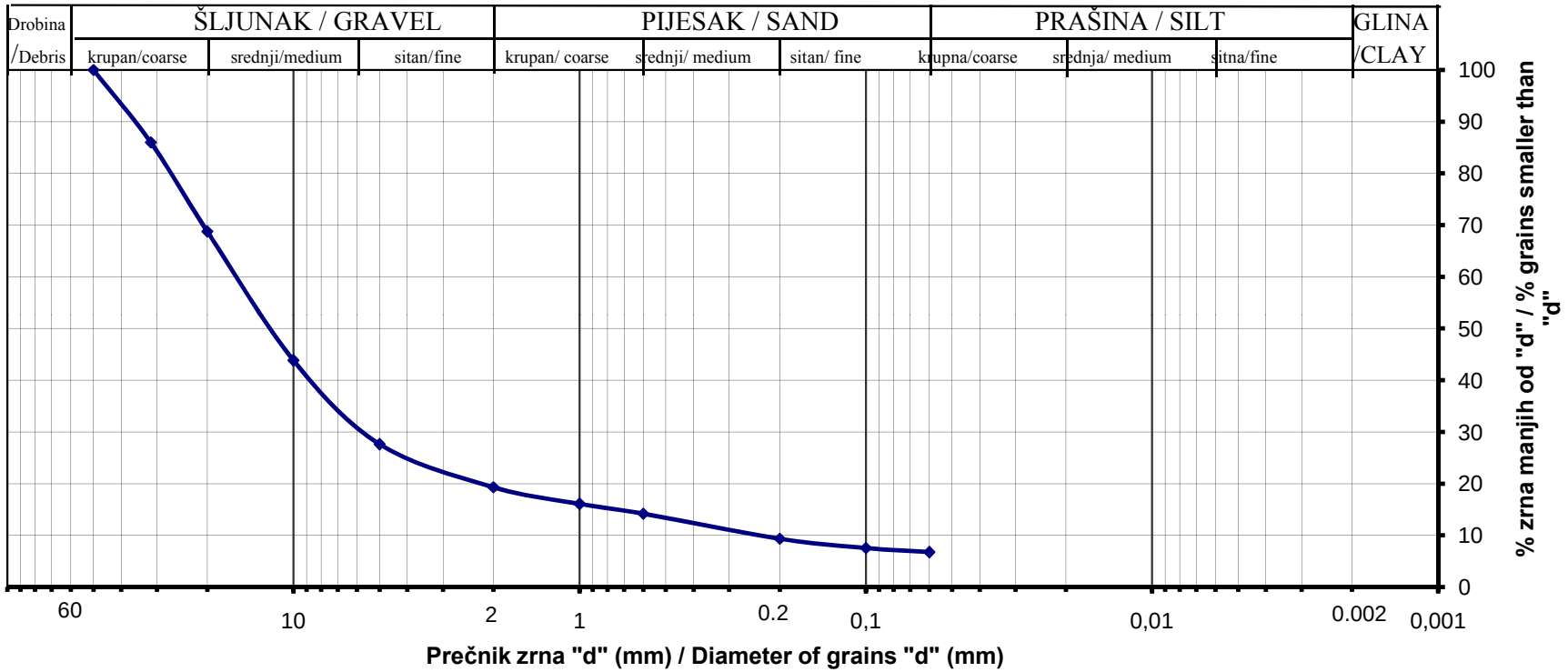
Podgorica:
maj 2019.

Ispitao/Tested by:
Ana Vojinović, dipl.ing.geol.

Odgovorni inženjer/Engineer in charge:
Milica Popović, dipl.ing.geol.

GP	OBJEKAT / OBJECT:	**Novo postrojenje za prečišćavanje, glavni kolektor, postrojenje za predtretman otpadnih voda na lokaciji Vinarije 13.jul i sekundarna kanalizaciona mreža / New waste water treatment plant, the main transfer collector, waste water pretreatment plant on location of Winery 13.jul and extension of secondary sewer network, Podgorica**	**Prilog br. / Appendix 2.4**

DIJAGRAM GRANULOMETRIJSKOG SASTAVA/GRAIN-SIZE CURVE Metoda ispitivanja/Testing method: **JUS.U.B1.018. 2005., EC 7 Part 2: 1997., BS 1377: Part 2: 1990.**



Labor.br.uzorka/Labor. No of sample:	**106**
Oznaka istražnog rada/Mark of research work:	**BH-WN-04**
Dubina uzimanja uzorka (m)/Sampling depth:	**3,80-4,00**

d_{60}	d_{10}	U	d_{30}	C_z	d_{20}	k_f
mm	mm		mm		mm	cm/s
17	0,22	**77,3**	5,8	**9,0**	2,1	1,98E+00

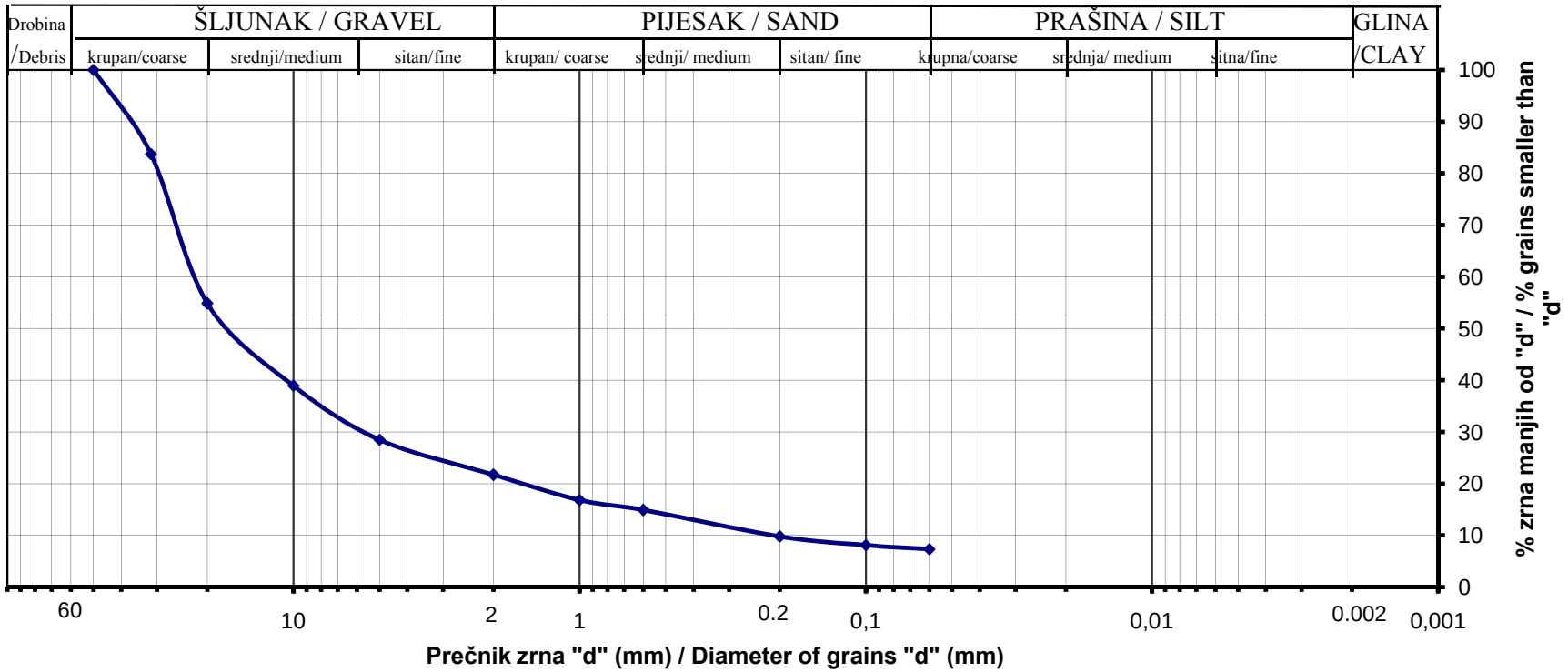
Podgorica:
maj 2019.

Ispitao/Tested by:
Ana Vojinović, dipl.ing.geol.

Odgovorni inženjer/Engineer in charge:
Milica Popović, dipl.ing.geol.

GP	OBJEKAT / OBJECT:	**Novo postrojenje za prečišćavanje, glavni kolektor, postrojenje za predtretman otpadnih voda na lokaciji Vinarije 13.jul i sekundarna kanalizaciona mreža / New waste water treatment plant, the main transfer collector, waste water pretreatment plant on location of Winery 13.jul and extension of secondary sewer network, Podgorica**	**Prilog br. / Appendix 2.5**

DIJAGRAM GRANULOMETRIJSKOG SASTAVA/GRAIN-SIZE CURVE Metoda ispitivanja/Testing method: **JUS.U.B1.018. 2005., EC 7 Part 2: 1997., BS 1377: Part 2: 1990.**



Labor.br.uzorka/Labor. No of sample:	**107**
Oznaka istražnog rada/Mark of research work:	**BH-WN-04**
Dubina uzimanja uzorka (m)/Sampling depth:	**7,80-8,00**

d_{60}	d_{10}	U	d_{30}	C_z	d_{20}	k_f
mm	mm		mm		mm	cm/s
22	0,2	**110,0**	5,8	**7,6**	1,7	1,22E+00

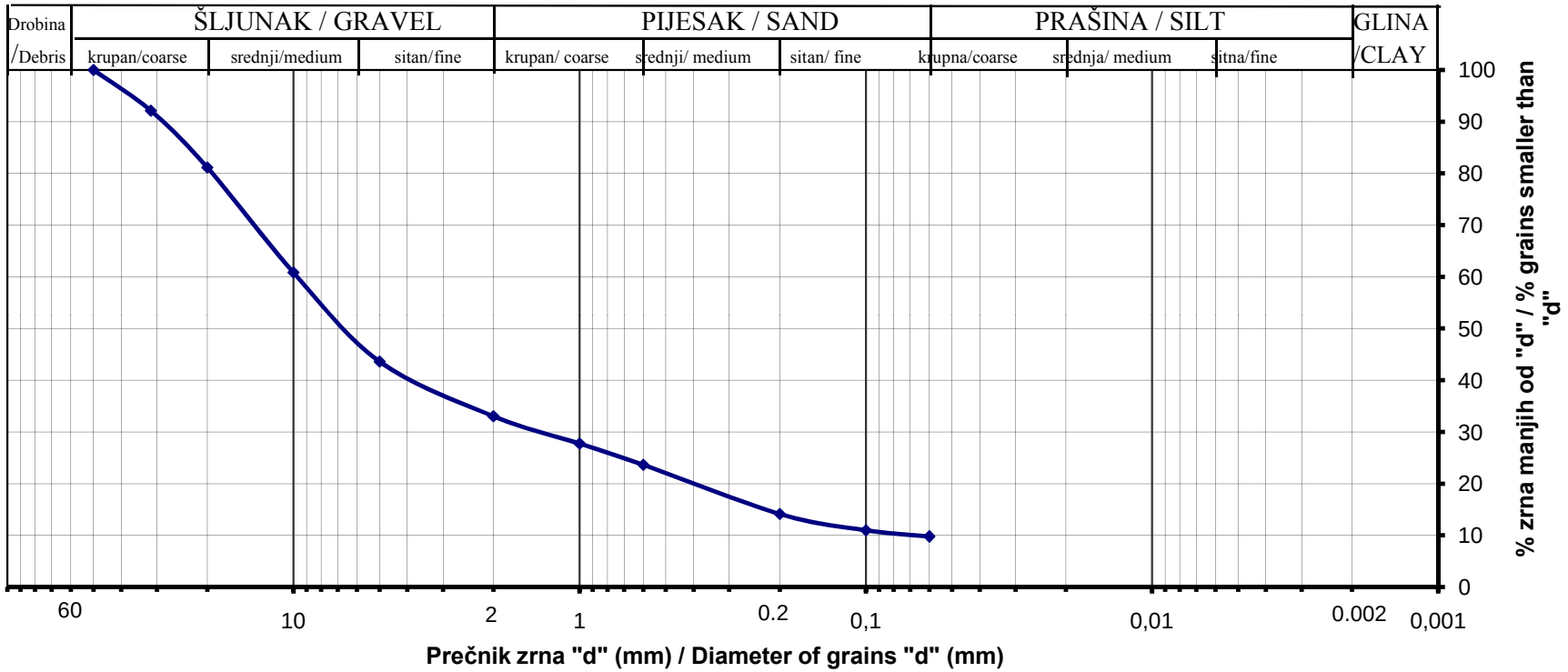
Podgorica:
maj 2019.

Ispitao/Tested by:
Ana Vojinović, dipl.ing.geol.

Odgovorni inženjer/Engineer in charge:
Milica Popović, dipl.ing.geol.

GP	OBJEKAT / OBJECT:	**Novo postrojenje za prečišćavanje, glavni kolektor, postrojenje za predtretman otpadnih voda na lokaciji Vinarije 13.jul i sekundarna kanalizaciona mreža / New waste water treatment plant, the main transfer collector, waste water pretreatment plant on location of Winery 13.jul and extension of secondary sewer network, Podgorica**	**Prilog br. / Appendix 2.6**

DIJAGRAM GRANULOMETRIJSKOG SASTAVA/GRAIN-SIZE CURVE Metoda ispitivanja/Testing method: **JUS.U.B1.018. 2005., EC 7 Part 2: 1997., BS 1377: Part 2: 1990.**



Labor.br.uzorka/Labor. No of sample:	**108**
Oznaka istražnog rada/Mark of research work:	**BH-WN-05**
Dubina uzimanja uzorka (m)/Sampling depth:	**2,80-3,00**

d_{60}	d_{10}	U	d_{30}	C_z	d_{20}	k_f
mm	mm		mm		mm	cm/s
9,8	0,07	**140,0**	1,4	**2,9**	0,4	4,38E-02

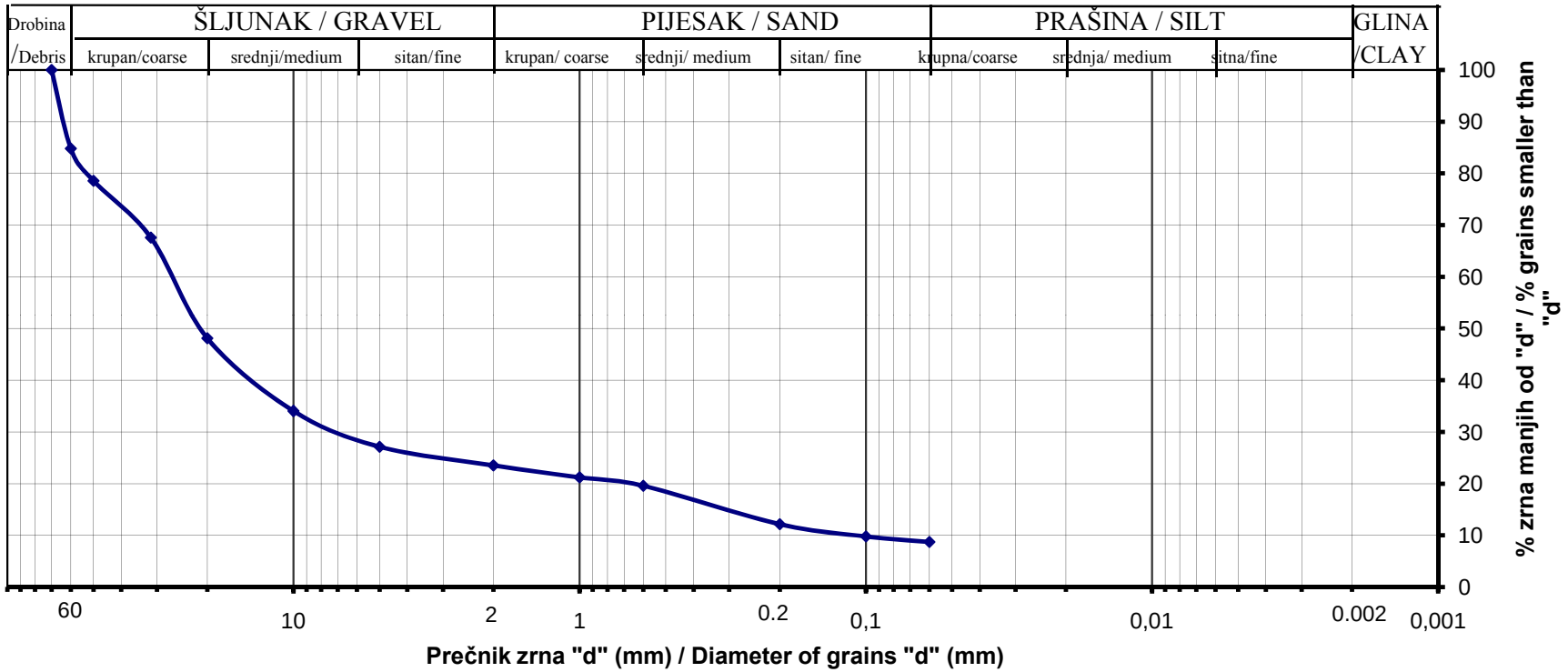
Podgorica:
maj 2019.

Ispitao/Tested by:
Ana Vojinović, dipl.ing.geol.

Odgovorni inženjer/Engineer in charge:
Milica Popović, dipl.ing.geol.

GP	OBJEKAT / OBJECT:	**Novo postrojenje za prečišćavanje, glavni kolektor, postrojenje za predtretman otpadnih voda na lokaciji Vinarije 13.jul i sekundarna kanalizaciona mreža / New waste water treatment plant, the main transfer collector, waste water pretreatment plant on location of Winery 13.jul and extension of secondary sewer network, Podgorica**	**Prilog br. / Appendix 2.7**

DIJAGRAM GRANULOMETRIJSKOG SASTAVA/GRAIN-SIZE CURVE Metoda ispitivanja/Testing method: **JUS.U.B1.018. 2005., EC 7 Part 2: 1997., BS 1377: Part 2: 1990.**



Labor.br.uzorka/Labor. No of sample:	**109**
Oznaka istražnog rada/Mark of research work:	**BH-WN-05**
Dubina uzimanja uzorka (m)/Sampling depth:	**4,80-5,00**

d_{60}	d_{10}	U	d_{30}	C_z	d_{20}	k_f
mm	mm		mm		mm	cm/s
17	0,12	**141,7**	7,2	**25,4**	0,65	1,34E-01

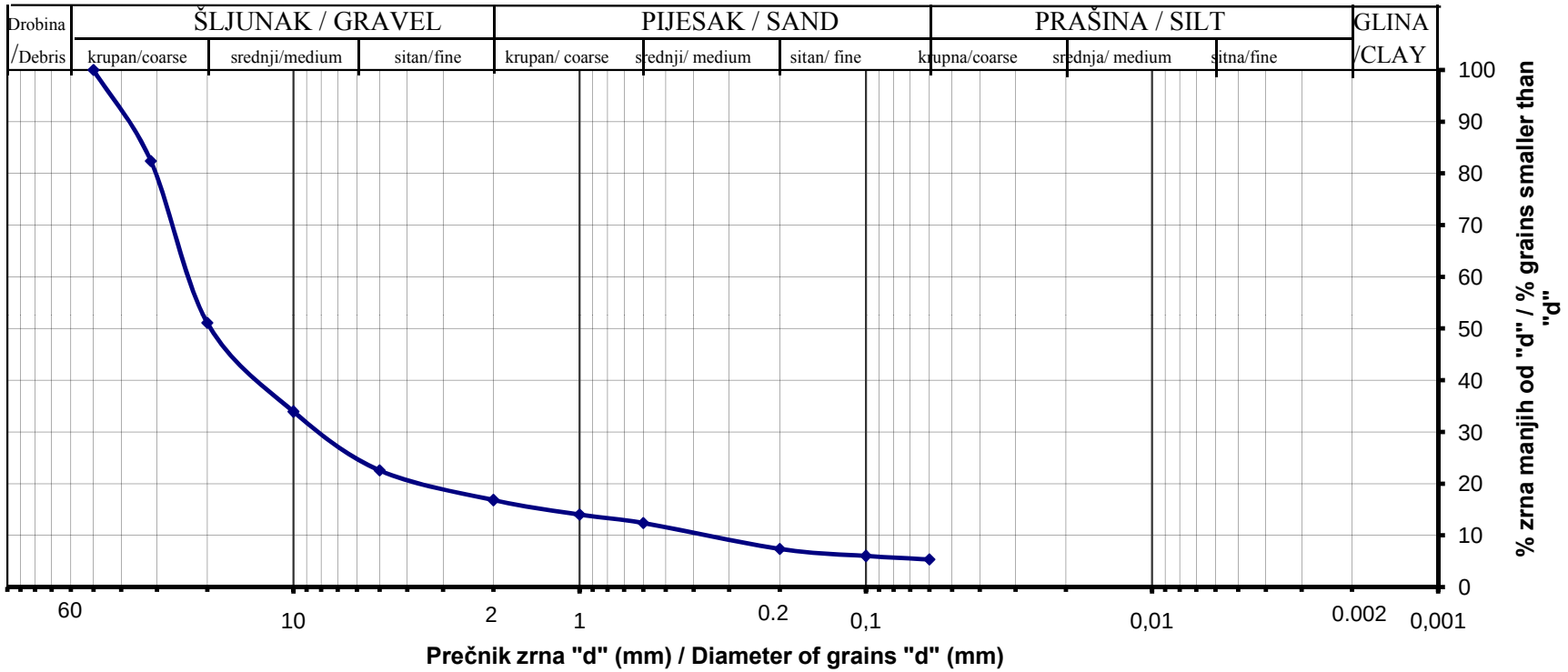
Podgorica:
maj 2019.

Ispitao/Tested by:
Ana Vojinović, dipl.ing.geol.

Odgovorni inženjer/Engineer in charge:
Milica Popović, dipl.ing.geol.

GP	OBJEKAT / OBJECT:	**Novo postrojenje za prečišćavanje, glavni kolektor, postrojenje za predtretman otpadnih voda na lokaciji Vinarije 13.jul i sekundarna kanalizaciona mreža / New waste water treatment plant, the main transfer collector, waste water pretreatment plant on location of Winery 13.jul and extension of secondary sewer network, Podgorica**	**Prilog br. / Appendix 2.8**

DIJAGRAM GRANULOMETRIJSKOG SASTAVA/GRAIN-SIZE CURVE Metoda ispitivanja/Testing method: **JUS.U.B1.018. 2005., EC 7 Part 2: 1997., BS 1377: Part 2: 1990.**



Labor.br.uzorka/Labor. No of sample:	**110**
Oznaka istražnog rada/Mark of research work:	**BH-WN-05**
Dubina uzimanja uzorka (m)/Sampling depth:	**7,80-8,00**

d_{60}	d_{10}	U	d_{30}	C_z	d_{20}	k_f
mm	mm		mm		mm	cm/s
23	0,37	**62,2**	8,2	**7,9**	3,7	7,30E+00

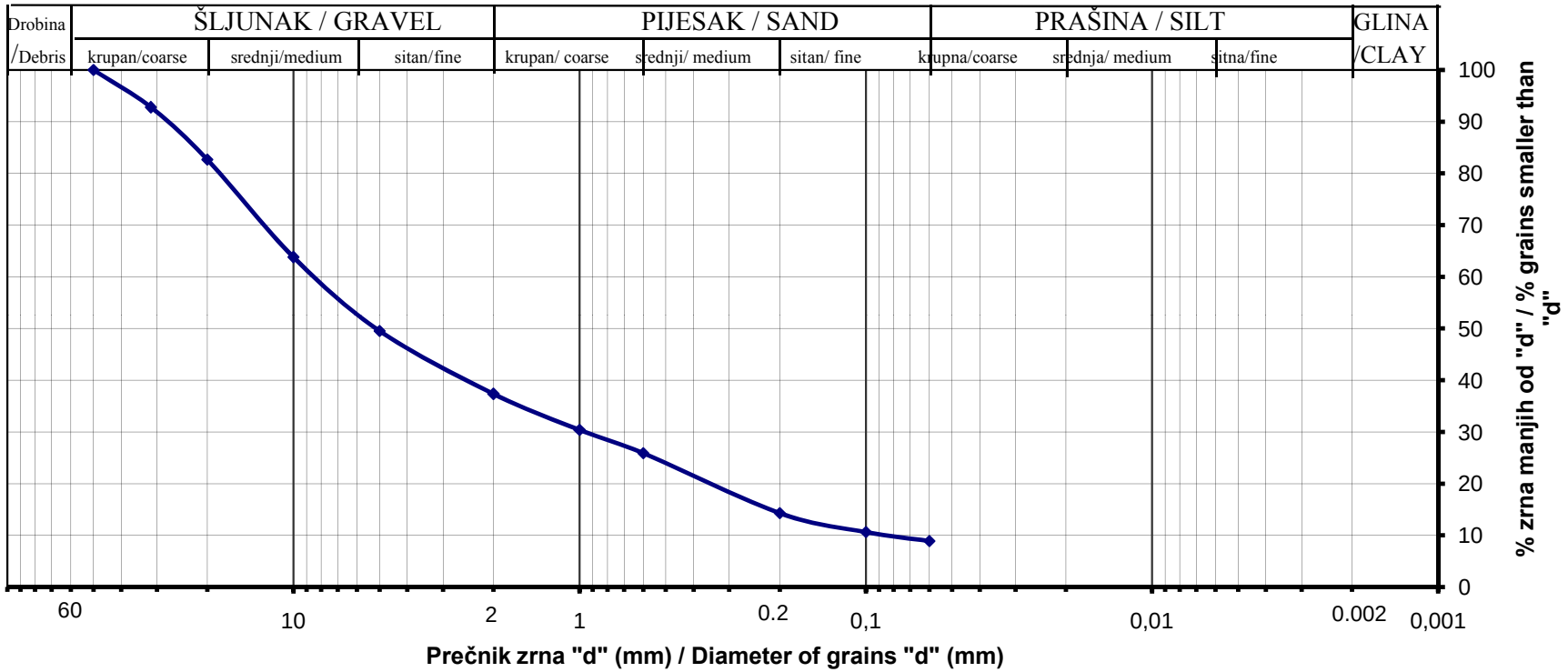
Podgorica:
maj 2019.

Ispitao/Tested by:
Ana Vojinović, dipl.ing.geol.

Odgovorni inženjer/Engineer in charge:
Milica Popović, dipl.ing.geol.

GP	OBJEKAT / OBJECT:	**Novo postrojenje za prečišćavanje, glavni kolektor, postrojenje za predtretman otpadnih voda na lokaciji Vinarije 13.jul i sekundarna kanalizaciona mreža / New waste water treatment plant, the main transfer collector, waste water pretreatment plant on location of Winery 13.jul and extension of secondary sewer network, Podgorica**	**Prilog br. / Appendix 2.9**

DIJAGRAM GRANULOMETRIJSKOG SASTAVA/GRAIN-SIZE CURVE Metoda ispitivanja/Testing method: **JUS.U.B1.018. 2005., EC 7 Part 2: 1997., BS 1377: Part 2: 1990.**



Labor.br.uzorka/Labor. No of sample:	**111**
Oznaka istražnog rada/Mark of research work:	**BH-WN-06**
Dubina uzimanja uzorka (m)/Sampling depth:	**1,80-2,00**

d_{60}	d_{10}	U	d_{30}	C_z	d_{20}	k_f
mm	mm		mm		mm	cm/s
8,6	0,085	**101,2**	0,96	**1,3**	0,35	3,22E-02

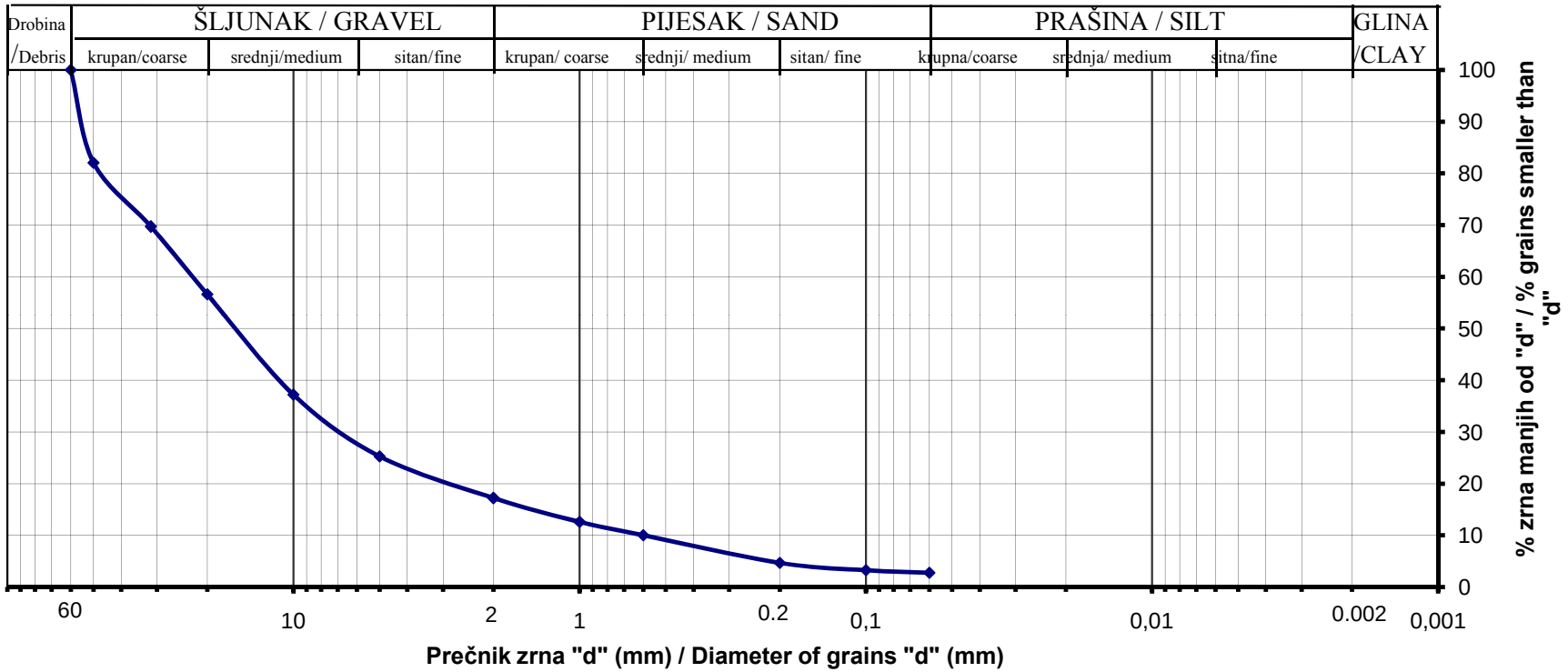
Podgorica:
maj 2019.

Ispitao/Tested by:
Ana Vojinović, dipl.ing.geol.

Odgovorni inženjer/Engineer in charge:
Milica Popović, dipl.ing.geol.

GP	OBJEKAT / OBJECT:	**Novo postrojenje za prečišćavanje, glavni kolektor, postrojenje za predtretman otpadnih voda na lokaciji Vinarije 13.jul i sekundarna kanalizaciona mreža / New waste water treatment plant, the main transfer collector, waste water pretreatment plant on location of Winery 13.jul and extension of secondary sewer network, Podgorica**	**Prilog br. / Appendix 2.10**

DIJAGRAM GRANULOMETRIJSKOG SASTAVA/GRAIN-SIZE CURVE Metoda ispitivanja/Testing method: **JUS.U.B1.018. 2005., EC 7 Part 2: 1997., BS 1377: Part 2: 1990.**



Labor.br.uzorka/Labor. No of sample:	**112**
Oznaka istražnog rada/Mark of research work:	**BH-WN-06**
Dubina uzimanja uzorka (m)/Sampling depth:	**9,80-10,00**

d_{60}	d_{10}	U	d_{30}	C_z	d_{20}	k_f
mm	mm		mm		mm	cm/s
23	0,6	**38,3**	6,9	**3,5**	2,8	3,84E+00

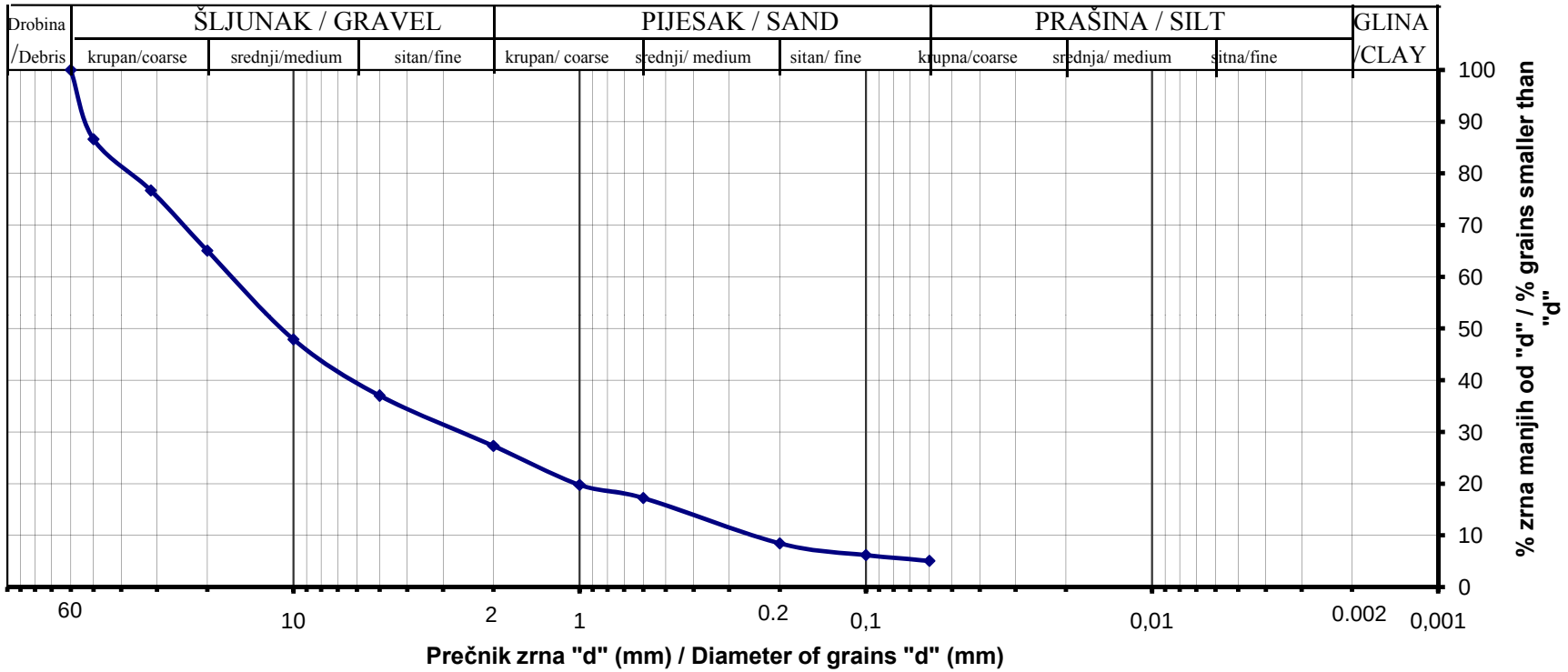
Podgorica:
maj 2019.

Ispitao/Tested by:
Ana Vojinović, dipl.ing.geol.

Odgovorni inženjer/Engineer in charge:
Milica Popović, dipl.ing.geol.

GP	OBJEKAT / OBJECT:	**Novo postrojenje za prečišćavanje, glavni kolektor, postrojenje za predtretman otpadnih voda na lokaciji Vinarije 13.jul i sekundarna kanalizaciona mreža / New waste water treatment plant, the main transfer collector, waste water pretreatment plant on location of Winery 13.jul and extension of secondary sewer network, Podgorica**	**Prilog br. / Appendix 2.11**

DIJAGRAM GRANULOMETRIJSKOG SASTAVA/GRAIN-SIZE CURVE Metoda ispitivanja/Testing method: **JUS.U.B1.018. 2005., EC 7 Part 2: 1997., BS 1377: Part 2: 1990.**



Labor.br.uzorka/Labor. No of sample:	**113**
Oznaka istražnog rada/Mark of research work:	**BH-WN-06**
Dubina uzimanja uzorka (m)/Sampling depth:	**15,80-16,00**

d_{60}	d_{10}	U	d_{30}	C_z	d_{20}	k_f
mm	mm		mm		mm	cm/s
17	0,27	**63,0**	2,8	**1,7**	1	3,60E-01

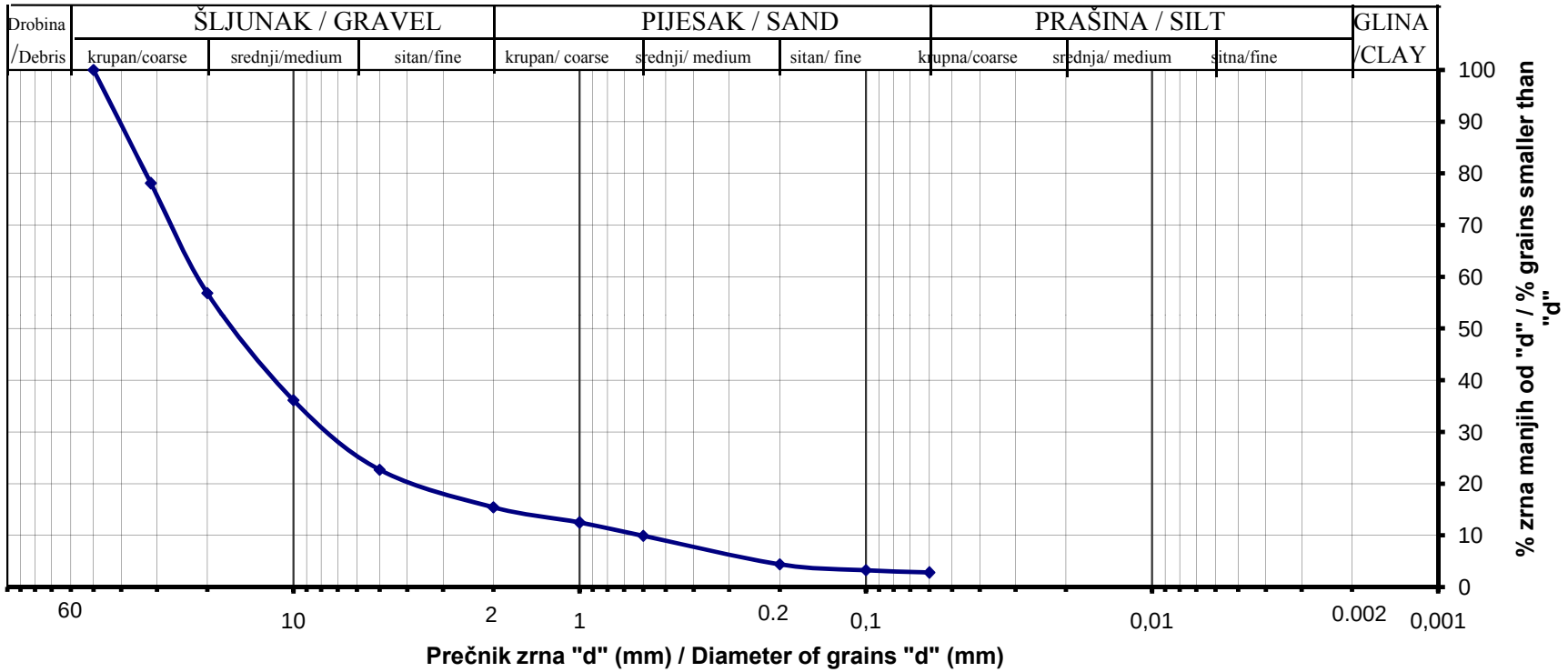
Podgorica:
maj 2019.

Ispitao/Tested by:
Ana Vojinović, dipl.ing.geol.

Odgovorni inženjer/Engineer in charge:
Milica Popović, dipl.ing.geol.

GP	OBJEKAT / OBJECT:	**Novo postrojenje za prečišćavanje, glavni kolektor, postrojenje za predtretman otpadnih voda na lokaciji Vinarije 13.jul i sekundarna kanalizaciona mreža / New waste water treatment plant, the main transfer collector, waste water pretreatment plant on location of Winery 13.jul and extension of secondary sewer network, Podgorica**	**Prilog br. / Appendix 2.12**

DIJAGRAM GRANULOMETRIJSKOG SASTAVA/GRAIN-SIZE CURVE Metoda ispitivanja/Testing method: **JUS.U.B1.018. 2005., EC 7 Part 2: 1997., BS 1377: Part 2: 1990.**



Labor.br.uzorka/Labor. No of sample:	**114**
Oznaka istražnog rada/Mark of research work:	**BH-WN-06**
Dubina uzimanja uzorka (m)/Sampling depth:	**19,80-20,00**

d_{60}	d_{10}	U	d_{30}	C_z	d_{20}	k_f
mm	mm		mm		mm	cm/s
22	0,65	**33,8**	7,8	**4,3**	3,9	8,24E+00

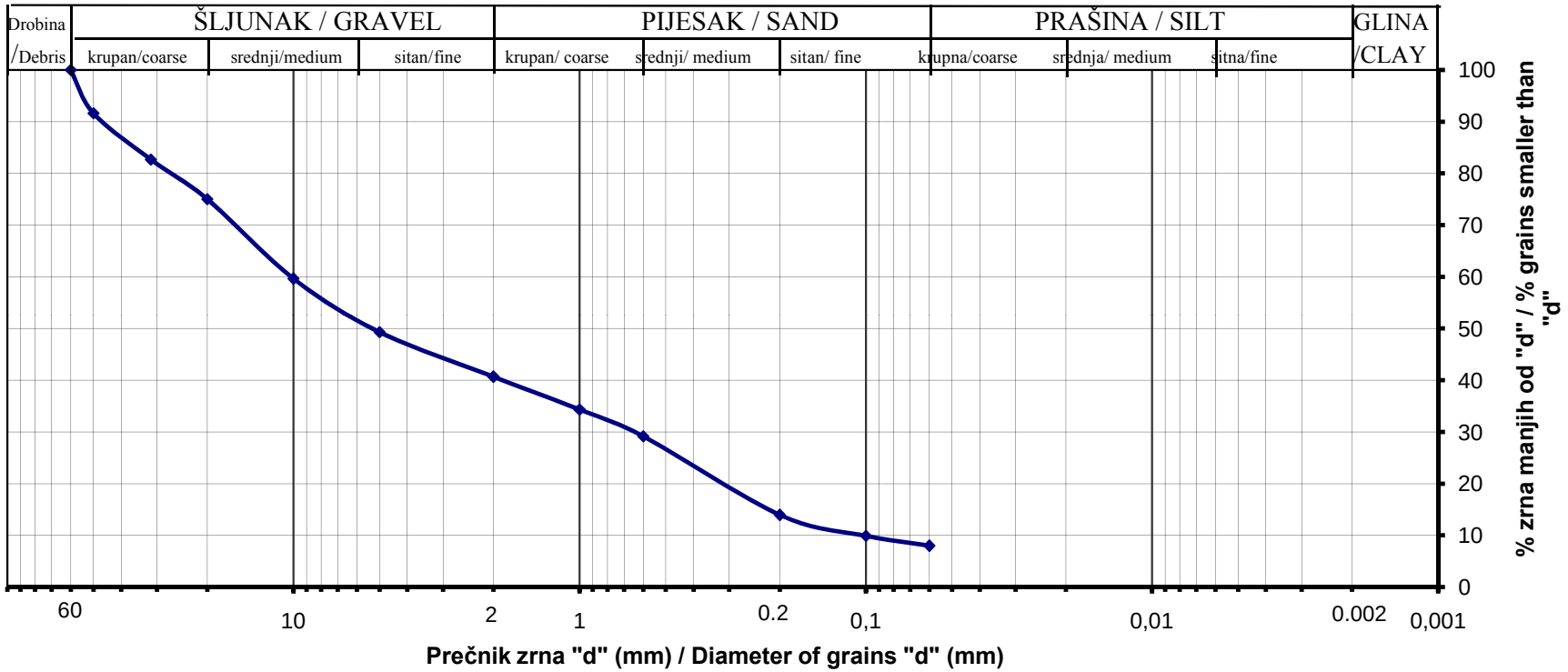
Podgorica:
maj 2019.

Ispitao/Tested by:
Ana Vojinović, dipl.ing.geol.

Odgovorni inženjer/Engineer in charge:
Milica Popović, dipl.ing.geol.

GP	OBJEKAT / OBJECT:	**Novo postrojenje za prečišćavanje, glavni kolektor, postrojenje za predtretman otpadnih voda na lokaciji Vinarije 13.jul i sekundarna kanalizaciona mreža / New waste water treatment plant, the main transfer collector, waste water pretreatment plant on location of Winery 13.jul and extension of secondary sewer network, Podgorica**	**Prilog br. / Appendix 2.13**

DIJAGRAM GRANULOMETRIJSKOG SASTAVA/GRAIN-SIZE CURVE Metoda ispitivanja/Testing method: **JUS.U.B1.018. 2005., EC 7 Part 2: 1997., BS 1377: Part 2: 1990.**



Labor.br.uzorka/Labor. No of sample:	**116**
Oznaka istražnog rada/Mark of research work:	**BH-WN-07**
Dubina uzimanja uzorka (m)/Sampling depth:	**3,80-4,00**

d_{60}	d_{10}	U	d_{30}	C_z	d_{20}	k_f
mm	mm		mm		mm	cm/s
10	0,11	**90,9**	0,62	**0,3**	0,31	2,43E-02

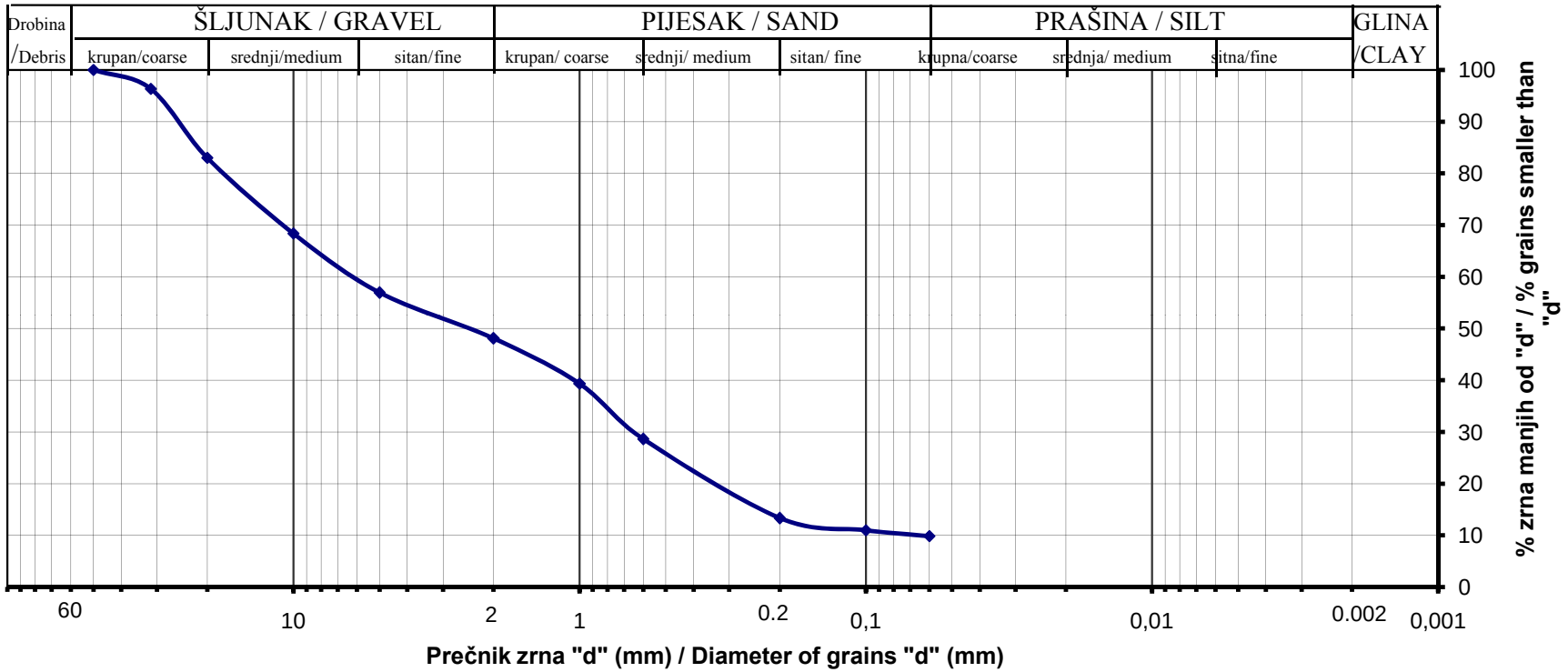
Podgorica:
maj 2019.

Ispitao/Tested by:
Ana Vojinović, dipl.ing.geol.

Odgovorni inženjer/Engineer in charge:
Milica Popović, dipl.ing.geol.

GP	OBJEKAT / OBJECT:	**Novo postrojenje za prečišćavanje, glavni kolektor, postrojenje za predtretman otpadnih voda na lokaciji Vinarije 13.jul i sekundarna kanalizaciona mreža / New waste water treatment plant, the main transfer collector, waste water pretreatment plant on location of Winery 13.jul and extension of secondary sewer network, Podgorica**	**Prilog br. / Appendix 2.14**

DIJAGRAM GRANULOMETRIJSKOG SASTAVA/GRAIN-SIZE CURVE Metoda ispitivanja/Testing method: **JUS.U.B1.018. 2005., EC 7 Part 2: 1997., BS 1377: Part 2: 1990.**



Labor.br.uzorka/Labor. No of sample:	**117**
Oznaka istražnog rada/Mark of research work:	**BH-WN-07**
Dubina uzimanja uzorka (m)/Sampling depth:	**6,80-7,00**

d_{60}	d_{10}	U	d_{30}	C_z	d_{20}	k_f
mm	mm		mm		mm	cm/s
6,2	0,07	**88,6**	0,66	**1,0**	0,33	2,81E-02

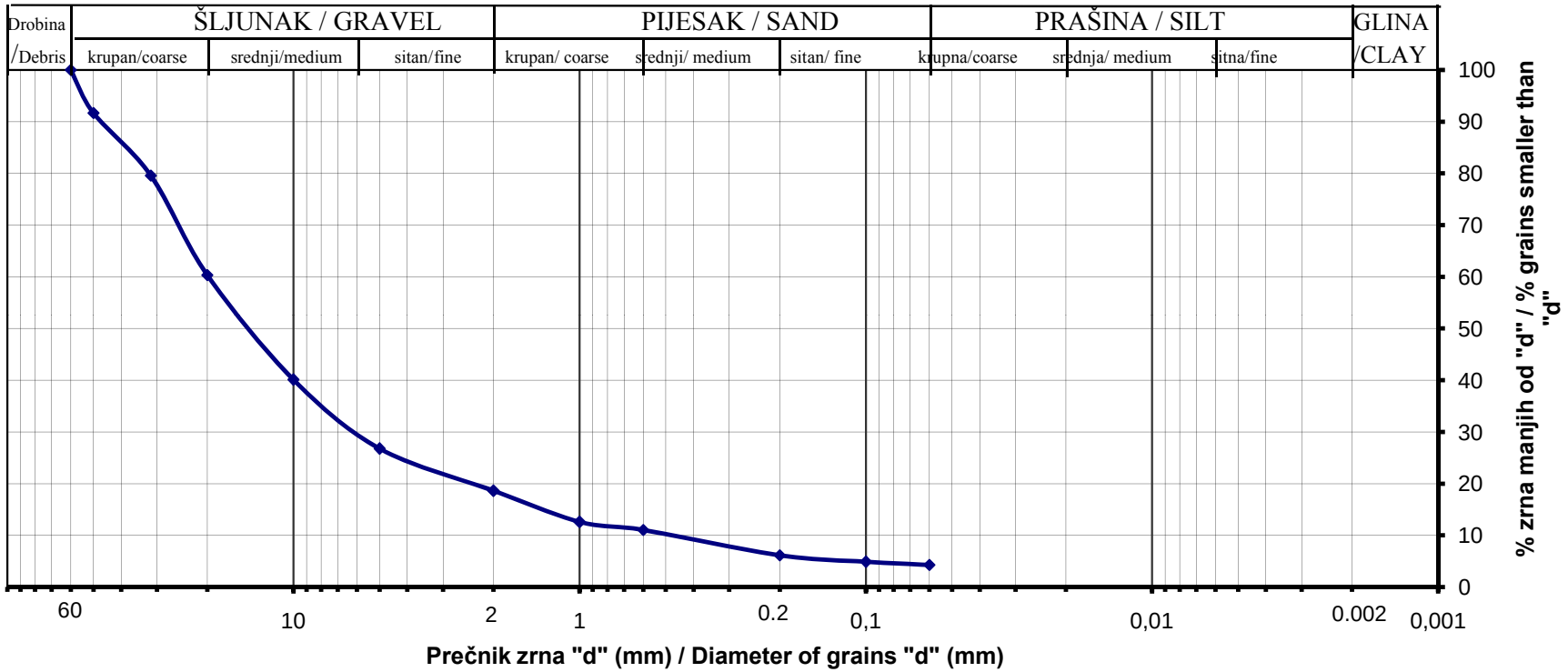
Podgorica:
maj 2019.

Ispitao/Tested by:
Ana Vojinović, dipl.ing.geol.

Odgovorni inženjer/Engineer in charge:
Milica Popović, dipl.ing.geol.

GP	OBJEKAT / OBJECT:	**Novo postrojenje za prečišćavanje, glavni kolektor, postrojenje za predtretman otpadnih voda na lokaciji Vinarije 13.jul i sekundarna kanalizaciona mreža / New waste water treatment plant, the main transfer collector, waste water pretreatment plant on location of Winery 13.jul and extension of secondary sewer network, Podgorica**	**Prilog br. / Appendix 2.15**

DIJAGRAM GRANULOMETRIJSKOG SASTAVA/GRAIN-SIZE CURVE Metoda ispitivanja/Testing method: **JUS.U.B1.018. 2005., EC 7 Part 2: 1997., BS 1377: Part 2: 1990.**



Labor.br.uzorka/Labor. No of sample:	**118**
Oznaka istražnog rada/Mark of research work:	**BH-WN-07**
Dubina uzimanja uzorka (m)/Sampling depth:	**9,80-10,00**

d_{60}	d_{10}	U	d_{30}	C_z	d_{20}	k_f
mm	mm		mm		mm	cm/s
20	0,48	**41,7**	6,1	**3,9**	2,3	2,44E+00

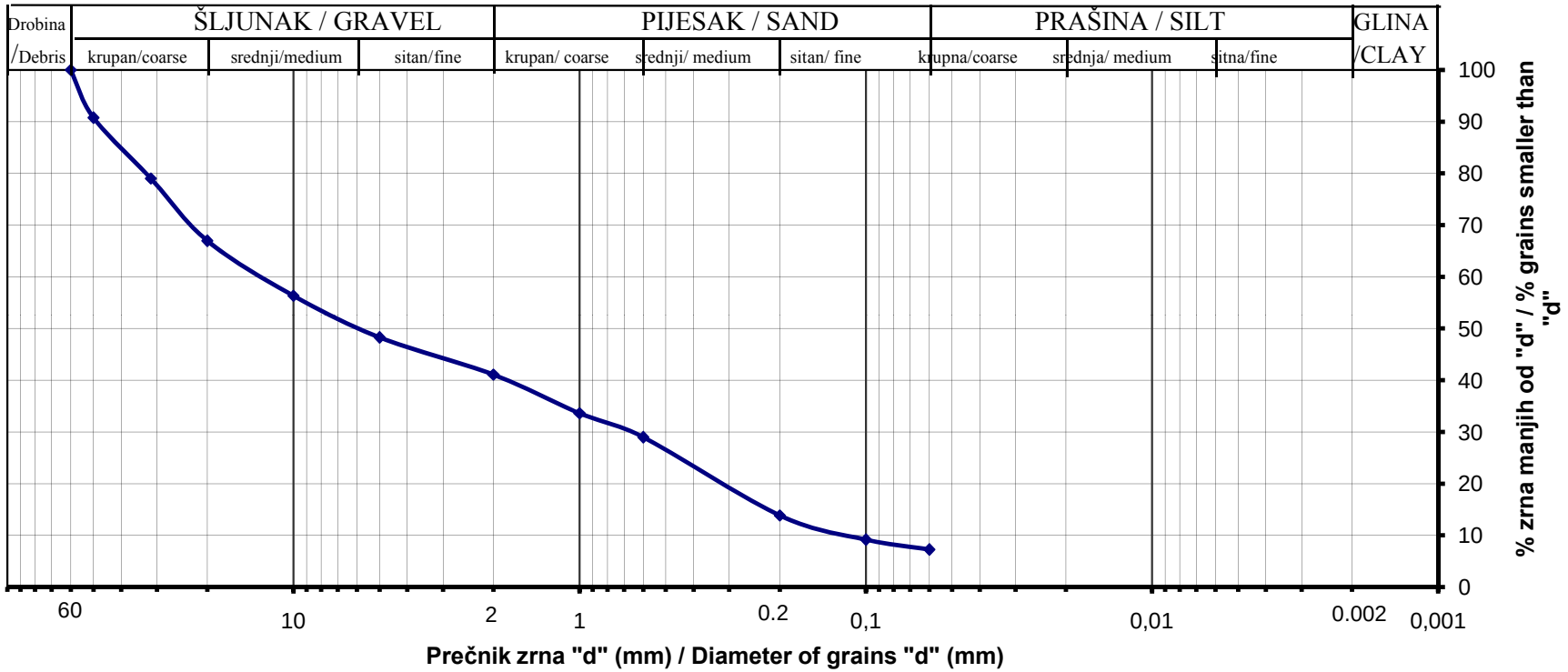
Podgorica:
maj 2019.

Ispitao/Tested by:
Ana Vojinović, dipl.ing.geol.

Odgovorni inženjer/Engineer in charge:
Milica Popović, dipl.ing.geol.

GP	OBJEKAT / OBJECT:	**Novo postrojenje za prečišćavanje, glavni kolektor, postrojenje za predtretman otpadnih voda na lokaciji Vinarije 13.jul i sekundarna kanalizaciona mreža / New waste water treatment plant, the main transfer collector, waste water pretreatment plant on location of Winery 13.jul and extension of secondary sewer network, Podgorica**	**Prilog br. / Appendix 2.16**

DIJAGRAM GRANULOMETRIJSKOG SASTAVA/GRAIN-SIZE CURVE Metoda ispitivanja/Testing method: **JUS.U.B1.018. 2005., EC 7 Part 2: 1997., BS 1377: Part 2: 1990.**



Labor.br.uzorka/Labor. No of sample:	**120**
Oznaka istražnog rada/Mark of research work:	**BH-WN-08**
Dubina uzimanja uzorka (m)/Sampling depth:	**4,80-5,00**

d_{60}	d_{10}	U	d_{30}	C_z	d_{20}	k_f
mm	mm		mm		mm	cm/s
13	0,13	**100,0**	0,65	**0,3**	0,32	2,62E-02

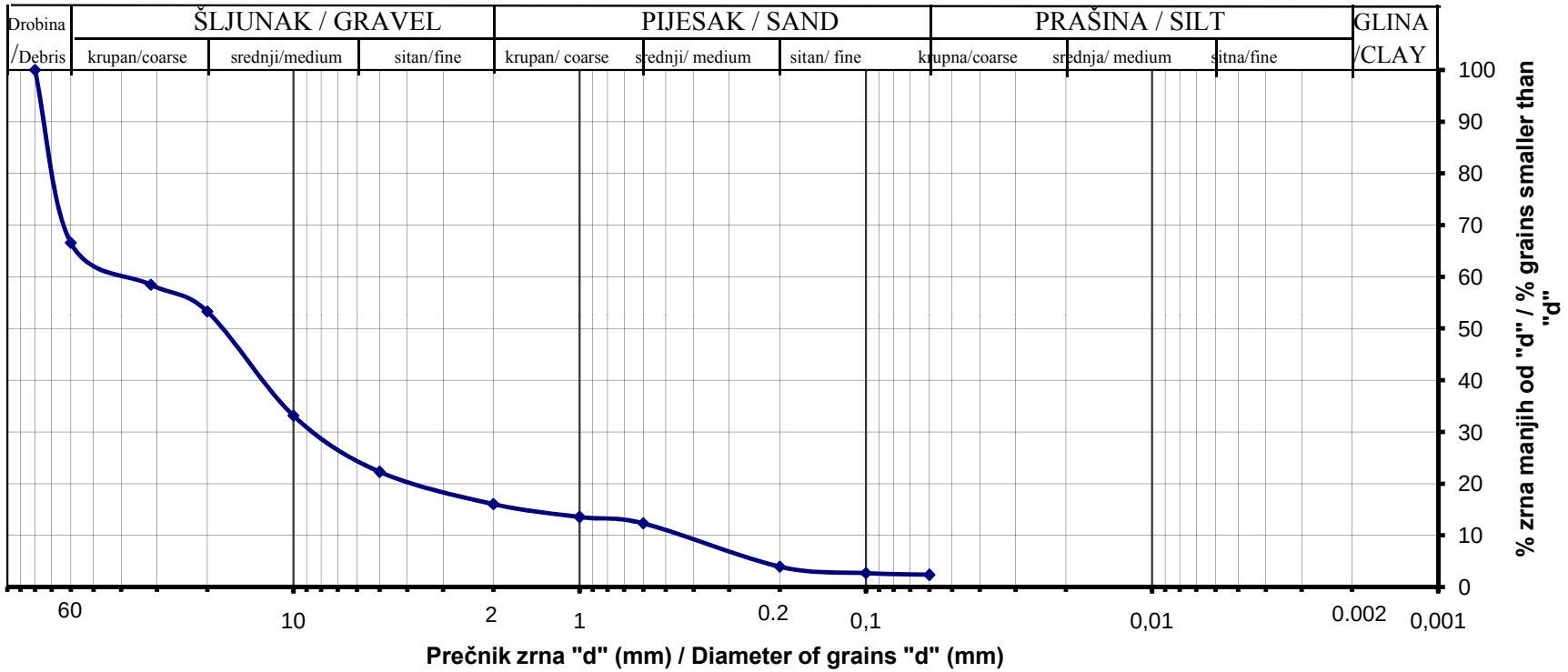
Podgorica:
maj 2019.

Ispitao/Tested by:
Ana Vojinović, dipl.ing.geol.

Odgovorni inženjer/Engineer in charge:
Milica Popović, dipl.ing.geol.

GP	OBJEKAT / OBJECT:	**Novo postrojenje za prečišćavanje, glavni kolektor, postrojenje za predtretman otpadnih voda na lokaciji Vinarije 13.jul i sekundarna kanalizaciona mreža / New waste water treatment plant, the main transfer collector, waste water pretreatment plant on location of Winery 13.jul and extension of secondary sewer network, Podgorica**	**Prilog br. / Appendix 2.17**

DIJAGRAM GRANULOMETRIJSKOG SASTAVA/GRAIN-SIZE CURVE Metoda ispitivanja/Testing method: **JUS.U.B1.018. 2005., EC 7 Part 2: 1997., BS 1377: Part 2: 1990.**



Labor.br.uzorka/Labor. No of sample:	**122**
Oznaka istražnog rada/Mark of research work:	**BH-WN-08**
Dubina uzimanja uzorka (m)/Sampling depth:	**14,80-15,00**

d_{60}	d_{10}	U	d_{30}	C_z	d_{20}	k_f
mm	mm		mm		mm	cm/s
39	0,43	**90,7**	8,8	**4,6**	3,8	7,76E+00

Podgorica:
maj 2019.

Ispitao/Tested by:
Ana Vojinović, dipl.ing.geol.

Odgovorni inženjer/Engineer in charge:
Milica Popović, dipl.ing.geol.

GP	OBJEKAT/ OBJECT:	**Novo postrojenje za prečišćavanje, glavni kolektor, postrojenje za predtretman otpadnih voda na lokaciji Vinarije 13.jul i sekundarna kanalizaciona mreža / New waste water treatment plant, the main transfer collector, waste water pretreatment plant on location of Winery 13.jul and extension of secondary sewer network, Podgorica**	**Prilog br. / Appendix 3**

ODREĐIVANJE VLAŽNOSTI TLA / DETERMINATION OF SOIL MOISTURE

Metoda ispitivanja / Investigation method:**JUS U.B1.012 1992., EC 7 Part 2 : 1997., BS 1377: Part 2 : 1990.**

Broj posude /Num. of vessel	Bruto masa vlažne probe/Gross mass of moisture testing A (g)	Bruto masa suve probe/Gross mass of dry testing B (g)	Masa posude/ Mass of vessel C (g)	Sadržina vode /Content of water A - B (g)	Masa suve probe / Mass of dry testing B - C (g)	Sadržina vode u odnosu na suv primjerak / Water content in relation to dry sample w=A-B/B-Cx100 (%)	Labor. broj uzorka / Lab. Num.	Oznaka istražnog rada /Mark of investigation work	Dubina uzimanja uzorka / Depth of taking samples (m)
14	2995,2	2929,8	163,6	65,5	2766,1	**2,37**	87	BH-WN-03	0,80-1,00
12	3343,2	3310,4	135,0	32,8	3175,4	**1,03**	109	BH-WN-05	4,80-5,00
1	1758,5	1719,5	131,5	39,0	1588,1	**2,46**	114	BH-WN-06	19,80-20,00
13	2156,4	2129,8	126,8	26,6	2003,1	**1,33**	122	BH-WN-08	14,80-15,00
14	3043,7	2996,2	163,6	47,6	2832,5	**1,68**	149	BH-SP-06	3,80-4,00
9	2290,5	2261,8	146,9	28,7	2114,9	**1,36**	153	BH-SP-08	1,80-2,00

Podgorica: maj 2019.

Ispitao/Testing by: Ana Vojinović, dipl.ing.geol.

Odgovorni inženjer/Engineer in charge: Milica Popović, dipl.ing.geol.

GP	OBJEKAT / OBJECT:	**Novo postrojenje za prečišćavanje, glavni kolektor, postrojenje za predtretman otpadnih voda na lokaciji Vinarije 13.jul i sekundarna kanalizaciona mreža / New waste water treatment plant, the main transfer collector, waste water pretreatment plant on location of Winery 13.jul and extension of secondary sewer network, Podgorica**	**Prilog br. / Appendix: 4**

ODREĐIVANJE ZAPREMINSKE MASE MATERIJALA TLA BEZ PORA / DETERMINATION OF DENSITY WITHOUT PORES

Metoda ispitivanja / Investigation method:**JUS U.B1.014. 1988., EC 7 Part 2: 1997., BS 1377: Part 2: 1990.**

Broj piknometra / Num. Pycnometer	Masa praznog piknometra / Mass of empty pycnometer m1 (g)	Masa piknometra i suvog uzorka / Mass of pycnometer and dry sample m2 (g)	Masa piknometra sa uzorkom i destilovanom vodom / Mass of pycnometer with water and dry sample m3 (g)	Masa piknometra sa destilovanom vodom / Mass of pycnometer with destiled water m4 (g)	Zapreminska masa materijala tla bez pora / Density of material without pores (g/cm^3)	Labor. broj uzorka / Lab. Num.	Oznaka istražnog rada / Mark of investigation work	Dubina uzimanja uzorka / Depth of taking samples
11	51,47	75,38	189,38	174,32	2,70	88	BH-WN-03	2,80-3,00
14	53,54	76,75	189,68	175,12	2,68	106	BH-WN-04	3,80-4,00
8	41,35	63,02	156,77	143,16	2,69	109	BH-WN-05	4,80-5,00
6	37,70	58,72	154,46	141,28	2,68	112	BH-WN-06	9,80-10,00
10	58,39	79,44	191,66	178,44	2,69	117	BH-WN-07	6,80-7,00
4	38,66	59,16	154,93	142,07	2,68	122	BH-WN-08	14,80-15,00
5	41,78	62,73	151,90	138,75	2,69	148	BH-SP-05	5,80-6,00
12	53,60	75,04	189,44	176,00	2,68	149	BH-SP-06	3,80-4,00
3	40,42	61,87	157,52	144,05	2,69	150	BH-SP-06	5,80-6,00
6	37,70	60,08	155,33	141,28	2,69	151	BH-SP-07	2,80-3,00
4	38,66	59,89	155,39	142,07	2,68	152	BH-SP-07	5,80-6,00

Podgorica: maj 2019.

Ispitao/Tested by: Ana Vojinović, dipl.ing.geol.

Odgovorni inženjer/Engineer in charge: Milica Popović, dipl.ing.geol.

GP	OBJEKAT / OBJECT:	**Novo postrojenje za prečišćavanje, glavni kolektor, postrojenje za predtretman otpadnih voda na lokaciji Vinarije 13.jul i sekundarna kanalizaciona mreža / New waste water treatment plant, the main transfer collector, waste water pretreatment plant on location of Winery13.jul and extension of secondary sewer network, Podgorica**	**Prilog br. / Appendix 5.1**

ODREĐIVANJE ODNOSA VLAŽNOSTI I SUVE ZAPREMINSKE MASE (PROKTOR-ov OPIT) / DETERMINATION HUMIDITY RATIO AND DRY DENSITY (PROCTOR'S EXPERIMENT)

Metoda ispitivanja / Investigation method:**JUS U.B1.038 1969., EC 7 Part 2 : 1997., BS 1377: Part 4 : 1990.**

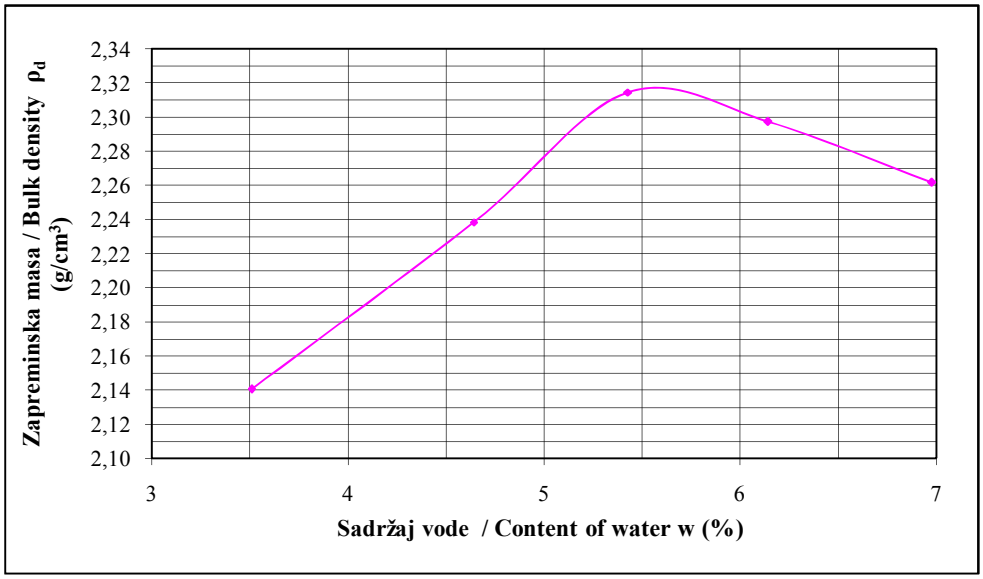
Laborat. broj uzorka/Laborat. sample number: **90**

Oznaka istražnog rada/Mark of investigation work: **BH-WN-03**

Redni broj / No.	Bruto masa vlažnog uzorka / Gross mass of wet	Bruto masa suvog uzorka / Gross mass of dry	Masa tare / Mass of tare	Masa vlažnog uzorka / Mass of wet sample m_2	Masa suvog uzorka / Mass of dry sample m_s	Vlažnost / Water content $w=(m_2-m_s)/m_s *100$	Zapreminska masa u vlažnom stanju / Bulk density in the wet state $\rho=(m_2/V)$	Zapreminska masa u suvom stanju / Bulk density in the dry state $\rho_d=(m_s/V)$
	(g)	(g)	(g)	(g)	(g)	(%)	(g/cm^3)	(g/cm^3)
1	5065,6	4906,4	370,0	4695,59	4536,4	3,51	2,22	2,14
2	5421,6	5201,4	458,1	4963,46	4743,3	4,64	2,34	2,24
3	5540,6	5274,4	369,8	5170,80	4904,6	5,43	2,44	2,31
4	5462,4	5163,4	295,0	5167,40	4868,4	6,14	2,44	2,30
5	5530,4	5196,0	403,2	5127,20	4792,8	6,98	2,42	2,26

Zapremina cilindra / Volume of cilinder V = **2119** (cm^3)

Energija zbijanja / Compacting energy E = 600 kJ/m^3



$W_{opt.}$ = 5,43 % **ρ_{dmax} = 2,31 (g/cm^3)**

Podgorica: maj 2019.

Ispitao/Testing by: Ana Vojinović, dipl.ing.geol

Odgovorni inženjer/Engineer in charge: Milica Popović, dipl.ing.geol

GP	OBJEKAT / OBJECT:	**Novo postrojenje za prečišćavanje, glavni kolektor, postrojenje za predtretman otpadnih voda na lokaciji Vinarije 13.jul i sekundarna kanalizaciona mreža / New waste water treatment plant, the main transfer collector, waste water pretreatment plant on location of Winery13.jul and extension of secondary sewer network, Podgorica**	**Prilog br. / Appendix 5.2**

ODREĐIVANJE ODNOSA VLAŽNOSTI I SUVE ZAPREMINSKE MASE (PROKTOR-ov OPIT) / DETERMINATION HUMIDITY RATIO AND DRY DENSITY (PROCTOR'S EXPERIMENT)

Metoda ispitivanja / Investigation method:**JUS U.B1.038 1969., EC 7 Part 2 : 1997., BS 1377: Part 4 : 1990.**

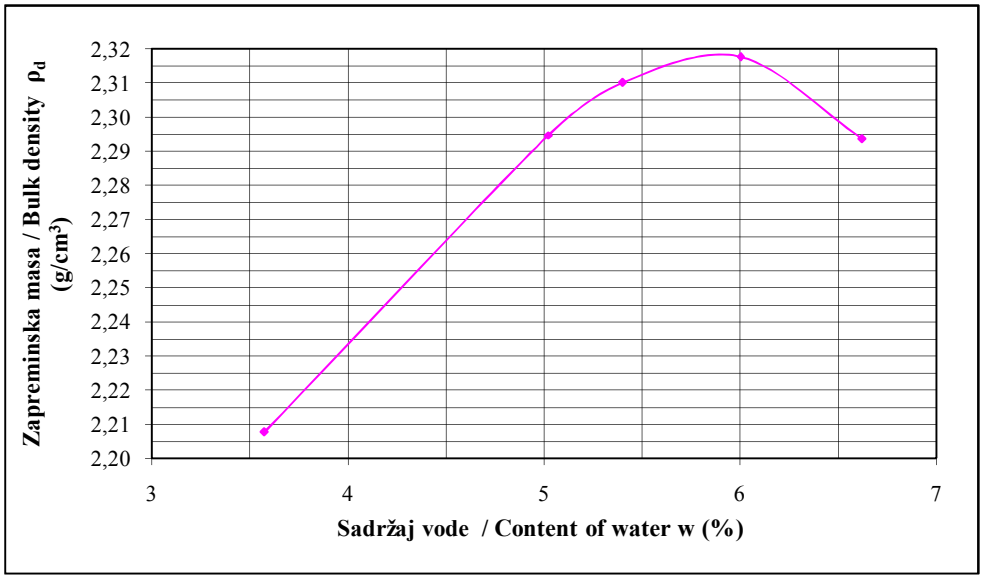
Laborat. broj uzorka/Laborat. sample number: **91**

Oznaka istražnog rada/Mark of investigation work: **BH-WN-04**

Redni broj / No.	Bruto masa vlažnog uzorka / Gross mass of wet	Bruto masa suvog uzorka / Gross mass of dry	Masa tare / Mass of tare	Masa vlažnog uzorka / Mass of wet sample m_2	Masa suvog uzorka / Mass of dry sample m_s	Vlažnost / Water content $w=(m_2-m_s)/m_s *100$	Zapreminska masa u vlažnom stanju / Bulk density in the wet state $\rho=(m_2/V)$	Zapreminska masa u suvom stanju / Bulk density in the dry state $\rho_d=(m_s/V)$
	(g)	(g)	(g)	(g)	(g)	(%)	(g/cm^3)	(g/cm^3)
1	5157,4	4990,2	311,9	4845,55	4678,4	3,57	2,29	2,21
2	5401,6	5157,4	294,9	5106,72	4862,5	5,02	2,41	2,29
3	5707,8	5443,4	548,2	5159,60	4895,2	5,40	2,43	2,31
4	5598,4	5303,6	392,4	5205,96	4911,2	6,00	2,46	2,32
5	5493,8	5172,0	311,6	5182,20	4860,4	6,62	2,45	2,29

Zapremina cilindra / Volume of cilinder V = **2119** (cm^3)

Energija zbijanja / Compacting energy E = 600 kJ/m^3



$W_{opt.}$ = 6,00 % **ρ_{dmax} = 2,32 (g/cm^3)**

Podgorica: maj 2019.

Ispitao/Testing by: Ana Vojinović, dipl.ing.geol

Odgovorni inženjer/Engineer in charge: Milica Popović, dipl.ing.geol

GP	OBJEKAT / OBJECT:	**Novo postrojenje za prečišćavanje, glavni kolektor, postrojenje za predtretman otpadnih voda na lokaciji Vinarije 13.jul i sekundarna kanalizaciona mreža / New waste water treatment plant, the main transfer collector, waste water pretreatment plant on location of Winery13.jul and extension of secondary sewer network, Podgorica**	**Prilog br. / Appendix 5.3**

ODREĐIVANJE ODNOSA VLAŽNOSTI I SUVE ZAPREMINSKE MASE (PROKTOR-ov OPIT) / DETERMINATION HUMIDITY RATIO AND DRY DENSITY (PROCTOR'S EXPERIMENT)

Metoda ispitivanja / Investigation method:**JUS U.B1.038 1969., EC 7 Part 2 : 1997., BS 1377: Part 4 : 1990.**

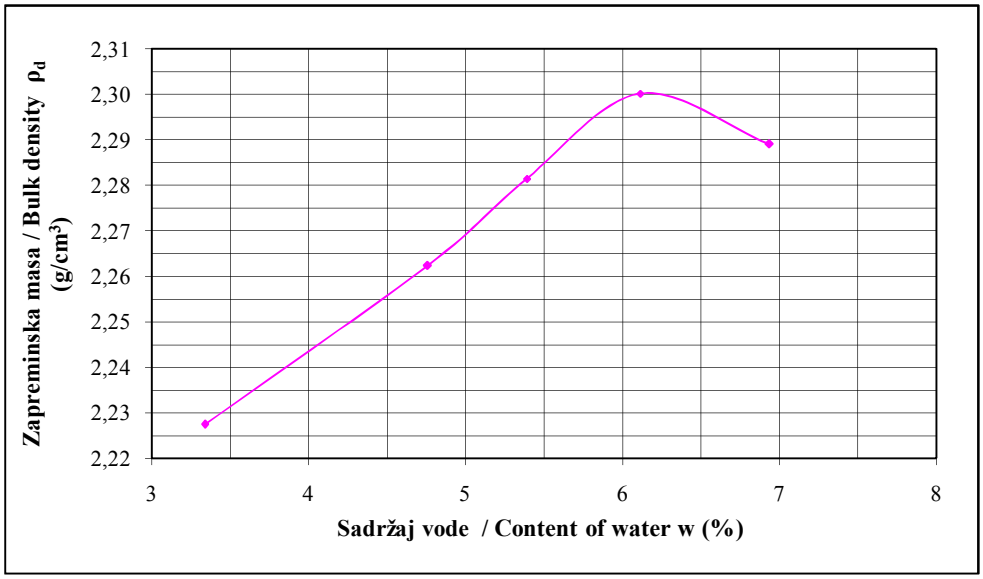
Laborat. broj uzorka/Laborat. sample number: **115**

Oznaka istražnog rada/Mark of investigation work: **BH-WN-06**

Redni broj / No.	Bruto masa vlažnog uzorka / Gross mass of wet	Bruto masa suvog uzorka / Gross mass of dry	Masa tare / Mass of tare	Masa vlažnog uzorka / Mass of wet sample m_2	Masa suvog uzorka / Mass of dry sample m_s	Vlažnost / Water content $w=(m_2-m_s)/m_s *100$	Zapreminska masa u vlažnom stanju / Bulk density in the wet state $\rho=(m_2/V)$	Zapreminska masa u suvom stanju / Bulk density in the dry state $\rho_d=(m_s/V)$
	(g)	(g)	(g)	(g)	(g)	(%)	(g/cm^3)	(g/cm^3)
1	5336,0	5178,4	458,2	4877,80	4720,2	3,34	2,30	2,23
2	5333,4	5105,4	311,4	5022,00	4794,0	4,76	2,37	2,26
3	5560,2	5299,6	465,2	5095,00	4834,4	5,39	2,40	2,28
4	5483,4	5185,4	311,4	5172,00	4874,0	6,11	2,44	2,30
5	5732,6	5396,2	545,6	5187,00	4850,6	6,94	2,45	2,29

Zapremina cilindra / Volume of cilinder V = **2119** (cm^3)

Energija zbijanja / Compacting energy E = 600 kJ/m^3



$W_{opt.}$ = 6,11 % **ρ_{dmax} = 2,30 (g/cm^3)**

Podgorica: maj 2019.

Ispitao/Testing by: Ana Vojinović, dipl.ing.geol

Odgovorni inženjer/Engineer in charge: Milica Popović, dipl.ing.geol

GP	OBJEKAT / OBJECT:	**Novo postrojenje za prečišćavanje, glavni kolektor, postrojenje za predtretman otpadnih voda na lokaciji Vinarije 13.jul i sekundarna kanalizaciona mreža / New waste water treatment plant, the main transfer collector, waste water pretreatment plant on location of Winery13.jul and extension of secondary sewer network, Podgorica**	Prilog br. / Appendix 6.1

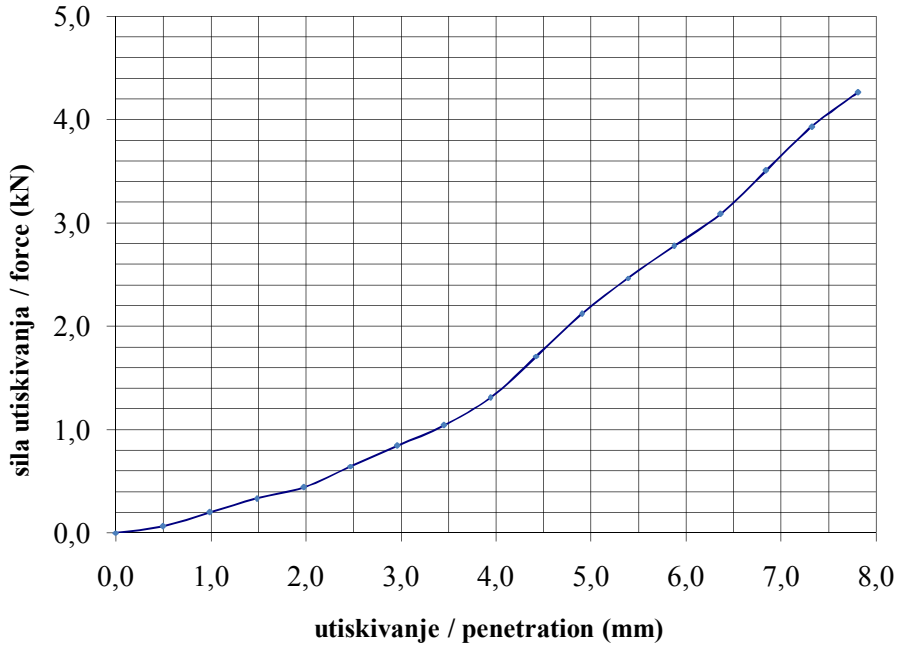
ODREĐIVANJE KALIFORNIJSKOG INDEKSA NOSIVOSTI CBR–OPIT / DETERMINATION OF THE CALIFORNIA BEARING RATIO IN LABORATORY

Metoda ispitivanja / Investigation method:**JUS U.B1.042 1969., EC 7 Part 2 : 1997., BS 1377: Part 4 : 1990**.

Laborat. broj uzorka/Laborat. sample number: **90**

Oznaka istražnog rada/Mark of investigation work: **BH-WN-03**

Dubina uzimanja uzorka / Depth of taking samples (m): **7,00-8,00**



Zapreminska masa u suvom stanju / Bulk density in the dry state (g/cm^3)	2,31
Vlažnost / Water content (%)	5,43
Energija zbijanja / Compacting energy (kJ/m^3)	600
Bubrenje / Sweling (%)	0,00
CBR vrijednost / CBR value (%)	**11**

Standardne vrijednosti / standard values	
2,54 mm	13,24 kN
5,08 mm	19,96 kN

Podgorica: maj 2019.

Ispitao/Testing by: Ana Vojinović, dipl.ing.geol.

Odgovorni inženjer/Engineer in charge: Milica Popović, dipl.ing.geol.

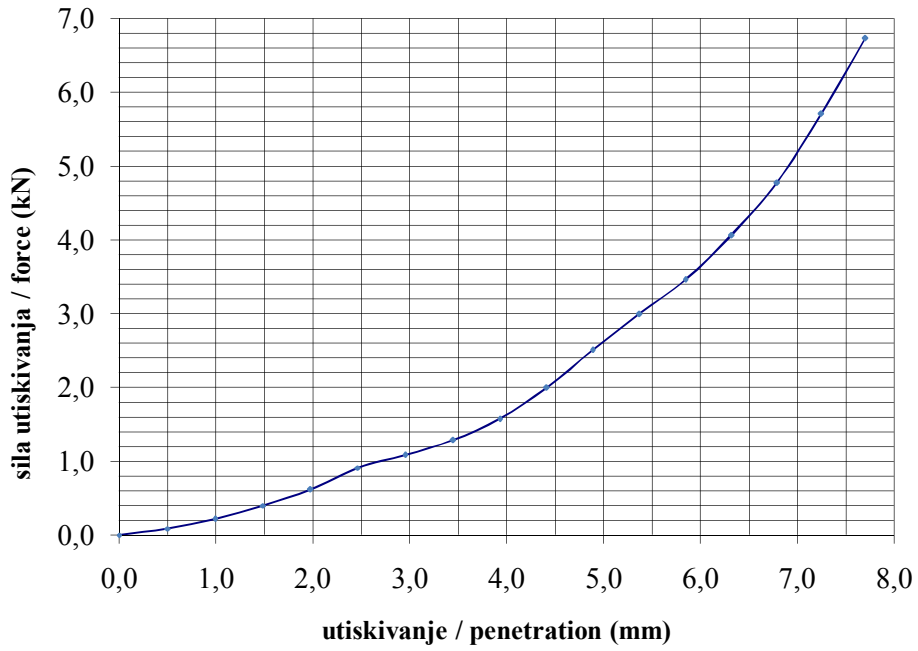
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ODREĐIVANJE KALIFORNIJSKOG INDEKSA NOSIVOSTI CBR–OPIT / DETERMINATION OF THE CALIFORNIA BEARING RATIO IN LABORATORY

Metoda ispitivanja / Investigation method:**JUS U.B1.042 1969., EC 7 Part 2 : 1997., BS 1377: Part 4 : 1990**.

Laborat. broj uzorka/Laborat. sample number: **91**

Oznaka istražnog rada/Mark of investigation work: **BH-WN-04**



Zapreminska masa u suvom stanju / Bulk density in the dry state (g/cm^3)	2,32
Vlažnost / Water content (%)	6,00
Energija zbijanja / Compacting energy (kJ/m^3)	600
Bubrenje / Sweling (%)	0,00
CBR vrijednost / CBR value (%)	**13**

Standardne vrijednosti / standard values	
2,54 mm	13,24 kN
5,08 mm	19,96 kN

Podgorica: maj 2019.

Ispitao/Testing by: Ana Vojinović, dipl.ing.geol.

Odgovorni inženjer/Engineer in charge: Milica Popović, dipl.ing.geol.

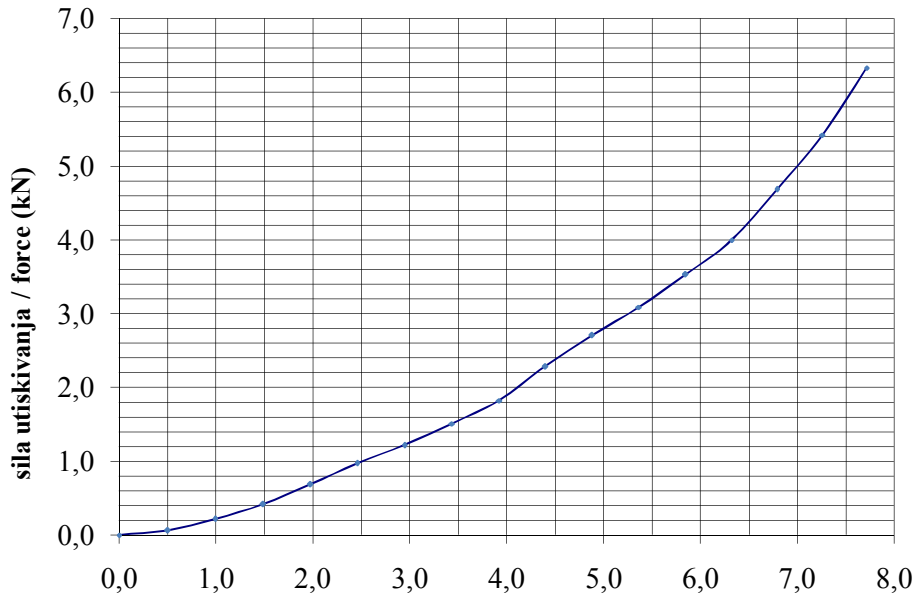
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ODREĐIVANJE KALIFORNIJSKOG INDEKSA NOSIVOSTI CBR–OPIT / DETERMINATION OF THE CALIFORNIA BEARING RATIO IN LABORATORY

Metoda ispitivanja / Investigation method:**JUS U.B1.042 1969., EC 7 Part 2 : 1997., BS 1377: Part 4 : 1990**.

Laborat. broj uzorka/Laborat. sample number: **115**

Oznaka istražnog rada/Mark of investigation work: **BH-WN-06**



Zapreminska masa u suvom stanju / Bulk density in the dry state (g/cm^3)	2,3
Vlažnost / Water content (%)	6,11
Energija zbijanja / Compacting energy (kJ/m^3)	600
Bubrenje / Sweling (%)	0,00
CBR vrijednost / CBR value (%)	**14**

Standardne vrijednosti / standard values	
2,54 mm	13,24 kN
5,08 mm	19,96 kN

Podgorica: maj 2019.

Ispitao/Testing by: Ana Vojinović, dipl.ing.geol.

Odgovorni inženjer/Engineer in charge: Milica Popović, dipl.ing.geol.

(viii) Other Documents

- Construction Site Plan
- Urban-Technical Conditions (Urbanisticko-Tehnicki Uslovi)
- Environmental and Social Impact Assessment (ESIA)
- Environmental and Social Management Plan (ESMP)
- Geotechnical Survey Report
- **Reports on Soil Contamination**
- KAP Well Water Analyses Data

MONTENEGRO

PODGORICA CAPITAL CITY

VODOVOD I KANALIZACIJA PODGORICA D.O.O.

Co-financed by:

KFW

Western Balkans Investment Framework WBIF

Podgorica Capital City

DESIGN, CONSTRUCTION AND APPROVAL OF DESIGN PARAMETERS, TECHNOLOGY AND CAPACITIES OF WASTEWATER TREATMENT PLANT, SLUDGE TREATMENT AND INCINERATION PLANT AND SEWER EXTENSIONS

Consulting Services for the Preparation of Final Design, Elaboration of Tender Documents and Construction Supervision

BMZ Project ID 2020 84 366
KfW Procurement No. 504 072
FWT Project ID 610-1403







REPORT ON SOIL CONTAMINATION INVESTIGATIONS AT THE SITE OF THE NEW WASTEWATER TREATMENT PLANT OF THE CITY OF PODGORICA

June 2020

FICHTNER
WATER & TRANSPORTATION

DESIGN, CONSTRUCTION AND APPROVAL OF DESIGN PARAMETERS, TECHNOLOGY AND CAPACITIES OF WASTEWATER TREATMENT PLANT, SLUDGE TREATMENT AND INCINERATION PLANT AND SEWER EXTENSIONS

Consulting Services for the Preparation of Final Design, Elaboration of Tender documents and Construction Supervision

Report on Soil Contamination Investigations at the Site of the new Wastewater Treatment Plant of the City of Podgorica

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List of Acronyms

CETI	Centar za ekotoksikološka ispitivanja (Centre for Ecotoxicological Research)
DOC	Dissolved Organic Carbon
FWT	Fichtner Water&Transportation GmbH
ha	Hectares
KfW	KfW Entwicklungsbank (German Development Bank)
LEL	Lower Explosion Limit
mbgl	Meter Below Ground Level
MNE	Montenegro
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
pH	potential for Hydrogen
TOC	Total Organic Carbon
TPH	Total Petroleum Hydrocarbons
VIK	Vodovod i kanalizacija (Water and Sewerage Company)
WWTP	Wastewater Treatment Plant

Format of Numbers

Throughout this report, as well as in the annexes, appendices and drawings, the **decimal comma** is used and the dot is used as **thousand separator**.

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[4] Geological Report (2017): Future WWTP-Site, October-November 2017; Indel Inzenjering;

[5] Geotechnical Report (2019): Geotechnical Conditions for the Construction of the New Wastewater Treatment Plant, the Main Transfer Collector from the Locality of the Existing to the New Treatment Plant, Wastewater Pre-Treatment, Plant at the Location of Winery 13 Jul and Extension of secondary sewer Network – Final Report, Geoprojekt, Podgorica, April 2019
Elaborat o geotehničkim uslovima izgradnje novog postrojenja za prečišćavanje otpadnih voda, glavnog prenosnog kolektora sa lokacije postojećeg do novog postrojenja za prečišćavanje, postrojenja za predtretman otpadnih voda na lokaciji vinarije 13. jul i proširenja sekundarne kanalizacione mreže

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Characteristics of the site, conditions of construction, sanitary and technical conditions, manner of operation and closure of landfills ("Official Gazette of Montenegro", No. 31/13 dated 5 July 2013)

[18] Decreto legislativo 3 aprile 2006, n. 152 Norme in materia ambientale
Legislative Decree 3 April 2006, n. 152 Environmental standards

[19] LAGA 20 - Anforderungen an die stoffliche Verwertung von mineralischen Reststoffen / Abfällen - Technische Regeln - Stand: 11/2003 (LAGA - Länderarbeitsgemeinschaft Abfall, Deutschland)
Requirements for the recycling of mineral residues / waste - Technical rules – Status: 11/2003 (State Working Group on Waste, Germany)

[20] BBodSchV - Bundes-Bodenschutz- und Altlastenverordnung vom 12. Juli 1999
Federal Soil Protection and Contaminated Sites Ordinance

[21] *Dutch List (1990): table for the assessment of concentrations of different substances in the soil and groundwater for the forms of use residential areas and drinking water production areas*

1 INTRODUCTION

1.1 Project Background

The existing wastewater treatment plant of the city of Podgorica is 40 years old and technically outdated and critically overloaded. In addition the plant is meanwhile located within the urban extension area of Podgorica city and directly surrounded with housing and commercial areas, which are not compatible with an industrial facility of the type of a WWTP.

To improve the sanitation situation in Podgorica, a state-of-the-art new WWTP will be constructed outside the city centre. The existing WWTP will be decommissioned and demolished after commissioning of the new plant.

Sewage sludge, screenings and other wastes produced at the plant have been disposed at the site of the existing WWTP since the start of operation of the plant in 1978. At the site of the new WWTP, contaminated areas, probably through the activity of the neighbouring KAP Aluminium factory, have been identified during of a survey carried out in the scope of the preparation of the Feasibility Study for the construction of the new WWTP in 2017.

Additional investigations of a possible contamination of the sites of the existing and the new WWTPs have been carried out in the scope of the geotechnical survey investigations campaign for the construction of the new sewer and wastewater treatment facilities in March 2019.

The present report describes the current state of the area of the new WWTP. It assesses the existing soil contamination and makes recommendations for the remediation of the site as well as for the handling of soil excavation during the construction phase of the new WWTP.

1.2 General Description

The designated construction area is situated approx. 6 km south of the urban centre of Podgorica in the immediate vicinity of the KAP Aluminum Plant (see **Figure 1**). To the east the area is bordered by the local road connecting Dajbabe and Botun settlements. The steep bank of the Moraca is located about 200 m east of this road. The area reserved for the construction of the WWTP covers an area of approximately 11,1 ha. It includes an approx. 4 ha buffer zone in the north in which contaminations of the underground by various chemical components have been detected during a survey carried out in 2017 in the scope of the preparation of the Feasibility Study for the construction of the new WWTP. The recommendation of the Feasibility Study is that contaminated areas shall not be used for the construction of the WWTP to avoid excavation and disposal or treatment of contaminated material, and that the treatment plant shall be shifted to the south in the not contaminated area.

The grassy area in the vicinity of the KAP plant is fenced and guarded. Access is only possible after prior registration. At first glance, the area does not differ from the surrounding grassland. On closer inspection, however, there are indications that parts of the area have been used by

the KAP factory for disposal of bauxite and other wastes. The findings are described in more details in Section 1.3.2.

The purpose of the additional investigations carried at the site of the new WWTP aim mainly at the confirmation that the selected site for the construction of the WWTP is located out of the contaminated area and do not present risks of contamination.

1.3 Geological Conditions

1.3.1 Cross-location Conditions

Figure 1 presents a geological map of the project area and indicates the location of the two sites.

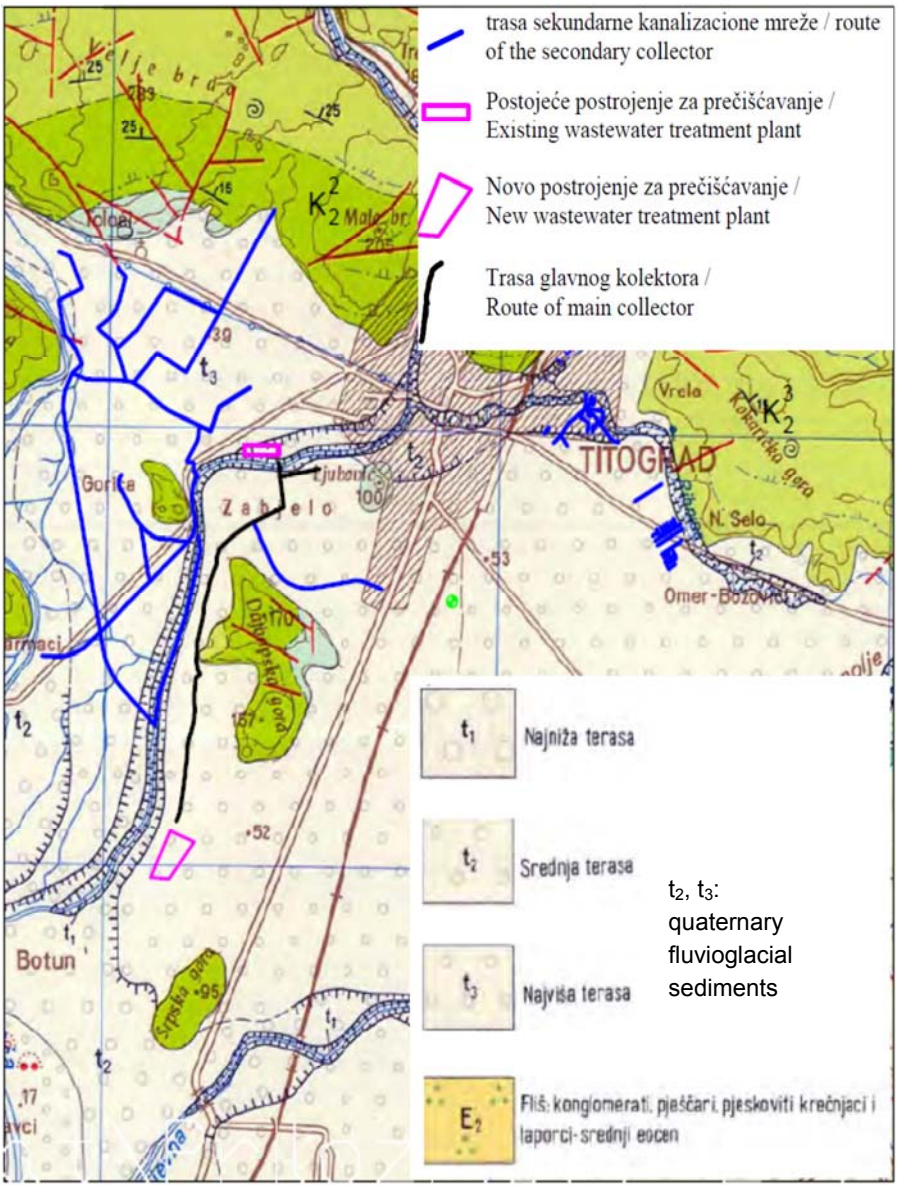


Figure 1: **Geological Map** *(Source: Basic Geological Map – OGK list Titograd, 1:100 000, Federal Geological Survey, Belgrade, 1973; Authors: Živaljević Milorad, Đokić Vukota, Pajović Marko)*

The entire Zeta plain is covered by quaternary fluvioglacial sediments. The area is exceeding 200 km^2, with thickness ranging between 30 and 100 m. The aquifer contained in these sediments is distributed throughout the wider investigation area and is considered as a valuable water resource, notably during the low water period of surface waters. The layer is formed partly within the alluvial sediments of the Moraca and partly in glacio-fluvial sediments that are deposited over the paleorelief limestones. The aquifer is recharged by storm water, rivers Moraca and Cijevna as well as by underground inflow from a karst aquifer of the surrounding limestone fields. Both locations cover the area close to the Moraca's bed, which belongs to the middle and high river terrace (t2 and t3), made of fluvio-glacial sediments – sandy gravels and loosely to firmly bound conglomerates [5].

The groundwater level largely corresponds to the water level in the deeply cut river bed and is located at both locations at approx. 12-15 m below ground.

The natural soils above the alluvial sediments (terra rossa) are largely preserved or only slightly changed at the location of the future WWTP. On the site of the existing WWTP the soils and the sediments near the surface are often disturbed by excavations and fillings.

1.3.2 Particularities of the Site of the future WWTP

After permission by the management of KAP the environmental expert and geotechnical expert of FWT visited the area several times in January 2019 and during the implementation of the investigation drillings in March 2019. The following was found during the inspection:

- An unpaved road giving access to the site of the KAP Factory crosses the northeastern part of the area;
- In the eastern part of the site, along the crossing road, solid waste is deposited in numerous small heaps;
- The waste piles contain scrap, ceramics and building rubble, sometimes with considerable amounts of substances containing asbestos cement;
- West and south of the heaps similar waste is distributed flatly on the adjacent area. These widespread wastes probably originate from the leveling of older heaps;
- In the north eastern part of the plot, deposits of slags and masonry from smelting furnaces are also visible on the surface;
- Adjacent to the northeastern corner of the area, on the site of the company KAP, there is a storage area for (mostly empty) mineral oil barrels in the open air. Apparently, the storage spot drains into the adjacent unpaved area;
- In larger parts of the site the upper soil is affected by the storage of alumina, identifiable by the residues of ore;
- In some smaller parts the upper soil is affected by the storage of lignite.

1.4 Former investigations

In 2017 soil investigations were carried out by CETI [2] in the scope of the preparation of the Feasibility Study for the construction of the new WWTP. The results can be summarized as follows:

- In the north and eastern parts of the considered plot for the construction of the WWTP, critical values were observed with regard to: PAHs, Total Petroleum Hydrocarbons (TPHs) and Fluoride;
- The increased concentrations of the above indicated components were mainly o observed in the superficial layers of the underground. Only hydrocarbons exhibited increased values also in deeper soil layers;
- Relevant fluoride concentrations were observed throughout the site with a maximum in the eastern part, where, close to the surface, threshold values of the Italian Standard for the evaluation of the effect on the soil-human path for industrial areas were partially exceeded.

It was assumed that the detected contaminations are mainly due to the influence of the adjacent industrial plant (KAP Aluminium factory), either through atmospheric deposition or by direct deposit.

In general, the selected site for the new WWTP was however considered as suitable for the construction of the WWTP. As a result of the identified soil contaminations a shift of the construction area towards the south, out of the contaminated area, was proposed to minimize possible interference on the construction works.

2 EXPLORATION SCOPE

2.1 Execution of Works

Investigations of the underground contamination has been carried out by mean of mechanical drilling with collection of soil water and gas samples at different depths

Drilling works have been carried out by the company Geoprojekt. The drilling was mechanical by using a drill rig BA-150, with a rotary system with continuous coring, drill diameter 146 mm.

Soil sampling, gas sampling and water sampling were done by the expert staff from the Centre of Ecotoxicological Research (CETI) under the supervision of the Consultant. The sampling techniques are described in [6]. All chemical analyses were carried out by the CETI laboratory.

11 boreholes were drilled at the site of the existing WWTP and 7 at the site of the future WWTP. The latter are additional boreholes to the 41 boreholes which were drilled in the scope of the soil contamination investigations in 2017 and aim only at corroborating the results of the previous investigations. The location of the drilling starting points is shown in **Annex 1**. The depth of the boreholes, samples taken and analyses carried out are detailed in **Annex 2**.

2.2 Scope of Exploration Works

The current exploration measures were carried out to check the results from 2017 and to confirm the delimitation of the more contaminated area in the north eastern part of the site.

The additional drillings were carried out in March 2019 as part of the geotechnical investigation survey works of the area. A total of 7 boreholes were drilled, two of them to investigate the transition zone in the north eastern parts of the site, and five for geotechnical exploration. A total of 64 meters of drilling were carried out.

The boreholes at the location of new plant are marked as BH-WN-01 through BH-WN-07.

Soil samples were taken from the cores. Following parameters were analysed: pH, heavy metals, cyanides, TPH (total petroleum hydrocarbons), PAH (polycyclic aromatic hydrocarbons), PCB (polychlorinated biphenyl), fluorine.

In the centre of the area there is a KAP piezometer. The measured groundwater level is about 17 m below the surface. Underground water samples were taken by pumping in March and June 2019 and following parameters were analysed: Electric conductivity, pH, DOC (dissolved organic carbon), heavy metals, cyanides, TPH (total petroleum hydrocarbons), PAH (polycyclic aromatic hydrocarbons), PCB (polychlorinated biphenyl), fluorine.

3 RESULTS

The drilling profiles are shown in **Annex 3**. The results of the chemical analyses of soil samples are attached in **Annex 4**, the results of water samples in **Annex 5**.

3.1 Soil

Lithological composition and organoleptic findings

Up to a depth of approx. 0.5 m there is a topsoil consisting of a red sandy-silty clay with veins of roots. Near the surface the topsoil locally contains construction waste or fragments of other solid waste. The soil can be classified as disturbed Terra Rossa. Generally, the proportion of waste increases towards the northeast.

Under the topsoil there is an uniformly distributed compressed sandy gravel layer. Up to a depth of approx. 10 m the gravel is mostly bound as a conglomerate, whereas in greater depth it is only slightly bound. The binder of the conglomerate is calcium carbonate ($CaCO_3$) [5].

Aside from the waste fragments in the topsoil, the drilling material in the newly executed boreholes was consistently organoleptically unremarkable.

Fluorine

Figure 2 shows the near-surface distribution of the fluoride concentration in the soil. The lines of equal concentration are based on the 2017 exploration (red dots). In addition the results of the 2019 investigation are shown in blue colour.

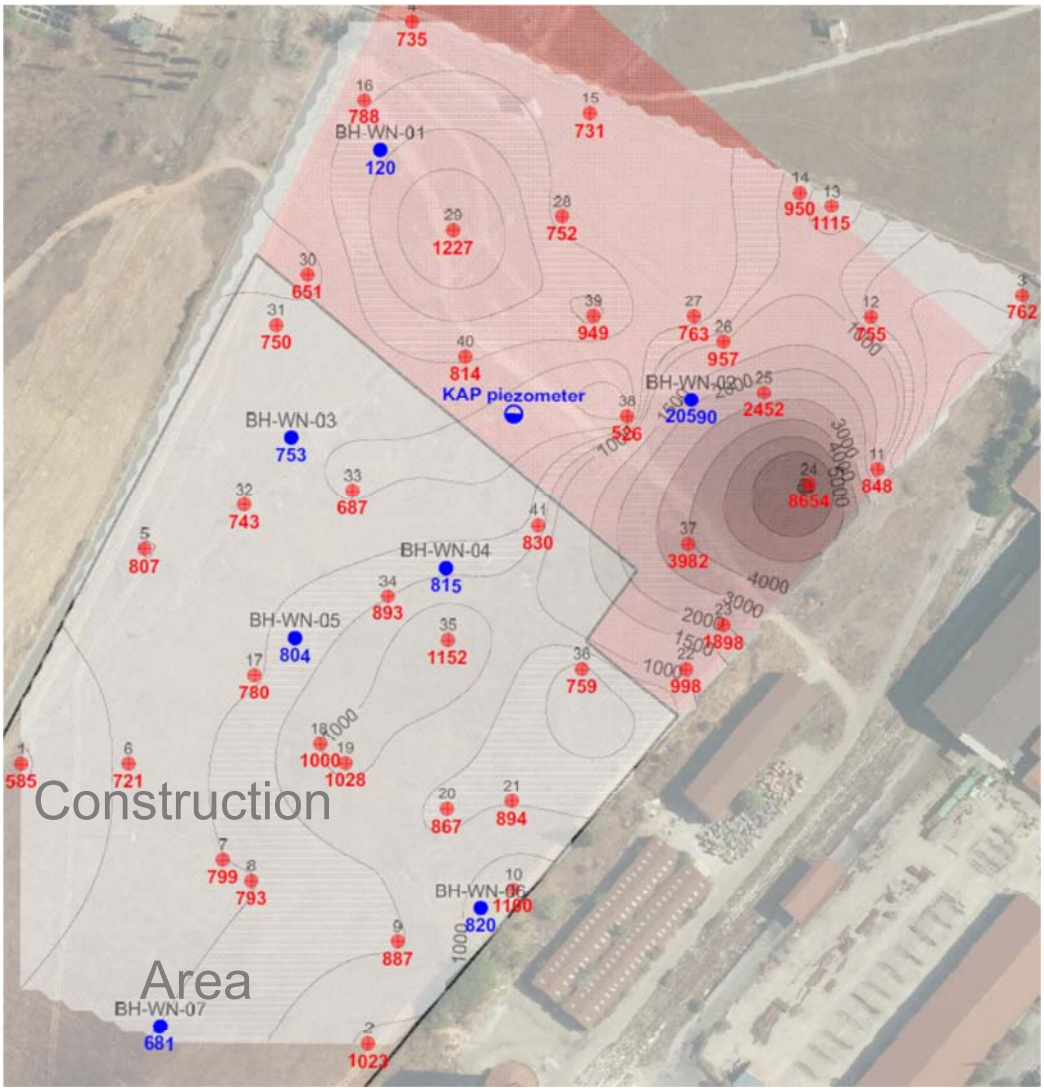


Figure 2: **Future WWTP-Site: Near-surface concentration of fluoride in mg/kg. Results 2017 as lines of equal concentration and red dots. Results 2019 as blue dots.**

The lines of equal concentration, measured in 2017, show strongly increasing concentrations towards the north east of the site. On the remaining area and thus the entire construction area of the new WWTP, a significantly increased background concentration of fluorine in the range of 600-1.000 mg/kg was measured.

The results of the investigations in 2019 confirm this distribution with high concentrations in the north eastern borehole BH-WN-02 and slightly increased values in all other spots. The results of 2019 are not included in the calculation of the concentration isolines.

PAH

Figure 3 shows the near-surface distribution of the PAH concentration in the soil. The lines of equal concentration are based on the results of the investigation 2017 (red dots). The results of the 2019 investigation are shown in blue colour.

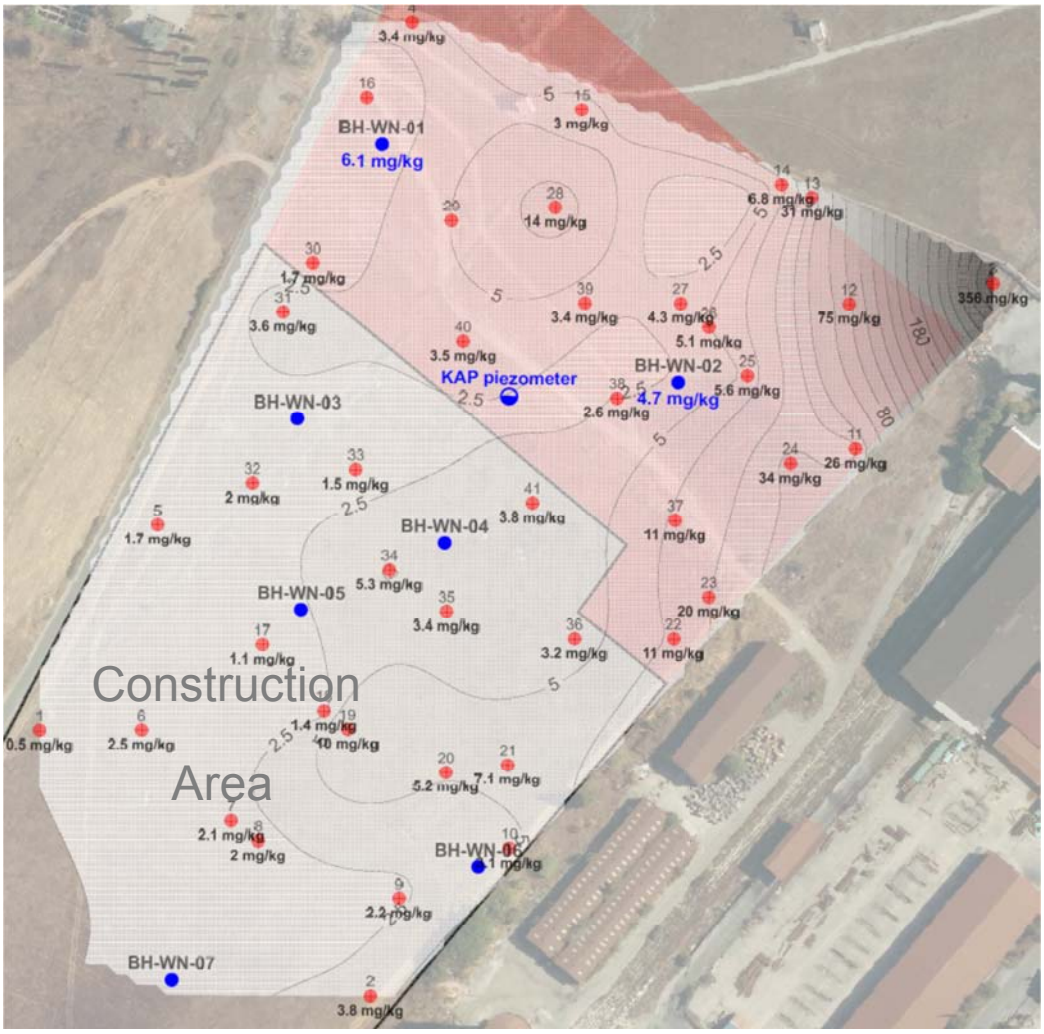


Figure 3: **Future WWTP-Site: Near-surface concentration of PAH in mg/kg. Results of 2017 as lines of equal concentration 2017 and red dots. Results of 2019 as blue dots.**

The lines of equal concentration of PAH, measured in 2017, show increasing concentrations towards the north east of the site. The significantly higher concentrations are limited to a point in the northeast. Even at a short distance from this point, the values decrease rapidly. In the entire construction area, moderately increased background concentrations were measured in 2017. The results determined in 2019 at boreholes BH-WN-01 and BH-WN-02 confirm this distribution.

TPH and PCB

Figure 4 shows the near-surface distribution of the TPH concentration in the soil. The lines of equal concentration are based on the results of the investigation 2017. In the 2019 exploration, no near-surface samples were examined for TPH.

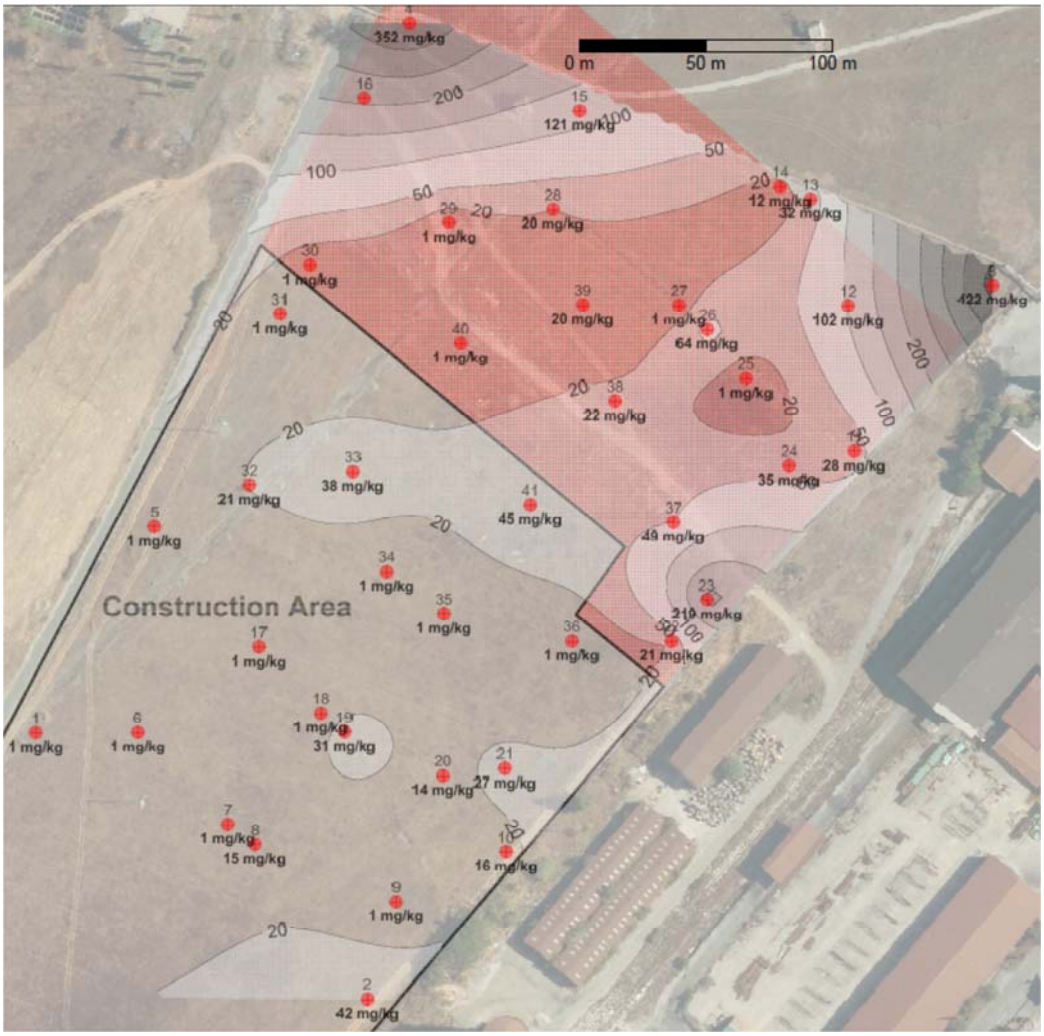


Figure 4: Future WWTP-Site: Near-surface concentration of TPH in mg/kg. Results of 2017 as lines of equal concentration and red dots.

The concentration of TPH is again significantly higher in the north eastern and northern zone, while the construction site of the WWTP is inconspicuous.

The 2017 investigations indicated increased values of hydrocarbons especially in the deeper soil layers. **Figure 5** shows the distribution of the maximum TPH concentration in the deeper soil layers from 2.0 - 5.0 m. The results of the local investigations in 2019 are shown in comparison, but are not included in the calculation of the concentration isolines.

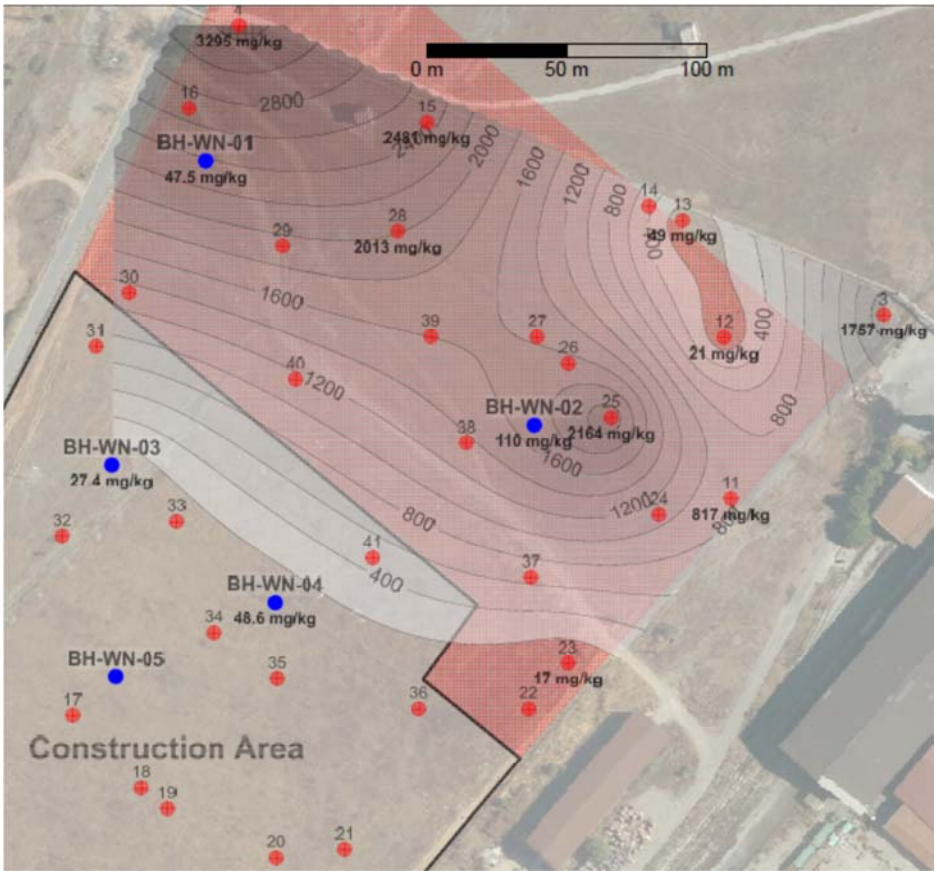


Figure 5: Future WWTP-Site: concentration of TPH. Maximum in deeper soil layers (2.0 – 5.0 m) in mg/kg. Results of 2017 as lines of equal concentration and red dots. Results of 2019 as blue dots.

The 2017 results show three hot spots of increased concentrations of TPH in the deeper soil at boreholes 3, 4 and 25. The findings at borehole 3 and 4 correspond to the increased concentrations in the near-surface layers (see Figure 4), while the near-surface concentration was rather low at point 25.

In 2019 the newly determined TPH concentrations in the deep soil layers were significantly lower than the interpolated values from the exploration in 2017. Within the construction area all concentrations measured in 2017 and 2019 were inconspicuous.

In 2019, the spots with increased values for TPH in 2017 were also examined for PCB, which often occurs together with TPH. No increased concentrations of PCB is observed.

3.2 Groundwater

The results of the groundwater sampling at the KAP piezometer are summarized in the table in **Annex 5**. The parameters examined are inconspicuous throughout. Only the fluoride value and the value for electric conductivity is slightly increased.

4 INTERPRETATION

4.1 Legal background

A comparison of measured concentrations in all soils and water samples with the relevant Montenegrin and European legislation (bibliography references [8] to [18]) is given in the *Report of Soil, Water and Gases Analyses on Existing and New Wastewater Treatment Plants of City Podgorica, Nr. 00-853, CETI, May 2019* [6]. At locations where the limits are met for both soil and groundwater, the site is assumed to not be contaminated. Where the limits are not met, the site is potentially contaminated and a site-specific risk analysis must be undertaken in order to assess the risk.

Following legal bases were used for the assessment:

Soil:

- Endangering of soil and groundwater:
  Dutch List [21]. List of limit and guideline values for pollutant levels in soils created in the Netherlands, which serves as a decision-making aid for the assessment of soil contamination.
- Endangering of human health:
  Italian regulations [18];
- Endangering of agricultural soils:
  Rulebook on allowed quantities of dangerous and harmful matters in soil and methods of their testing (“Official gazette of Montenegro”, no. 18/97) [8], which primarily relates to agricultural land.
- Disposal / recycling of excavated soil:
  German regulations: Requirements for the recycling of mineral residues / waste - Technical rules [19].

Water:

- Rep.of Montenegro (2007): Regulation on the classification and categorization of surface and ground water ("Off. Gazette of Montenegro", no. 02/07 of 29.10.2007) [10];
- German regulations: Federal Soil Protection and Contaminated Sites Ordinance [20].

4.2 Findings

Findings of the visual inspection

Apparently, solid waste dumped on piles, mainly in the northern part of the Site, have been regularly levelled and distributed over the whole area. Also deposits of bauxite have been identified in the northern part of the Site.

Fluorine

The distribution of fluorine in the near surface layers confirms the influence of the deposits of slags and masonry from smelting furnaces, that are visible on the surface in the north eastern part of the plot. The generally increased background concentration on the remaining areas may be due to the carry-over of these substances to the south, but also be due to atmospheric deposition in the vicinity of the aluminium factory.

The highest concentrations in the northeast exceed the limit for industrial areas according to the Italian standards, while this limit value is maintained on the entire remaining construction site.

The chemical analysis of eluates from the soil indicate that the fluoride is highly eluable.

PAH

Borehole 3 with the maximum concentration is located directly next to the KAP oil tank storage described in section 1.3.2. The significantly increased PAH concentration at borehole 3 in 2017 may be related to an entry of pollutants at this point.

This maximum concentration exceeds the limit for industrial areas according to the Italian standard but is assessed as a singularity. The concentrations in the construction area comply with the limit for residential areas of the Italian standard. Here no restrictions on the usability of excavated soil due to the prevailing concentrations of PAH are to be expected.

TPH / PCB

The distribution of TPH in the near surface layers with the maximum concentration directly next to the oil store again shows an influence of the adjacent industrial plant. Another source of entry for TPH is obviously in the north near to the road.

The investigation in 2017 revealed that also deeper ground horizons in the northern part were heavily loaded with TPH. In 2019 a review of this fact with two new boreholes in the northern part could not confirm the results from 2017. Due to the fact that the high concentrations were found in several holes in 2017, a basic contamination of the deeper soil by TPH in the northern part can however still be assumed.

The maximum concentrations in the deeper soil layers do not exceed the intervention value of the Dutch soil quality standards. The near surface concentrations comply with the limit for industrial areas according to the Italian standard. The concentrations in the construction area consistently comply with the limit for residential areas of the Italian standard. In the construction area no restrictions on the recycling of excavated soil due to the concentration of TPH are to be expected.

There is no contamination of the subsoil with PCB, according to the available results.

Groundwater

The sample of water from the KAP piezometer (No.101/04) corresponds to the class A1 quality according to the Regulation on the classification and categorization of surface and ground water [10], due to the value of the electro conductivity in relation to the prescribed value. The concentrations of all other parameters measured in the groundwater correspond to the A0 water quality.

Summary

The results can be summarized as follows:

- Due to the increased content of fluorine, chromium, nickel and PAH in the upper soil of the entire construction area, the samples do not comply with the requirements of the Montenegrin Rulebook on allowed quantities of dangerous and harmful matters in soil and methods of their testing ("Official gazette of Montenegro", no. 18/97) [8];
- Clearly increased contents of PAH are limited to an area northeast of the site and will not be affected by the construction project with the shifting of the construction site towards the south. The concentrations of PAH prevailing on the construction site largely comply with the limit for residential use according to Italian standards and are so unproblematic;
- The content of chromium complies with the limit for residential use according to the Italian standards. The concentrations of nickel only slightly exceed this limit;
- On the entire construction area the concentrations of fluorine clearly exceed the limit for residential use according to Italian standards, but concentrations comply with the limit for industrial / commercial use. North of the construction area, where the fluoride-containing waste was deposited directly on the surface, even the limit for commercial use is exceeded;
- Increased contents of TPH in the deeper soil, which were detected in 2017, are limited to an area in the northern part of the site and will not be affected by the construction project. In these contaminated zones a possible simultaneous contamination by PCB was not found;
- In the groundwater the slightly increased fluoride indicates an influence of the surface. Apart from that, the groundwater is not influenced by the pollutants measured on the surface.

5 RECOMMENDATIONS

Based on the assessment of the level of contamination, the following recommendations are made for the construction phase:

Waste on the surface

In order to prevent the further spreading of pollution (fluorine, PAH, asbestos, plastic waste and scrab), the superficial waste has to be removed from the entire construction area and from the

contaminated area to the north. The collected waste should be disposed of in accordance with the local legislation and in coordination with the local authorities, e.g. to the municipal landfill. The amount of waste generated is roughly estimated at approx. 100 m3, thereof approx. 10 m3 asbestos cement, slags from melts etc.;

Topsoil

For the topsoil the following points have to be considered:

- The pollutant concentrations prevailing on the building construction area do not require external disposal of the excavated soil; Therefore the topsoil, which has to be removed for building the plant, should remain on site.
- The amount of topsoil generated during excavation is estimated at approx. 3.500 m^3. This amount of topsoil cannot simply be distributed over a large area, but should be installed in defined heaps.
- Any disposal of topsoil outside of the construction site must be coordinated with the local authorities. Because of the increased fluoride content any relocation of the topsoil on agricultural land is not possible;

Subsoil

For the handling of the subsoil the following should be noted:

The gravel-sand subsoil within the construction site is unlikely to have any particular contamination.

Nevertheless it is recommended to reuse the excavated material within the site for embankments and landscaping.

Disposal off-site is expected to be possible without restrictions. It is possible that the level of fluoride in the subsoil does not comply with the requirements of the Rulebook on allowed quantities of dangerous and harmful matters in soil and methods of their testing (“Official gazette of Montenegro”, no. 18/97) [8]. For this reason also for the subsoil disposal outside of the construction site should be coordinated with the local authorities.

6 ANNEXES

Annex 1: **Site plan: Area of the future WWTP**

Annex 2: **Sample list and scope of analysis**
Area of the future WWTP

Annex 3: **Drilling profiles: Area of the future WWTP**

Annex 4: **Results of physico-chemical analyses of soil**
Area of the future WWTP

Annex 5: **Results of physico-chemical analyses of water from borehole and piezometer**
Area of the existing and the future WWTP

Annex 1

Site plan: Area of the future WWTP



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33 Investigation pt. 2017 / Mjesto ispitivanja. 2017

BH-WN-05 Investigation pt. 2019 / Mjesto ispitivanja. 2019

Kap Piezometer / Kap Piezometar

Estimated direction of groundwater flow / Procjenjeni smjer toka podzemne vode

Client: Vik Podgorica	Proj.-Nr. / Broj projekta: 610-1403	Annexe / Dodatak 1
Name of the project / Naziv projekta: WWTP Podgoriza - Soil contamination investigations PPOV Podgorica – Ispitivanje zagadenja zemljišta	Datum: 30.04.2020	
Name of the plan / Naziv plana: Future WWTP: Site plan investigation points Postojeci PPOV – Plan lokacije sa mjestima ispitivanja	Scale / Skala: ca. 1 : 2.000	

P:\610\1400-1449\0-1403 MNE KA Podgorica\500 Design\510 Elaboration\Soil Contamination\05 Maps\Surfer\new WWTP\Future WWTP-200430-bra.srf

Annex 2

Sample list and scope of analysis
Area of the future WWTP

Annex 2
Sample List and Scope of Analyses
Future WWTP Site

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| Drillng Point | Depth of Drilling [m] | Sample Name | Sample Depth [m] | Date of Sampling | Type and number of samples | | | | | ORGANOLEPTIC FINDINGS | | | | | | LABORATORY ANALYTICS | | | | | |

Annex 2
Sample List and Scope of Analyses
Future WWTP Site

FICHTNER
WATER & TRANSPORTATION

| Drillng Point | Depth of Drilling [m] | Sample Name | Sample Depth [m] | Date of Sampling | Type and number of samples | | | | | ORGANOLEPTIC FINDINGS | | | | | | | LABORATORY ANALYTICS | | | | | | |

Annex 3

Drilling profiles: Area of the future WWTP

Razmernik / Ruler	Kota / Elevation (m)	Završna dubina End depth (m)	Debljina / Thickness (m)	Litološka oznaka / lithol. denotation	Opis litološko-strukturnog sastava / Description of lithological-structural composition	Grafički prikaz jezgra / Graphic presen.of core	RQD (%)	SPT(N)	Uzeti uzorci (GP) / Samples (GP)	Uzeti uzorci (CETI) / Uzeti uzorci (CETI)	Razmernik / Razmernik /	NPV/PPV GWL/AGW
0	29.8										0	
0.5	29.3	0.5	0.5	gl	Prašinasto - peskovita glina, sa sadržajem drobine. Braon boje. Sredina koja mora u potpunosti biti uklonjena pri izgradnji objekta, platoa i pristupnih saobraćajnica. / Silty - sandy clay, with debris. Brown. This unit needs to be removed completely during the construction of the facility, platform and access roads.					U-1	0.5	
1										U-2	1	
1.5									U-1	U-3	1.5	
2										U-4	2	
2.5			4.5	P,Šlj,Kg	Od 0.5-5.0m zastupljen peskoviti šljunak, slabije ili jače vezan - konglomerat. Do dubine 2.0m slabije vezan peskoviti šljunak, dok je u nastavku, do dubine istraživanja jače vezan , sa zaobljenim do poluzaobljenim valucima veličine i do 10cm. Sivkaste boje. Sredina zbijena do vrlo zbijena i povoljna za fundiranje. U površinskoj zoni gde su slabije vezani imaju nepovoljnija fizičko-mehanička svojstva u odnosu na jače vezanu zonu, ali u svakom slučaju predstavljaju povoljnu sredinu za fundiranje. / From 0.5-5.0m there is sandy gravel, slightly or firmly bound - conglomerate. Till depht of 2.0m the sandy gravel is slightly bound, while further, until the studied depth, it is firmly bound, with rounded to subrounded boulders in size up to 10 cm. Grayish. This unit is very compressed and suitable for foundation. In the surface area, where they are slightly bound, they have more adverse physical - mechanical properties in comparison to the firmly bound area. In any case, they represent an eligible area for foundation,			50 / 7cm	U-2		2.5	
3										U-5	3	
3.5									U-3		3.5	
4								50 / 9cm		U-6	4	
4.5									U-4		4.5	
5	24.8	5.0								U-7	5	
5.5									U-5		5.5	
6											6	
6.5											6.5	
7											7	
7.5											7.5	
8											8	
8.5											8.5	
9											9	
9.5											9.5	
10											10	
10.5											10.5	
11											11	
11.5											11.5	
12											12	
12.5											12.5	
13											13	

LEGEND

gl - Silty - sandy clay, with content of debris. Brown,

P,Šlj,Kg - Sandy gravel, mostly slightly to firmly bound (conglomerate)

Fotografije / Photos

0.00-5.00 m



Koordinate bušotine / Borehole's coordinates

X	4695405.844
Y	6600790.482
Z	29.787

INŽENJERSKO-GEOLOŠKI PROFIL BUŠOTINE BH-WN-01
Razmjera 1:50

ENGINEERING-GEOLOGICAL PROFILE OF BOREHOLE BH-WN-01
Scale 1:50

Prečnik bušenja / Diametar of borehole:
Ø 146 mm
Vreme bušenja / Date of drilling:
18. March 2019.

Bušio / Drilled: GEOMIP inženjering
Kartirao / Mapped: M.Matović, M. Z. Matović

Prilog br. 6.1
Appendix No. 6.1

Razmernik / Ruler	Kota / Elevation (m)	Završna dubina End depth (m)	Debljina / Thickness (m)	Litološka oznaka / lithol. denotation	Opis litološko-strukturnog sastava / Description of lithological-structural composition
0	30.5				
	30.2	0.3	0.3	gl	Prašinasto-peskovita glina, sa sadržajem drobine, humificirana. Slabo konsolidovana sredina. Braon boje. Sredina koja mora u potpunosti biti uklonjena pri izgradnji objekta, platoa i pristupnih saobraćajnica. / Silty - sandy clay, with debris. Humified. Under-consolidated unit. Brown. This unit needs to be removed completely during the construction of the facility, platform and access roads.
			4.7	P,Šlj,Kg	Od 0.3-5.0m zastupljen peskoviti šljunak, slabije ili jače vezan - konglomerat. Do dubine oko 2.0m slabije vezan peskoviti šljubak, dok je u nastavku, do dubine istraživanja jače vezan , sa zaobljenim do poluzaobljenim valucima veličine i do 10cm. Sivkaste boje. Sredina zbijena do vrlo zbijena i povoljna za fundiranje. U površinskoj zoni gde su slabije vezani imaju nepovoljnija fizičko-mehanička svojstva u odnosu na jače vezanu zonu, ali u svakom slučaju predstavljaju povoljnu sredinu za fundiranje. / From 0.3-5.0m there is sandy gravel, slightly or firmly bound - conglomerate. Till depht of 2.0m the sandy gravel is slightly bound, while further, until the studied depth, it is firmly bound, with rounded to subrounded boulders in size up to 10 cm. Grayish. This unit is compressed to very compressed and suitable for foundation. In the surface area, where they are slightly bound, they have more adverse physical - mechanical properties in comparison to the firmly bound area. In any case, they represent an eligible area for foundation.
5	25.5	5.0			

Grafički prikaz jezgra / Graphic presen.of core	RQD (%)	SPT(N)	Uzeti uzorci (GP) / Samples (GP)	Uzeti uzorci (CETI) / Uzeti uzorci (CETI)	Razmernik / Razmernik /
				U-1	0
				U-2	0.5
				U-3	1
			U-1		1.5
				U-4	2
		50 / 10cm	U-2		2.5
				U-5	3
			U-3		3.5
				U-6	4
		50 / 9cm	U-4		4.5
				U-7	5
				U-8	5.5
			U-5		6
					6.5
					7
					7.5
					8
					8.5
					9
					9.5
					10
					10.5
					11
					11.5
					12
					12.5
					13

LEGEND

gl - Silty - sandy clay, with content of debris. With veins of plants and roots. Under-consolidated unit. Brown.

P,Šlj,Kg - sandy gravel, in general slightly to firmly bound (conglomerate)

Fotografije / Photos

0.00-5.00 m



Koordinate bušotine / Borehole's coordinates

X	4 695 303.224
Y	6 600 909.140
Z	30.524

INŽENJERSKO-GEOLOŠKI PROFIL BUŠOTINE BH-WN-02
Razmjera 1:50

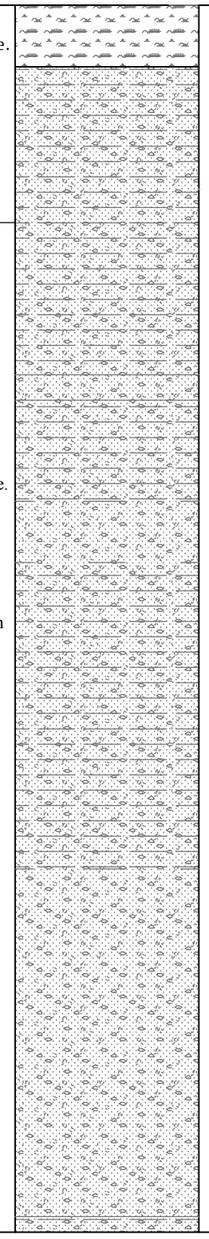
ENGINEERING-GEOLOGICAL PROFILE OF BOREHOLE BH-WN-02
Scale 1:50

Prečnik bušenja / Diametar of borehole:
Ø 146 mm
Vreme bušenja / Date of drilling:
20. March 2019.

Bušio / Drilled: GEOMIP inženjering
Kartirao / Mapped: M.Matović, M. Z. Matović

Prilog br. 6.2
Appendix No. 6.2

Razmernik / Ruler	Kota / Elevation (m)	Završna dubina End depth (m)	Debljina / Thickness (m)	Litološka oznaka / lithol. denotation	Opis litološko-strukturnog sastava / Description of lithological-structural composition
0	29.8				
0.5	29.3	0.5	0.5	gl	Prašinasto-peskovita glina, humificirana, prožeta žilicama biljaka i korenjem. Slabo konsolidovana sredina. Braon boje. Sredina koja mora u potpunosti biti uklonjena pri izgradnji objekta, platoa i pristupnih saobraćajnica. / Silty - sandy clay, Humified. With veins of plants and roots. Under-consolidated unit. Brown. This unit needs to be removed completely during the construction of the facility, platform and access roads.
1					
1.5					
2					
2.5					Od 0.5-10.0m zastupljen peskoviti šljunak, uglavnom slabije ili jače vezan kalcijum karbonatnim ($CaCO_3$) vezivom - konglomerati, sa zaobljenim do poluzaobljenim valucima veličine i do 10cm. Sivkaste boje. Sredina zbijena do vrlo zbijena i povoljna za fundiranje. U intervalima 3.0-3.2; 4.0-4.5; 7.0-9.9 salbije vezani, a u intervalu od 8.0-9.9m i sa povećanim sadržajem prašinasto-glinovite komponente. U zonama gde su slabije vezani imaju nepovoljnija fizičko-mehanička svojstva u odnosu na jače vezane zone, ali u svakom slučaju predstavljaju povoljnu sredinu za fundiranje. / From 0.5-10.0m there is sandy gravel, in general slightly or firmly bound by a calcium carbonate ($CaCO_3$) binder - conglomerate, with rounded to subrounded boulders sized even up to 10 cm. Grayish. This unit is compressed to very compressed and suitable for foundation. At the intervals 3.0-3.2; 4.0-4.5; 7.0-9.9 they are slightly bound, and 8.0-9.9m even with increased content of silt-clay component. In areas where they are slightly bound, they have more adverse physical - mechanical properties in comparison to the firmly bound area. In any case, they represent an eligible area for foundation.
3					
3.5					
4					
4.5					
5					
5.5			9.5	P,Šlj,Kg	
6					
6.5					
7					
7.5					
8					
8.5					
9					
9.5					
10	19.8	10.0			
10.5					
11					
11.5					
12					
12.5					
13					



SPT(N)	Uzeti uzorci (GP) / Samples (GP)	Uzeti uzorci (CETI) / Uzeti uzorci (CETI)	Razmernik / Razmernik /	NPV/PPV GWL/AGW
		U-1	0	
		U-2	0.5	
	U-1	U-3	1	
		U-4	1.5	
50 11cm	U-2		2	
			2.5	
	U-3		3	
50 11cm	U-4		3.5	
			4	
	U-5		4.5	
		U-5	5	
			5.5	
50 8.5cm	U-6		6	
			6.5	
	U-7		7	
			7.5	
50 4cm	U-8		8	
			8.5	
	U-9		9	
			9.5	
50 5cm	U-10		10	
			10.5	
			11	
			11.5	
			12	
			12.5	
			13	

LEGEND

gl - Silty - sandy clay, with content of debris and with veins of plants and roots. Under-consolidated unit. Brown.

P,Šlj,Kg - sandy gravel, in general slightly to firmly bound (conglomerate)

Fotografije / Photos

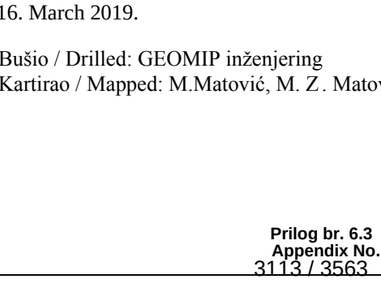
0.00-10.00 m

Koordinate bušotine / Borehole's coordinates

X	4 695 293.876
Y	6 600 756.688
Z	29.825

INŽENJERSKO-GEOLOŠKI PROFIL BUŠOTINE BH-WN-03
Razmjera 1:50

ENGINEERING-GEOLOGICAL PROFILE OF BOREHOLE BH-WN-03
Scale 1:50

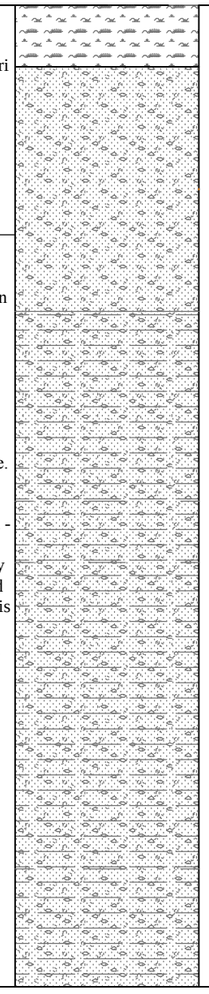


Prečnik bušenja / Diametar of borehole:
Ø 146 mm
Vreme bušenja / Date of drilling:
16. March 2019.

Bušio / Drilled: GEOMIP inženjering
Kartirao / Mapped: M.Matović, M. Z. Matović

Prilog br. 6.3
Appendix No. 6.3

Razmernik / Ruler	Kota / Elevation (m)	Završna dubina End depth (m)	Debljina / Thickness (m)	Litološka oznaka / lithol. denotation	Opis litološko-strukturnog sastava / Description of lithological-structural composition
0	30.2				
0.5	29.6	0.6	0.6	gl	Prašinasto-peskovita glina, sa sadržajem drobine, prožeta žilicama biljaka i korenjem. Slabo konsolidovana sredina. Braon boje. Sredina koja mora u potpunosti biti uklonjena pri izgradnji objekta, platoa i pristupnih saobraćajnica. / Silty - sandy clay, with content of debris. With veins of plants and roots. Under-consolidated unit. Brown. This unit needs to be removed completely during the construction of the facility, platform and access roads.
1					
1.5					
2					
2.5					Od 0.6-8.0m zastupljen peskoviti šljunak, slabije ili jače vezan - konglomerat. Do dubine 2.5m slabije vezan peskoviti šljubak, dok je u nastavku, do dubine istraživanja jače vezan kalcijum karbonatnim ($CaCO_3$) vezivom, sa zaobljenim do poluzaobljenim valucima veličine i do 10cm. Sivkaste boje. Sredina zbijena do vrlo zbijena i povoljna za fundiranje. U površinskoj zoni gde su slabije vezani imaju nepovoljnija fizičko-mehanička svojstva u odnosu na jače vezanu zonu, ali u svakom slučaju predstavljaju povoljnu sredinu za fundiranje. / From 0.6-8.0m there is sandy gravel, slightly or firmly bound - the conglomerate. There is slightly bound sandy gravel till depth of 2.5 m, while further, till the studied depth, it is firmly bound by a calcium carbonate ($CaCO_3$) binder , with rounded to subrounded boulders sized even up to 10 cm. Grayish. This unit is compressed to very compressed and suitable for foundation. In the surface area where they are slightly bound, they have more adverse physical - mechanical properties in comparison to the firmly bound area. In any case, they represent an eligible area for foundation.
3					
3.5					
4					
4.5					
5			7.4	P,Šlj,Kg	
5.5					
6					
6.5					
7					
7.5					
8	22.2	8.0			
8.5					
9					
9.5					
10					
10.5					
11					
11.5					
12					
12.5					
13					



Uzeti uzorci (GP) / Samples (GP)	Uzeti uzorci (CETI) / Uzeti uzorci (CETI)	SPT(N)	RQD (%)
	U-1		
	U-2		
U-1	U-3		
	U-4		
U-2		50 / 5cm	
	U-3		
U-4		50 / 7.5cm	
	U-5		
U-5			
U-6		50 / 4cm	
	U-7		
U-6			
U-8		50 / 4.5cm	

Razmernik / Razmernik /	NPV/PPV GWL/AGW
0	
0.5	
1	
1.5	
2	
2.5	
3	
3.5	
4	
4.5	
5	
5.5	
6	
6.5	
7	
7.5	
8	
8.5	
9	
9.5	
10	
10.5	
11	
11.5	
12	
12.5	
13	

Fotografije / Photos

0.00-8.00 m



Koordinate bušotine / Borehole's coordinates

X	4 695 251.041
Y	6 600 813.760
Z	30.208

INŽENJERSKO-GEOLOŠKI PROFIL BUŠOTINE BH-WN-04
Razmjera 1:50

ENGINEERING-GEOLOGICAL PROFILE OF BOREHOLE BH-WN-04
Scale 1:50



LEGEND

gl - Silty - sandy clay, with content of debris and with veins of plants and roots. Under-consolidated unit. Brown.

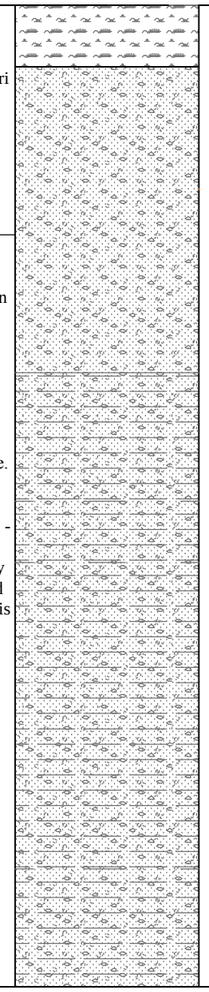
P,Šlj,Kg - sandy gravel, in general slightly to firmly bound (conglomerate)

Prečnik bušenja / Diametar of borehole:
Ø 146 mm
Vreme bušenja / Date of drilling:
18-19. March 2019.

Bušio / Drilled: GEOMIP inženjering
Kartirao / Mapped: M.Matović, M. Z. Matović

Prilog br. 6.4
Appendix No. 6.4

Razmernik / Ruler	Kota / Elevation (m)	Završna dubina End depth (m)	Debljina / Thickness (m)	Litološka oznaka / lithol. denotation	Opis litološko-strukturnog sastava / Description of lithological-structural composition
0	29.8				
0.5	29.3	0.5	0.5	gl	Prašinasto - peskovita glina, sa sadržajem drobine, prožeta žilicama biljaka i korenjem. Slabo konsolidovana sredina. Braon boje. Sredina koja mora u potpunosti biti uklonjena pri izgradnji objekta, platoa i pristupnih saobraćajnica. / Silty - sandy clay, with content of debris. With veins of plants and roots. Under-consolidated unit. Brown. This unit needs to be removed completely during the construction of the facility, platform and access roads.
8	21.8	8.0	7.5	P,Šlj,Kg	Od 0.5-8.0m zastupljen peskoviti šljunak, slabije ili jače vezan - konglomerat. Do dubine 3.0m slabije vezan peskoviti šljunak, dok je u nastavku, do dubine istraživanja jače vezan kalcijum karbonatnim ($CaCO_3$) vezivom, sa zaobljenim do poluzaobljenim valucima veličine i do 10cm. Sivkaste boje. Sredina zbijena do vrlo zbijena i povoljna za fundiranje. U površinskoj zoni gde su slabije vezani imaju nepovoljnija fizičko-mehanička svojstva u odnosu na jače vezanu zonu, ali u svakom slučaju predstavljaju povoljnu sredinu za fundiranje. / From 0.5-8.0m there is sandy gravel, slightly or firmly bound - the conglomerate. There is slightly bound sandy gravel till depth of 3.0 m, while further, till the studied depth, it is firmly bound by a calcium carbonate ($CaCO_3$) binder , with rounded to subrounded boulders sized even up to 10 cm. Grayish. This unit is compressed to very compressed and suitable for foundation. In the surface area where they are slightly bound, they have more adverse physical - mechanical properties in comparison to the firmly bound area. In any case, they represent an eligible area for foundation.



SPT(N)	Uzeti uzorci (GP) / Samples (GP)	Uzeti uzorci (CETI) / Uzeti uzorci (CETI)	Razmernik / Razmernik /
		U-1	0
		U-2	0.5
	U-1	U-3	1
		U-4	1.5
50 10cm	U-2		2
			2.5
	U-3		3
			3.5
50 5cm	U-4		4
			4.5
	U-5		5
			5.5
50 7.5cm	U-6		6
			6.5
	U-7		7
		U-5	7.5
50 3cm	U-8		8
			8.5
			9
			9.5
			10
			10.5
			11
			11.5
			12
			12.5
			13

LEGEND

gl - Silty - sandy clay, with content of debris and with veins of plants and roots. Under-consolidated unit. Brown.

P,Šlj,Kg - sandy gravel, in general slightly to firmly bound (conglomerate)

NPV/PPV GWL/AGW

Fotografije / Photos

0.00-8.00 m



Koordinate bušotine / Borehole's coordinates

X	4 695 215.296
Y	6 600 759.851
Z	29.826

INŽENJERSKO-GEOLOŠKI PROFIL BUŠOTINE BH-WN-05
Razmjera 1:50

ENGINEERING-GEOLOGICAL PROFILE OF BOREHOLE BH-WN-05
Scale 1:50



Prečnik bušenja / Diametar of borehole:
Ø 146 mm
Vreme bušenja / Date of drilling:
19-20. March 2019.

Bušio / Drilled: GEOMIP inženjering
Kartirao / Mapped: M.Matović, M. Z. Matović

Prilog br. 6.5
Appendix No. 6.5

Razmernik / Ruler	Kota / Elevation (m)	Završna dubina End depth (m)	Debljina / Thickness (m)	Litološka oznaka / lithol. denotation	Opis litološko-strukturnog sastava / Description of lithological-structural composition
0	30.0				
	29.5	0.5	0.5	gl	Prašinasto - peskovita glina, sa sadržajem drobine, prožeta žilicama biljaka i korenjem. Slabo konsolidovana sredina. Braon boje. Sredina koja mora u potpunosti biti uklonjena pri izgradnji objekta, platoa i pristupnih saobraćajnica. / Silty - sandy clay, with content of debris. With veins of plants and roots. Under-consolidated unit. Brown. This unit needs to be removed completely during the construction of the facility, platform and access roads.
1–9			19.5		
10				P,Šlj,Kg	Od 0.5-20.0m zastupljen peskoviti šljunak, u površinskoj zoni slabije ili jače vezan kalcijum karbonatnim ($CaCO_3$) vezivom-konglomerat do oko 10m, dok je u nastavku, do dubine istraživanja slabije vezan do nevezan peskoviti šljunak , sa zaobljenim do poluzaobljenim valucima veličine i do 10cm. Sivkaste boje. Sredina zbijena do vrlo zbijena i povoljna za fundiranje. U zoni gde su nevezani do slabije vezani imaju nepovoljnija fizičko-mehanička svojstva u odnosu na jače vezanu zonu površinsku zonu, ali u svakom slučaju predstavljaju povoljnu sredinu za fundiranje. / From 0.5-20.0m there is sandy gravel, at surface area it is slightly or firmly bound by a calcium carbonate ($CaCO_3$) binder- the conglomerate till cca 10m, while further, till the studied depth, there is slightly bound to loose sandy gravel , with rounded to subrounded boulders sized even up to 10 cm. Grayish. This unit is compressed to very compressed and suitable for foundation. In area where they are loose to slightly bound, they have more adverse physical - mechanical properties in comparison to the firmly bound area. In any case, they represent an eligible area for foundation.
11–19					
20	10.0	20.0			
21–26					

Grafički prikaz jezgra / Graphic presen.of core

RQD (%)

SPT(N) | Uzeti uzorci (GP) / Samples (GP) | Uzeti uzorci (CETI) / Uzeti uzorci (CETI)

Uzeti uzorci (GP) / Samples (GP)	SPT(N)	Uzeti uzorci (CETI) / Uzeti uzorci (CETI)
U-1	50 / 9.0cm	U-1
U-2		U-2
U-3	50 / 10.5cm	U-3
U-4		U-4
U-5	50 / 9.0cm	
U-6		
U-7	50 / 13.0cm	
U-8		
U-9	50 / 1.0cm	
U-10		
U-11	50 / 5.0cm	
U-12		
U-13	50 / 7.0cm	
U-14		
U-15	50 / 5.0cm	
U-16		
U-17		
U-18		
U-19		

Razmernik / Razmernik / Ruler

NPV/PPV GWL/AGW

AGW/PPV 16.2m

Fotografije / Photos

0.00-20.00 m



Koordinate bušotine / Borehole's coordinates

X	4 695 153.245
Y	6 600 842.323
Z	30.019

INŽENJERSKO-GEOLOŠKI PROFIL BUŠOTINE BH-WN-06
Razmjera 1:100

ENGINEERING-GEOLOGICAL PROFILE OF BOREHOLE BH-WN-06
Scale 1:100

LEGEND

gl - Silty - sandy clay, with content of debris and with veins of plants and roots. Under-consolidated unit. Brown.

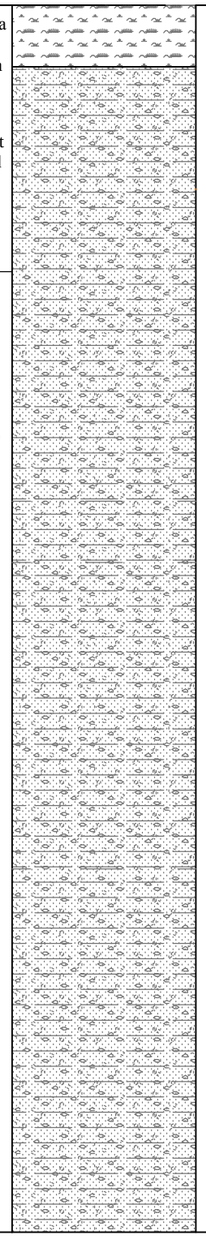
P,Šlj,Kg - sandy gravel, at surface it is slightly or firmly bound by a calcium carbonate ($CaCO_3$) binder- the conglomerate till around 10m, while further, till the studied depth there is loosely bound to unbound sandy gravel.

Prečnik bušenja / Diametar of borehole:
Ø 146 mm
Vreme bušenja / Date of drilling:
21-25. March 2019.

Bušio / Drilled: GEOMIP inženjering
Kartirao / Mapped: M.Matović, M. Z. Matović

Prilog br. 6.6
Appendix No. 6.6

Razmernik / Ruler	Kota / Elevation (m)	Završna dubina End depth (m)	Debljina / Thickness (m)	Litološka oznaka / lithol. denotation	Opis litološko-strukturnog sastava / Description of lithological-structural composition
0	29.6				
0.5	28.8	0.8	0.8	gl	Prašinasto-peskovita glina do zaglinjena peskovita prašina, sa manjim sadržajem drobine, prožeta žilicama biljaka i korenjem. Slabo konsolidovana sredina. Braon boje. Sredina koja mora u potpunosti biti uklonjena pri izgradnji objekta, platoa i pristupnih saobraćajnica. / Silty - sandy clay to clayey and sandy silt, with lower content of debris. With veins of plants and roots. Under-consolidated unit. Brown. This unit needs to be removed completely during the construction of the facility, platform and access roads.
1					
1.5					
2					
2.5					Od 0.5-10.0m zastupljen slabije do jače vezan peskoviti šljunak - konglomerat. U jezgru zastupljeni zaobljeni do poluzaobljeni valuci veličine i do 10cm. Sivkaste boje. Sredina vrlo zbijena i povoljna za fundiranje. / From 0.5 to 10.0m there is slightly to firmly bound sandy gravel - the conglomerate. Rounded to subrounded boulders sized up to 10 cm are present in the core. Grayish. This unit is very compressed and suitable for foundation.
3					
3.5					
4					
4.5					
5					
5.5			9.2	P,Šlj,Kg	
6					
6.5					
7					
7.5					
8					
8.5					
9					
9.5					
10	19.6	10.0			
10.5					
11					
11.5					
12					
12.5					
13					



RQD (%)	SPT(N)	Uzeti uzorci (GP) / Samples (GP)	Uzeti uzorci (CETI) / Uzeti uzorci (CETI)	Razmernik / Razmernik /
	50 10cm	U-1	U-1	0
			U-2	0.5
			U-3	1
			U-4	1.5
		U-1		2
				2.5
		U-2		3
	50 5cm	U-3		3.5
				4
		U-4		4.5
			U-5	5
				5.5
	50 7.5cm	U-5		6
				6.5
		U-6		7
				7.5
	50 3cm	U-7		8
				8.5
		U-8		9
			U-6	9.5
	50 5cm	U-9		10
				10.5
				11
				11.5
				12
				12.5
				13

NPV/PPV GWL/AGW

Fotografije / Photos

0.00-10.00 m



Koordinate bušotine / Borehole's coordinates

X	4 695 067.115,
Y	6 600 708.451
Z	29.556

INŽENJERSKO-GEOLOŠKI PROFIL BUŠOTINE BH-WN-07
Razmjera 1:50

ENGINEERING-GEOLOGICAL PROFILE OF BOREHOLE BH-WN-07
Scale 1:50



LEGEND

gl - Silty - sandy clay, with content of debris and with veins of plants and roots. Under-consolidated unit. Brown.

P,Šlj,Kg - sandy gravel, in general slightly to firmly bound (conglomerate)

Prečnik bušenja / Diametar of borehole:
Ø 146 mm
Vreme bušenja / Date of drilling:
21. March 2019.

Bušio / Drilled: GEOMIP inženjering
Kartirao / Mapped: M.Matović, M. Z. Matović

Prilog br. 6.7
Appendix No. 6.7

Annex 4

Results of physico-chemical analyses of soil Area of the future WWTP

Annexe 4 / Dodatak 4

Future WWTP - Chemical Analyses Results / Buduće PPOV – Rezultati hemijske analize

Borehole / Bušotina			WN 01	WN 01	WN 01	WN 01	WN 02	WN 02	WN 02	WN 02	WN 03	WN 03	WN 03	WN 04	WN 04	WN 04	WN 05	WN 06	WN 07	WN 07	MNE	Dutch Soil / Qual. Standards Holandski standard kvaliteta zemlje		Italian Soil Quality Standards Italijanski standard kvaliteta zemlje	
Sample identification / Identifikacija uzorka			WN1/1	WN1/2	WN1/5	WN1/7	WN2/1	WN2/2	WN2/5	WN2/6	WN3/1	WN3/2	WN3/4	WN4/1	WN4/2	WN4/5	WN5/1	WN6/1	WN7/1	WN7/2	"Off. Gazette of Montenegro", No. 18/97 permitted amounts of hazardous and harmful substances in soil „Službeni list Crne Gore" br. 18/97	Target value	Invervention value	Residential / Public (green) use	Industrial / Commercial use
Depth / Dubina			0,0-0,3m	0,3-0,5m	2,0-3,0m	4,0-5,0m	0,0-0,4m	0,4-0,7m	2,0-3,0m	3,0-4,0m	0,0-0,1m	0,1-0,6m	1,0-2,0m	0,0-0,3m	0,3-0,7m	4,0-5,0m	0,0-0,3m	0,0-0,3m	0,0-0,3m	0,3-0,5m		Ciljna vrijednost	Vrijednost intervencije	Stambena / javna (zelena) upotreba	Industrijska / komercijalna upotreba
Laboratory sample ID / ID uzorka laboratorija			45/11	46/11	47/11	48/11	49/11	50/11	51/11	52/11	53/11	54/11	55/11	56/11	57/11	58/11	59/11	60/11	61/11	62/11					
Date of sampling / Datum uzorkovanja			21.03.19	21.03.19	21.03.19	21.03.19	21.03.19	21.03.19	21.03.19	21.03.19	21.03.19	21.03.19	21.03.19	21.03.19	21.03.19	21.03.19	21.03.19	21.03.19	25.03.19	25.03.19					
N_0	Parameter / Parametar	Units/Jedinice																							
1.	pH		8,4±0,1	7,9±0,1	/	/	6,8±0,1	8,1±0,1	/	/	7,6±0,1	8,1±0,1	/	/	/	/	/	6,4±0,1	/	/				/	/
2.	Fluorine	mg/kg d.w.	120	182	/	/	20590	5378	/	/	753	721	/	815	670	/	804	820	681	105	300			100	2000
3.	Cyanides	mg/kg d.w.	5,6	/	/	/	15,8	/	/	/	/	8,7	/	12	/	/	10,7	9,3	7,2	/		1[1)]	20[1)]	1[1)]	100[1)]
4.	Cadmium	mg/kg d.w.	0,51±0,05	/	/	/	0,56±0,06	/	/	/	/	0,65±0,07	/	0,53±0,05	/	/	0,58±0,06	0,60±0,06	0,40±0,04	/	2	0,8	12	2	15
5.	Chromium	mg/kg d.w.	35±3	/	/	/	75±7	/	/	/	/	87±9	/	73±7	/	/	62±6	81±8	76±8	/	50	100	380	150	800
6.	Mercury	mg/kg d.w.	0,07±0,01	/	/	/	0,08±0,01	/	/	/	/	0,10±0,02	/	0,08±0,01	/	/	0,07±0,01	0,11±0,02	0,11±0,02	/	1,5	0,3	10	1	5
7.	Arsenic	mg/kg d.w.	5,8±0,6	/	/	/	14±1	/	/	/	/	15±2	/	13±1	/	/	11±1	16±2	17±2	/	20	29	55	20	50
8.	Copper	mg/kg d.w.	21±2	/	/	/	43±4	/	/	/	/	36±3	/	32±3	/	/	29±3	36±4	37±4	/	100	36	190	120	600
9.	Nickel	mg/kg d.w.	54±5	/	/	/	113±11	/	/	/	/	132±13	/	103±10	/	/	93±9	125±12	128±13	/	50	35	210	120	500
10.	Lead	mg/kg d.w.	9,5±0,9	/	/	/	21±2	/	/	/	/	21±2	/	32±3	/	/	27±3	25±2	24±2	/	50	85	530	100	1000
11.	TPH	mg/kg d.w.	/	/	47,5	124	/	/	110	84,2	/	/	27,4	/	/	48,6	/	/	/	/		50	5000	50[2)]	750[2)]
12.	Polycyclic aromatic hydrocarbons (PAH):																								
	Naphtalene	mg/kg d.w.	0,024±0,007	/	/	/	0,037±0,010	/	/	/	/	/	/	/	/	/	/	/	/	/	/			/	/
	2-Methylnaphtalene	mg/kg d.w.	0,012±0,003	/	/	/	0,033±0,009	/	/	/	/	/	/	/	/	/	/	/	/	/	/			/	/
	1-Methylnaphtalene	mg/kg d.w.	0,009±0,002	/	/	/	0,024±0,007	/	/	/	/	/	/	/	/	/	/	/	/	/	/			/	/
	Acenaphtylene	mg/kg d.w.	<0,005	/	/	/	<0,005	/	/	/	/	/	/	/	/	/	/	/	/	/	/			/	/
	Acenaphtene	mg/kg d.w.	0,037±0,007	/	/	/	0,044±0,008	/	/	/	/	/	/	/	/	/	/	/	/	/	/			/	/
	Fluorene	mg/kg d.w.	0,023±0,004	/	/	/	0,029±0,005	/	/	/	/	/	/	/	/	/	/	/	/	/	/			/	/
	Phenanthrene	mg/kg d.w.	0,39±0,06	/	/	/	0,37±0,06	/	/	/	/	/	/	/	/	/	/	/	/	/	/			/	/
	Anthracene	mg/kg d.w.	0,053±0,006	/	/	/	0,049±0,006	/	/	/	/	/	/	/	/	/	/	/	/	/	/			/	/
	Fluoranthene	mg/kg d.w.	0,90±0,14	/	/	/	0,74±0,11	/	/	/	/	/	/	/	/	/	/	/	/	/	/			/	/
	Pyrene	mg/kg d.w.	0,73±0,11	/	/	/	0,56±0,09	/	/	/	/	/	/	/	/	/	/	/	/	/	/			5	50
	Benzo(a)anthracene	mg/kg d.w.	0,52±0,07	/	/	/	0,40±0,05	/	/	/	/	/	/	/	/	/	/	/	/	/	/			0,5	10
	Chrysene	mg/kg d.w.	0,49±0,08	/	/	/	0,48±0,07	/	/	/	/	/	/	/	/	/	/	/	/	/	/			5	50
	Benzo(b)fluoranthene	mg/kg d.w.	1,03±0,16	/	/	/	0,81±0,12	/	/	/	/	/	/	/	/	/	/	/	/	/	/			0,5	10
	Benzo(k)fluoranthene	mg/kg d.w.	0,36±0,09	/	/	/	0,27±0,06	/	/	/	/	/	/	/	/	/	/	/	/	/	/			0,5	10
	Benzo(a)pyrene	mg/kg d.w.	0,51±0,07	/	/	/	0,20±0,03	/	/	/	/	/	/	/	/	/	/	/	/	/	/			0,1	10
	Indeno(1,2,3-cd)pyrene	mg/kg d.w.	0,47±0,07	/	/	/	0,31±0,05	/	/	/	/	/	/	/	/	/	/	/	/	/	/			0,1	5
	Dibenzo(a,h)anthracene	mg/kg d.w.	0,12±0,03	/	/	/	0,081±0,019	/	/	/	/	/	/	/	/	/	/	/	/	/	/			0,1	10
	Benzo(g,h,i)perylene	mg/kg d.w.	0,43±0,08	/	/	/	0,25±0,05	/	/	/	/	/	/	/	/	/	/	/	/	/	/			0,1	10
	ΣPAHs	**mg/kg d.w.**	**6,1±1,1**	/	/	/	**4,7±0,8**	/	/	/	/	/	/	/	/	/	/	/	/	/	**0,6**	**1[3)]**	**40[3)]**	**10[3)]**	**100[3)]**
13.	**Polychlorinated biphenyl (PCB):**																					**0,02**	**1**	**0,001**	**5**
	PCB 18	**mg/kg d.w.**	/	/	**<0,002**	**<0,002**	/	/	**<0,002**	**<0,002**	/	/	**<0,002**	/	/	**<0,002**	/	/	/	/	/			/	/
	PCB 31	**mg/kg d.w.**	/	/	**<0,002**	**<0,002**	/	/	**<0,002**	**<0,002**	/	/	**<0,002**	/	/	**<0,002**	/	/	/	/	/			/	/
	PCB 28	**mg/kg d.w.**	/	/	**<0,002**	**<0,002**	/	/	**<0,002**	**<0,002**	/	/	**<0,002**	/	/	**<0,002**	/	/	/	/	**0,004**			/	/
	PCB 52	**mg/kg d.w.**	/	/	**<0,002**	**<0,002**	/	/	**<0,002**	**<0,002**	/	/	**<0,002**	/	/	**<0,002**	/	/	/	/	**0,004**			/	/
	PCB 44	**mg/kg d.w.**	/	/	**<0,002**	**<0,002**	/	/	**<0,002**	**<0,002**	/	/	**<0,002**	/	/	**<0,002**	/	/	/	/	/			/	/
	PCB 101	**mg/kg d.w.**	/	/	**<0,002**	**<0,002**	/	/	**<0,002**	**<0,002**	/	/	**<0,002**	/	/	**<0,002**	/	/	/	/	**0,004**			/	/
	PCB 149	**mg/kg d.w.**	/	/	**<0,002**	**<0,002**	/	/	**<0,002**	**<0,002**	/	/	**<0,002**	/	/	**<0,002**	/	/	/	/	/			/	/
	PCB 118	**mg/kg d.w.**	/	/	**<0,002**	**<0,002**	/	/	**<0,002**	**<0,002**	/	/	**<0,002**	/	/	**<0,002**	/	/	/	/	**0,004**			/	/
	PCB 153	**mg/kg d.w.**	/	/	**<0,002**	**<0,002**	/	/	**<0,002**	**<0,002**	/	/	**<0,002**	/	/	**<0,002**	/	/	/	/	**0,004**			/	/
	PCB 138	**mg/kg d.w.**	/	/	**<0,002**	**<0,002**	/	/	**<0,002**	**<0,002**	/	/	**<0,002**	/	/	**<0,002**	/	/	/	/	/			/	/
	PCB 180	**mg/kg d.w.**	/	/	**<0,002**	**<0,002**	/	/	**<0,002**	**<0,002**	/	/	**<0,002**	/	/	**<0,002**	/	/	/	/	**0,004**			/	/
	PCB 194	**mg/kg d.w.**	/	/	**<0,002**	**<0,002**	/	/	**<0,002**	**<0,002**	/	/	**<0,002**	/	/	**<0,002**	/	/	/	/	/			/	/

[1)] Free Cyanides / Slobodni cijanidi

[2)] >C12

[3)] PAH (10)

Annex 5

Results of physico-chemical analyses of water from borehole and piezometer
Area of the existing and the future WWTP

Annex 5:

Results of physico-chemical analysis of water - Existing and new wastewater treatment plant

Source: Centre for Ecotoxicological Research Podgorica, Report No. 00-853 (slightly revised),

Parameter	Unit	Results of analysis	Results of analysis	MPL A	MPL A1	MPL A2	MPL A3	Method
Protocol No.		**100/04**	**101/04**					
Date of sampling		**16.03.2019.**	**21.03.2019.**					
Location		**Existing Wastewater Treatment Plant Borehole B6B**	**New Wastewater Treatment Plant KAP piezometer**					
pH		7,8±0,3	7,2±0,3	6,8-8,3	6,8-8,5	6,5-8,5	5,5-9	MEST EN ISO 10523:2013*
Electroconductivity	μS/cm	15700±88	315±2	300	400	600	1000	MEST EN 27888:2009*
Soluble carbon dioxide	mg/l	/	2,0					SMV8
Ammonium	mg/l	0,7±0,1	<0,02	0,00	0,02	0,05	1	SMVP.179*
Magnesium	mg/l	201±11	5,5±0,3					EPA.200.7*
Sulphate	mg/l	79,5±5,2	8,7±0,6	20	20	50	200	ISO 10304-1*
Cyanides	mg/l	<0,001	<0,001	<G.D.	0,001	0,005	0,005	SMEW 4500CN-E*
Cadmium	mg/l	<0,001	<0,001	0,000	0,001	0,005	0,005	MEST EN ISO 17924-2:2017
Chromium	mg/l	<0,1	<0,1	0,000	0,000	0,05	0,05	MEST EN ISO 17924-2:2017
Mercury	mg/l	0,0022±0,0001	<0,0001	<G.D.	<G.D.	0,0005	0,001	AMA-111*
Arsenic	mg/l	<0,01	<0,01	0,001	0,010	0,050	0,050	MEST EN ISO 17924-2:2017

Parameter	Unit	Results of analysis	Results of analysis	MPL A	MPL A1	MPL A2	MPL A3	Method
Copper	mg/l	<0,05	<0,05	0,005	0,02	0,05	1	MEST EN ISO 17924-2:2017
Nickel	mg/l	0,24±0,02	<0,1	0,002	0,002	0,050	0,100	MEST EN ISO 17924-2:2017
Lead	mg/l	0,13±0,01	<0,05	0,001	0,010	0,05	0,05	MEST EN ISO 17924-2:2017
DOC	mg/l	2263,5	1,17					ISO 20236:2018
TPH	mg/l	1,4±0,2	<0,01	<GD	0,01	0,05	0,5	DIN EN ISO 9377-2:2001*
Policyclic aromatic hydrocarbon (PAH):	mg/l	0,000732±0,00011	<0,00001	<GD	0,0002	0,0002	0,001	SMEW.6440C*
Naphtalene	mg/l	0,00017±0,00003	<0,00001					SMEW.6440C*
2-Methylnaphtalene	mg/l	0,00011±0,00002	<0,00001					SMEW.6440C*
1-Methylnaphtalene	mg/l	0,00020±0,00004	<0,00001					SMEW.6440C*
Acenaphtylene	mg/l	<0,00001	<0,00001					SMEW.6440C*
Acenaphtene	mg/l	<0,00001	<0,00001					SMEW.6440C*
Fluorene	mg/l	0,000040±0,000005	<0,00001					SMEW.6440C*
Phenanthrene	mg/l	0,00013±0,00002	<0,00001					SMEW.6440C*
Anthracene	mg/l	<0,00001	<0,00001					SMEW.6440C*
Fluoranthene	mg/l	0,000040±0,000006	<0,00001					SMEW.6440C*
Pyrene	mg/l	0,000042±0,000008	<0,00001					SMEW.6440C*
Benzo(a)anthracene	mg/l	<0,00001	<0,00001					SMEW.6440C*
Chrysene	mg/l	<0,00001	<0,00001					SMEW.6440C*
Benzo(b)fluoranthene	mg/l	<0,00001	<0,00001					SMEW.6440C*

Parameter	Unit	Results of analysis	Results of analysis	MPL A	MPL A1	MPL A2	MPL A3	Method
Benzo(k)fluoranthene	mg/l	<0,00001	<0,00001					SMEW.6440C*
Benzo(a)pyrene	mg/l	<0,00001	<0,00001					SMEW.6440C*
Indeno(1,2,3-cd)pyrene	mg/l	<0,00001	<0,00001					SMEW.6440C*
Dibenzo(a,h)anthracene	mg/l	<0,00001	<0,00001					SMEW.6440C*
Benzo(g,h,i)perylene	mg/l	<0,00001	<0,00001					SMEW.6440C*
Polychlorinated biphenyl (PCB):	mg/l							SMWP-6431C *
PCB 18	mg/l	<0,000002	<0,000002					SMWP-6431C *
PCB 31	mg/l	<0,000002	<0,000002					SMWP-6431C *
PCB 28	mg/l	<0,000002	<0,000002					SMWP-6431C *
PCB 52	mg/l	<0,000002	<0,000002					SMWP-6431C *
PCB 44	mg/l	<0,000002	<0,000002					SMWP-6431C *
PCB 101	mg/l	<0,000002	<0,000002					SMWP-6431C *
PCB 149	mg/l	<0,000002	<0,000002					SMWP-6431C *
PCB 118	mg/l	<0,000002	<0,000002					SMWP-6431C *
PCB 153	mg/l	<0,000002	<0,000002					SMWP-6431C *
PCB 138	mg/l	<0,000002	<0,000002					SMWP-6431C *
PCB 180	mg/l	<0,000002	<0,000002					SMWP-6431C *
PCB 194	mg/l	<0,000002	<0,000002					SMWP-6431C *
Fluoride Added after sampling on 06.06.2019	mg/l		0,04	0,05	1	1,5	1,7	SMVP.326*

* - accredited method

CONSULTING SERVICES FOR THE PREPARATION OF AN UPDATED FEASIBILITY STUDY FOR THE CONSTRUCTION OF A WASTEWATER TREATMENT PLANT AND THE EXTENSION OF THE SEWER NETWORK IN PODGORICA

Addendum to the

Report on the Soil Analysis from the Location of the Future Wastewater Treatment Plant

Centar za ekotoksikološka ispitivanja Podgorica d.o.o. (CETI) /
LLC Center for Ecotoxicological Research Podgorica

December 2017

1 INTRODUCTION

The present note is an addendum to the report on soil investigations carried out by CETI on the site of the planned WWTP Podgorica, to assess the level of contamination of the soil and identify necessary mitigation or remediation measures in the scope of the construction of the future WWTP. The present note is prepared by Fichtner Water & Transportation, based on the report delivered by CETI in December 2017.

2 ASSESSMENT AND RECOMMENDATIONS

Following analysis is made on the results of the soil investigations, based on the report dated December 2017 and the clarifications received from CETI on 22nd January and 13th February 2018:

1. in the CETI report, measured concentrations are compared to:

a) values from the Montenegrin Standard on permitted amounts of hazardous and harmful subtances on agricultural soils;

b) values from the Italian Standard for the evaluation of the effect on the soil-human path;

c) values from the Dutch Standard for the evaluation of the effect on the soil-groundwater path.

2. there is no applicable European Standard for level of contamination of soils. Contamination of soils is still regulated at national level.

3. Relatively high concentrations of Total Chromium, Nickel, Fluoride (CETI report refers to Fluorine, however we assume Fluoride is meant) and total Polycyclic Aromatic

Hydrocarbons (PAHs) are measured in all surface layers and most of the samples also in deeper layers for Fluoride and PAHs.

4. Values given by the Montenegrin Standard are not relevant as they refer to land used for agriculture (they may however become relevant in case material is exported, as such material with concentrations exceeding the standards may not be allowed for disposal on land used for agriculture).

5. If Italian (land for industrial / commercial use) and Dutch (Intervention Level) standards are considered, critical values are observed only in the eastern part of the considered plot for the construction of the WWTP (see attached map in **Annex 2**) with regard to: PAHs, Total Petroleum Hydrocarbons (TPHs) and Fluoride.

6. With reference to the applicable German Standard for possible Soil - Human interaction[1] (see **Annex 3**) , the following can be stated:

- apart from benzopyrene at Sampling Point 3, other relevant parameters are not exceeded for industrial or commercial use of the land;
- apart from Nickel (almost all points) and Benzopyrene (Point 3 and Point 13, again in the eastern part of the plot) all relevant parameters comply with the most restrictive requirements for use of the land as children playground;
- the German standard give no threshold value for Total PAHs (only benzopyrene is considered) as well as for TPHs.

7. Based on the above considerations, following statements and recommendations can be made:

i. the selected site is suitable for the construction of the WWTP Podgorica;

ii. critically contaminated areas are located at the eastern edge of the selected plot. No construction works should be carried out in this area and the site for the construction of the WWTP should be shifted approx. 80 m to the south-west (towards UP5 - lok 2) in order that the sites with contaminated soil are not touched;

iii. disposal of the excavated soil outside of the plot may become problematic and / or expensive in case the excavated material is to be considered as hazardous waste. We recommend that excavated soil is - as much as possible and in coordination with the relevant authorities - used on the site for landscaping;

iv. on-site remediation could be a possible option for removal of TPHs. However it's feasibility would need to be analysed in more details and confirmed through pilot tests;

v. additional samples for analysis of relevant parameters should be taken during excavation works for the construction of the WWTP at different depth.

[1] Appendix 2 to the Federal Soil Protection and Contaminated Soils Act (Bundes-Bodenschutz- und Altlastenverordnung (BBodSchV))

Requirements for sampling and management of potentially contaminated soil should be described in the tender documents for the construction of the WWTP.

A table with a summary of the analysis is attached in **Annex 1**. In this table only values exceeding the threshold values of the above mentioned standards are indicated. A map with the location of the sampling points were high concentrations of different substances were measured is attached in **Annex 2**. **Annex 4**, shows the revised layout plan for the WWTP Podgorica considering the recommendations made in the present note.

3 ANNEXES

Annex 1: Summary Table of Soil Analysis Results

Annex 2: Map with Location of contaminated Soil Samples

Annex 3: German Standard for possible Soil - Human interaction

Annex 4: Revised WWTP Layout Plan considering the Recommendations of the present Note

Annex 1

SUMMARY TABLE OF SOIL ANALYSIS RESULTS

Results of soil investigation

Measurement was carried out | No measurement was carried out | Threshold value exceeded

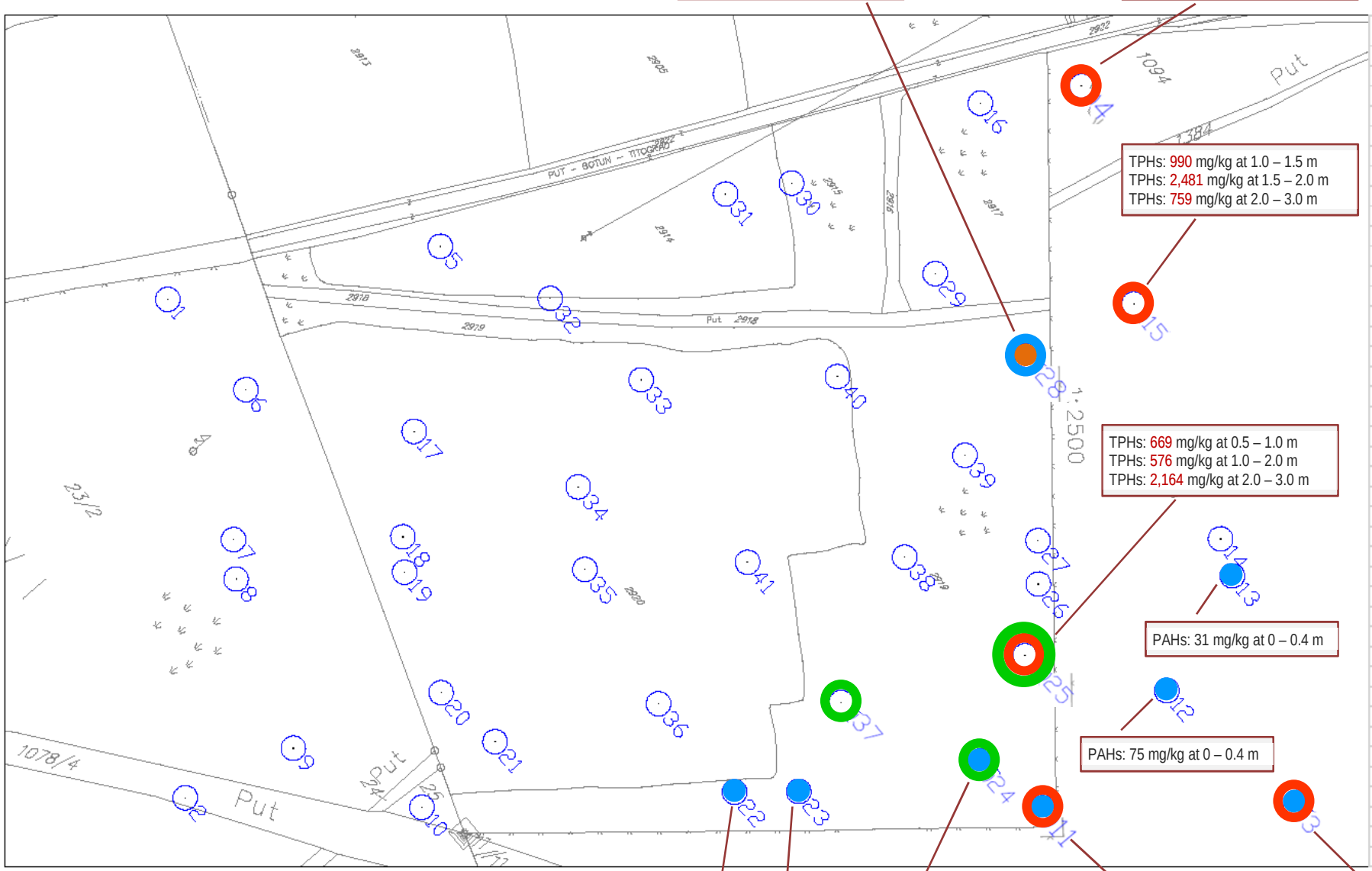
Borehole No.	Unit	Parameters over threshold value																						
		0 - 0,5 m					0,5 - 1,0 m					1,0 - 2,0 m				1,5 - 2,0 m		2,0 - 3,0 m		3,0 - 5,0 m		5,0 - 6,0 m		
		Total Cr	Nickel	Fluorine [1]	Tot PAHs	TPHs [2]	Total Cr	Nickel	Fluorine [1]	Tot PAHs	TPHs [2]	Total Cr	Nickel	Tot PAHs	TPHs [2]	Tot PAHs	TPHs [2]	Tot PAHs	TPHs [2]	Tot PAHs	TPHs [2]	Tot PAHs	TPHs [2]	[1] For Italian Norm "Fluoruride"
																								[2] "Mineral Oil" for Dutch standard
																								[2] "Hydrocarbons light" for Italian standard
Standard MNE	mg/kg	50	50	300	0,6	--	50	50	300	0,6	--	50	50	0,6	--	0,6	--	0,6	--	0,6	--	0,6	--	
Standard NL	mg/kg	100	35	--	1	50	100	35	--	1	50	100	35	1	50	1	50	1	50	1	50	1	50	Target Level
Standard NL	mg/kg	380	210	--	40	5.000	380	210	--	40	5.000	380	210	40	5.000	40	5.000	40	5.000	40	5.000	40	5.000	Intervention Level
Standard IT	mg/kg	150	120	100	10	10	150	120	100	10	10	150	120	10	10	10	10	10	10	10	10	10	10	Residential / Public Green
Standard IT	mg/kg	800	500	2.000	100	250	800	500	2.000	100	250	800	500	100	250	100	250	100	250	100	250	100	250	Industrial / Commercial
		0 - 0,5					0,5 - 1,0					1,0 - 2,0												
23		79 ± 6	95 ± 9	1.898	20 ± 3	219				2,9 ± 0,5	143				17									
		0 - 0,5																						
22		73 ± 6	96 ± 9	998	11 ± 2	21																		
		0 - 0,5																						
21		68 ± 5	87 ± 9	894	7,1 ± 1,2	27																		
		0 - 0,7																						
10		95 ± 8	116 ± 9	1.100	3,1 ± 0,5	16																		
		0 - 0,4																						
20		83 ± 7	111 ± 11	867	5,2 ± 0,9	14																		
		0 - 0,7																						
19		82 ± 7	104 ± 10	1.028	10 ± 1	31																		
		0 - 0,5																						
18		85 ± 7	138 ± 13	1.000	1,4 ± 0,2	< 10																		
		0 - 0,6																						
35		93 ± 7	89 ± 9	1.152	3,4 ± 0,6	< 10																		
		0 - 0,5																						
36		76 ± 6	75 ± 7	759	3,2 ± 0,6	< 10																		
		0 - 0,5																						
17		88 ± 7	95 ± 9	780	1,1 ± 0,2	< 10																		
		0 - 0,4																						
6		67 ± 5	62 ± 6	721	2,5 ± 0,4	< 10																		
		0 - 0,7																						
5		79 ± 6	93 ± 9	807	1,7 ± 0,3	< 10																		
		0 - 0,7																						
7		83 ± 7	86 ± 8	799	2,1 ± 0,4	< 10																		
		0 - 1,0																						
8		92 ± 7	110 ± 11	793	2,0 ± 0,3	15																		
		0 - 0,3																						
9		83 ± 7	87 ± 8	887	2,2 ± 0,4	< 10																		
		0 - 1,0																						
38		85 ± 7	106 ± 10	526	2,6 ± 0,4	22																		
		0 - 1,0																						
30		91 ± 7	195 ± 19	651	1,7 ± 0,3	< 10																		
		0 - 0,4																						
31		61 ± 5	86 ± 8	750	3,6 ± 0,6	< 10																		
		0 - 0,6																						
32		67 ± 5	98 ± 9	743	2,0 ± 0,4	21																		
		0 - 0,4																						
34		65 ± 5	100 ± 10	893	5,3 ± 0,9	< 10																		
		0 - 0,2																						
1		56 ± 4	62 ± 6	585	0,5 ± 0,09	< 10																		
		0 - 0,6																						
33		86 ± 7	105 ± 10	687	1,5 ± 0,3	38																		
		0 - 0,4																						
2		91 ± 7	116 ± 11	1.023	3,8 ± 0,7	42																		
		0 - 0,5																						
39		84 ± 7	94 ± 9	949	3,4 ± 0,6	20																		
		0 - 0,9					0,9 - 1,0																	
37		73 ± 6	108 ± 10	3.982	11 ± 2	49			470		39													
		0 - 0,5					0,5 - 1,0																	
24		78 ± 6	107 ± 10	8.654	34 ± 6	35			4.485	0,9 ± 0,16	26													
		0 - 0,4																						
27		76 ± 6	93 ± 9	763	4,3 ± 0,7	< 10																		
		0 - 0,5																						
26		107 ± 9	145 ± 14	957	5,1 ± 0,9	64																		
		0 - 0,5					0,5 - 1,0					1,0 - 2,0						2,0 - 3,0						
25		91 ± 7	117 ± 11	2.452	5,6 ± 1,0	< 10			370	2,1 ± 0,4	669			1,2 ± 0,2	576			7,0 ± 1,2	2.164					
		0 - 0,6										1,0 - 2,0												
11		91 ± 7	99 ± 10	848	26 ± 4	28								2,6 ± 0,5	817									
		0 - 0,4																2,0 - 3,0						
28		67 ± 5	75 ± 7	752	14 ± 2	20												4,9 ± 0,9	2.013					
		0 - 0,4																						
29		64 ± 5	76 ± 7	1.227		< 10																		
		0 - 0,4																						

Borehole No.	Unit	Parameters over threshold value																						
		0 - 0,5 m					0,5 - 1,0 m					1,0 - 2,0 m				1,5 - 2,0 m		2,0 - 3,0 m		3,0 - 5,0 m		5,0 - 6,0 m		[1] For Italian Norm "Fluoruride" [2] "Mineral Oil" for Dutch standard [2] "Hydrocarbons light" for Italian standard
		Total Cr	Nickel	Fluorine [1]	Tot PAHs	TPHs [2]	Total Cr	Nickel	Fluorine [1]	Tot PAHs	TPHs [2]	Total Cr	Nickel	Tot PAHs	TPHs [2]	Tot PAHs	TPHs [2]	Tot PAHs	TPHs [2]	Tot PAHs	TPHs [2]	Tot PAHs	TPHs [2]	
Standard MNE	mg/kg	50	50	300	0,6	--	50	50	300	0,6	--	50	50	0,6	--	0,6	--	0,6	--	0,6	--	0,6	--	
Standard NL	mg/kg	100	35	--	1	50	100	35	--	1	50	100	35	1	50	1	50	1	50	1	50	1	50	Target Level
Standard NL	mg/kg	380	210	--	40	5.000	380	210	--	40	5.000	380	210	40	5.000	40	5.000	40	5.000	40	5.000	40	5.000	Intervention Level
Standard IT	mg/kg	150	120	100	10	10	150	120	100	10	10	150	120	10	10	10	10	10	10	10	10	10	10	Residential / Public Green
Standard IT	mg/kg	800	500	2.000	100	250	800	500	2.000	100	250	800	500	100	250	100	250	100	250	100	250	100	250	Industrial / Commercial
16		95 ± 8	119 ± 12	788																				
		0 - 0,4					0,5 - 1,0					1,0 - 2,0								3,0 - 5,0		5,0 - 6,0		
4		94 ± 8	131 ± 13	735	3,4 ± 0,6	352	136 ± 11	235 ± 23	500	0,81 ± 0,14	213			1,5 ± 0,3	460					6,5 ± 1,1	2.213	9,2 ± 1,6	3.295	
		0 - 0,5					0,5 - 1,0													3,0 - 5,0		5,0 - 6,0		
3		67 ± 5	77 ± 7	762	356 ± 62	422				28 ± 5	49									4,5 ± 0,8	1.757	1,9 ± 0,3	1.069	
		0 - 0,5																						
14		76 ± 6	84 ± 8	950	6,8 ± 1,2	12																		
		0 - 1,0										1 0 - 1,5				1,5 - 2,0		2,0 - 3,0						
15		96 ± 8	129 ± 13	731	3,0 ± 0,5	121						72 ± 6	107 ± 10	3,5 ± 0,6	990	7,1 ± 1,2	2.481	1,5 ± 0,3	759					
		0 - 0,4					0,4 - 1,0											2,0 - 3,0						
13		101 ± 8	110 ± 11	1.115	31 ± 5	32				0,87 ± 0,15	< 10							2,4 ± 0,4	49					
		0 - 0,4					0,4 - 1,0											2,0 - 3,0						
12		77 ± 6	85 ± 8	755	75 ± 13	102				1,0 ± 0,2	13							0,8 ± 0,14	21					
		0 - 0,4																						
40		73 ± 6	85 ± 8	814	3,5 ± 0,6	< 10																		
		0 - 0,5																						
41		88 ± 7	112 ± 11	830	3,8 ± 0,7	45																		

Annex 2

MAP WITH LOCATION OF CONTAMINATED SOIL SAMPLES

Location of Soil Samples



Br	Y	X
1	600650.44	4695174.29
2	600782.30	4695069.65
3	601027.06	4695354.24
4	600796.02	4695456.12
5	600696.62	4695256.06
6	600690.79	4695174.65
7	600726.55	4695138.61
8	600737.29	4695130.66
9	600793.27	4695108.35
10	600836.63	4695128.42
11	600972.93	4695288.13
12	600970.04	4695345.64
13	600954.94	4695387.64
14	600942.85	4695392.69
15	600863.46	4695421.87
16	600778.25	4695426.31
17	600738.39	4695208.77
18	600762.97	4695182.80
19	600772.46	4695175.49
20	600811.41	4695158.49
21	600835.83	4695161.62
22	600901.31	4695212.22
23	600915.23	4695228.87
24	600947.24	4695282.21
25	600929.94	4695316.84
26	600914.51	4695335.95
27	600903.26	4695345.34
28	600853.23	4695382.95
29	600812.14	4695377.36
30	600757.38	4695360.25
31	600745.71	4695340.86
32	600734.09	4695272.92
33	600774.94	4695278.51
34	600788.60	4695238.82
35	600811.32	4695222.48
36	600861.95	4695211.99
37	600901.70	4695259.33
38	600878.28	4695307.44
39	600865.30	4695345.24
40	600817.11	4695329.66
41	600845.11	4695265.85

Soil samples indicating a contamination

- Polycyclic Aromatic Hydrocarbons (PAHs)
- Total Petroleum Hydrocarbons (TPHs)
- Fluoride

Annex 3

GERMAN STANDARD FOR POSSIBLE SOIL - HUMAN INTERACTION

Bundesministerium der Justiz und für Verbraucherschutz

juris

zurück weiter

Nichtamtliches Inhaltsverzeichnis

Bundes-Bodenschutz- und Altlastenverordnung (BBodSchV)

Anhang 2

(Fundstelle: BGBl. I 1999, 1575 - 1579)

Maßnahmen-, Prüf- und Vorsorgewerte

1. Wirkungspfad Boden - Mensch (direkter Kontakt)

1.1 Abgrenzung der Nutzungen

a) Kinderspielflächen
Aufenthaltsbereiche für Kinder, die ortsüblich zum Spielen genutzt werden, ohne den Spielsand von Sandkästen. Amtlich ausgewiesene Kinderspielplätze sind ggf. nach Maßstäben des öffentlichen Gesundheitswesens zu bewerten.

b) Wohngebiete
Dem Wohnen dienende Gebiete einschließlich Hausgärten oder sonstige Gärten entsprechender Nutzung, auch soweit sie nicht im Sinne der Baunutzungsverordnung planungsrechtlich dargestellt oder festgesetzt sind, ausgenommen Park- und Freizeitanlagen, Kinderspielflächen sowie befestigte Verkehrsflächen.

c) Park- und Freizeitanlagen
Anlagen für soziale, gesundheitliche und sportliche Zwecke, insbesondere öffentliche und private Grünanlagen sowie unbefestigte Flächen, die regelmäßig zugänglich sind und vergleichbar genutzt werden.

d) Industrie- und Gewerbegrundstücke
Unbefestigte Flächen von Arbeits- und Produktionsstätten, die nur während der Arbeitszeit genutzt werden.

1.2 Maßnahmenwerte nach § 8 Abs. 1 Satz 2 Nr. 2 des Bundes-Bodenschutzgesetzes für die direkte Aufnahme von Dioxinen/Furanen auf Kinderspielflächen, in Wohngebieten, Park- und Freizeitanlagen und Industrie- und Gewerbegrundstücken (in ng/kg Trockenmasse, Feinboden, Analytik nach Anhang 1)

	Maßnahmenwerte (ng I-TEq/kg TM) [1*)]			
Stoff	Kinderspielflächen	Wohngebiete	Park- u. Freizeitanlagen	Industrie- und Gewerbegrundstücke
Dioxine/Furane (PCDD/F)	100	1 000	1 000	10 000

1*) Summe der 2,3,7,8 - TCDD-Toxizitätsäquivalente (nach NATO/CCMS).

1.3 Anwendung der Maßnahmenwerte

Bei Vorliegen dioxinhaltiger Laugenrückstände aus Kupferschiefer ("Kieselrot") erfolgt eine Anwendung der Maßnahmenwerte aufgrund der geringen Resorption im menschlichen Organismus nicht unmittelbar zum Schutz der menschlichen Gesundheit als vielmehr zum Zweck der nachhaltigen Gefahrenabwehr.

1.4 Prüfwerte nach § 8 Abs. 1 Satz 2 Nr. 1 des Bundes-Bodenschutzgesetzes für die direkte Aufnahme von Schadstoffen auf Kinderspielflächen, in Wohngebieten, Park- und Freizeitanlagen und Industrie- und Gewerbegrundstücken (in mg/kg Trockenmasse, Feinboden, Analytik nach Anhang 1)

Prüfwerte (mg/kg TM)				
Stoff	Kinderspielflächen	Wohngebiete	Park- u. Freizeitanlagen	Industrie- und Gewerbegrundstücke
Arsen	25	50	125	140
Blei	200	400	1 000	2 000
Cadmium	10 1)	20 1)	50	60
Cyanide	50	50	50	100
Chrom	200	400	1 000	1 000
Nickel	70	140	350	900
Quecksilber	10	20	50	80
Aldrin	2	4	10	-
Benzo(a)pyren	2	4	10	12
DDT	40	80	200	-
Hexachlorbenzol	4	8	20	200

1) In Haus- und Kleingärten, die sowohl als Aufenthaltsbereiche für Kinder als auch für den Anbau von Nahrungspflanzen genutzt werden, ist für Cadmium der Wert von 2,0 mg/kg TM als Prüfwert anzuwenden.

	Prüfwerte (mg/kg TM)			
Stoff	Kinderspielflächen	Wohngebiete	Park- u. Freizeitanlagen	Industrie- und Gewerbegrundstücke
Hexachlorcyclohexan (HCH-Gemisch oder Beta-HCH)	5	10	25	400
Pentachlorphenol	50	100	250	250
Polychlorierte Biphenyle (PCB(tief)6) 2)	0,4	0,8	2	40
2) Soweit PCB-Gesamtgehalte bestimmt werden, sind die ermittelten Meßwerte durch den Faktor 5 zu dividieren.				

2. Wirkungspfad Boden - Nutzpflanze

2.1 Abgrenzung der Nutzungen

a) Ackerbau
Flächen zum Anbau wechselnder Ackerkulturen einschließlich Gemüse und Feldfutter, hierzu zählen auch erwerbsgärtnerisch genutzte Flächen.

b) Nutzgarten
Hausgarten-, Kleingarten- und sonstige Gartenflächen, die zum Anbau von Nahrungspflanzen genutzt werden

c) Grünland
Flächen unter Dauergrünland

2.2 Prüf- und Maßnahmenwerte nach § 8 Abs. 1 Satz 2 Nr. 1 und 2 des Bundes-Bodenschutzgesetzes für den Schadstoffübergang Boden - Nutzpflanze auf Ackerbauflächen und in Nutzgärten im Hinblick auf die Pflanzenqualität (in mg/kg Trockenmasse, Feinboden, Analytik nach Anhang 1)

	Ackerbau, Nutzgarten		
Stoff	Methode [11)]	Prüfwert	Maßnahmenwert
Arsen	KW	200 [22)]	-
Cadmium	AN	-	0,04/0,1 [33)]
Blei	AN	0,1	-
Quecksilber	KW	5	
Thallium	AN	0,1	-
Benzo(a)pyren	-	1	-

33) Auf Flächen mit Brotweizenanbau oder Anbau stark Cadmiumanreichernder Gemüsearten gilt als Maßnahmenwert 0,04 mg/kg Trockenmasse; ansonsten gilt als Maßnahmenwert 0,1 mg/kg Trockenmasse.

22) Bei Böden mit zeitweise reduzierenden Verhältnissen gilt ein Prüfwert von 50 mg/kg Trockenmasse.

11) Extraktionsverfahren für Arsen und Schwermetalle: AN = Ammoniumnitrat, KW = Königswasser.

2.3 Maßnahmenwerte nach § 8 Abs. 1 Satz 2 Nr. 2 des Bundes-Bodenschutzgesetzes für den Schadstoffübergang Boden - Nutzpflanze auf Grünlandflächen im Hinblick auf die Pflanzenqualität (in mg/kg Trockenmasse, Feinboden, Arsen und Schwermetalle im Königswasser-Extrakt, Analytik nach Anhang 1)

	Grünland
Stoff	Maßnahmenwert
Arsen	50
Blei	1 200
Cadmium	20
Kupfer	1 300 [11)]
Nickel	1 900
Quecksilber	2
Thallium	15
Polychlorierte Biphenyle (PCB(tief)6)	0,2

11) Bei Grünlandnutzung durch Schafe gilt als Maßnahmenwert 200 mg/kg Trockenmasse.

2.4 Prüfwerte nach § 8 Abs. 1 Satz 2 Nr. 1 des Bundes-Bodenschutzgesetzes für den Schadstoffübergang Boden - Pflanze auf Ackerbauflächen im Hinblick auf Wachstumsbeeinträchtigungen bei Kulturpflanzen (in mg/kg Trockenmasse, Feinboden, im Ammoniumnitrat-Extrakt, Analytik nach Anhang 1)

	Ackerbau
Stoff	Prüfwert
Arsen	0,4
Kupfer	1
Nickel	1,5
Zink	2

2.5 Anwendung der Prüf- und Maßnahmenwerte

Die Prüf- und Maßnahmenwerte gelten für die Beurteilung der Schadstoffgehalte in der Bodentiefe von 0 bis 30 cm bei Ackerbauflächen und in Nutzgärten sowie in der Bodentiefe von 0 bis 10 cm bei Grünland entsprechend Anhang 1 Nr. 2.1 Tabelle 1. Für die in Anhang 1 Nr. 2.1 Tabelle 1 genannten größeren Bodentiefen gelten die 1,5fachen Werte.

3. Wirkungspfad Boden - Grundwasser

3.1 Prüfwerte zur Beurteilung des Wirkungspfads Boden - Grundwasser nach § 8 Abs. 1 Satz 2 Nr. 1 des Bundes-Bodenschutzgesetzes (in myg/l, Analytik nach Anhang 1)

Anorganische Stoffe	Prüfwert (myg/l)
Antimon	10
Arsen	10
Blei	25
Cadmium	5
Chrom, gesamt	50
Chromat	8
Kobalt	50
Kupfer	50
Molybdän	50
Nickel	50
Quecksilber	1
Selen	10
Zink	500
Zinn	40
Cyanid, gesamt	50
Cyanid, leicht freisetzbar	10
Fluorid	750

Organische Stoffe	Prüfwert (myg/l)
Mineralölkohlenwasserstoffe 1)	200
BTEX 2)	20
Benzol	1
LHKW 3)	10
Aldrin	0,1
DDT	0,1
Phenole	20
PCB, gesamt 4)	0,05
PAK, gesamt 5)	0,20
Naphthalin	2

1) n-Alkane (C 10 C39), Isoalkane, Cycloalkane und aromatische Kohlenwasserstoffe.

2) Leichtflüchtige aromatische Kohlenwasserstoffe (Benzol, Toluol, Xylole, Ethylbenzol, Styrol, Cumol).

3) Leichtflüchtige Halogenkohlenwasserstoffe (Summe der halogenierten C1- und C2-Kohlenwasserstoffe).

4) PCB, gesamt: Summe der polychlorierten Biphenyle; in der Regel Bestimmung über die 6 Kongeneren nach Ballschmiter gemäß Altöl-VO (DIN 51527) multipliziert mit 5; ggf. z.B. bei bekanntem Stoffspektrum einfache Summenbildung aller relevanten Einzelstoffe (DIN 38407-3-2 bzw. -3-3).

5) PAK, gesamt: Summe der polycyclischen aromatischen Kohlenwasserstoffe ohne Naphthalin und Methylnaphthaline; in der Regel Bestimmung über die Summe von 15 Einzelsubstanzen gemäß Liste der US Environmental Protection Agency (EPA) ohne Naphthalin; ggf. unter Berücksichtigung weiterer relevanter PAK (z.B. Chinoline).

3.2 Anwendung der Prüfwerte

a) Die Prüfwerte gelten für den Übergangsbereich von der ungesättigten zur wassergesättigten Bodenzone (Ort der Beurteilung). Der Ort der Bodenprobennahme stimmt nicht notwendigerweise mit dem Ort der Beurteilung für das Grundwasser überein.

b) Bei der Bewertung, ob es zu erwarten ist, daß die Prüfwerte für das Sickerwasser am Ort der Beurteilung überschritten werden, sind die Veränderungen der Schadstoffkonzentrationen im Sickerwasser beim Durchgang durch die ungesättigte Bodenzone sowie die Grundwasserflurabstände und deren Schwankungen zu berücksichtigen.

c) Bei Altablagerungen ist die Abschätzung der Schadstoffkonzentrationen im Sickerwasser durch Materialuntersuchungen auf Grund von Inhomogenitäten der abgelagerten Abfälle in der Regel nicht zweckmäßig. Entsprechendes gilt für Altstandorte mit besonders ungleichmäßiger Schadstoffverteilung. In diesen Fällen kann durch Rückschlüsse oder Rückrechnung aus Abstrommessungen im Grundwasser unter Berücksichtigung insbesondere auch der Stoffkonzentration im Anstrom eine Abschätzung der Schadstoffkonzentrationen im Sickerwasser erfolgen.

d) Soweit die Schadstoffkonzentrationen im Sickerwasser direkt gemessen werden können, soll die Probennahme nach Möglichkeit

am Ort der Beurteilung für das Grundwasser durchgeführt werden.

e) Soweit schädliche Bodenveränderungen und Altlasten in der wassergesättigten Bodenzone liegen, werden sie hinsichtlich einer Gefahr für das Grundwasser nach wasserrechtlichen Vorschriften bewertet.

f) Die geogen bedingte Hintergrundsituation der jeweiligen Grundwasserregion ist bei der Anwendung der Prüfwerte zu berücksichtigen.

4. Vorsorgewerte für Böden nach § 8 Abs. 2 Nr. 1 des Bundes-Bodenschutzgesetzes
(Analytik nach Anhang 1)

4.1 Vorsorgewerte für Metalle
(in mg/kg Trockenmasse, Feinboden, Königswasseraufschluß)

Böden	Cadmium	Blei	Chrom	Kupfer	Quecksilber	Nickel	Zink
Bodenart Ton	1,5	100	100	60	1	70	200
Bodenart Lehm/ Schluff	1	70	60	40	0,5	50	150
Bodenart Sand	0,4	40	30	20	0,1	15	60
Böden mit naturbedingt und großflächig siedlungsbedingt erhöhten Hintergrundgehalten	unbedenklich, soweit eine Freisetzung der Schadstoffe oder zusätzliche Einträge nach § 9 Abs. 2 und 3 dieser Verordnung keine nachteiligen Auswirkungen auf die Bodenfunktionen erwarten lassen						

4.2 Vorsorgewerte für organische Stoffe
(in mg/kg Trockenmasse, Feinboden)

Böden	Polychlorierte Biphenyle (PCB(tief)6)	Benzo (a)pyren	Polycycl. Aromatische Kohlenwasserstoffe (PAK(tief)16)
Humusgehalt > 8%	0,1	1	10
Humusgehalt <= 8%	0,05	0,3	3

4.3 Anwendung der Vorsorgewerte

a) Die Vorsorgewerte werden nach den Hauptbodenarten gemäß Bodenkundlicher Kartieranleitung, 4. Auflage, berichtigter Nachdruck 1996, unterschieden; sie berücksichtigen den vorsorgenden Schutz der Bodenfunktionen bei empfindlichen Nutzungen. Für die landwirtschaftliche Bodennutzung gilt § 17 Abs. 1 des Bundes-Bodenschutzgesetzes.

b) Stark schluffige Sande sind entsprechend der Bodenart Lehm/Schluff zu bewerten.

c) Bei den Vorsorgewerten der Tabelle 4.1 ist der Säuregrad der Böden wie folgt zu berücksichtigen:

- Bei Böden der Bodenart Ton mit einem pH-Wert von < 6,0 gelten für Cadmium, Nickel und Zink die Vorsorgewerte der Bodenart Lehm/Schluff.
- Bei Böden der Bodenart Lehm/Schluff mit einem pH-Wert von < 6,0 gelten für Cadmium, Nickel und Zink die Vorsorgewerte der Bodenart Sand.
- Bei Böden mit einem pH-Wert von < 5,0 sind die Vorsorgewerte für Blei entsprechend den ersten beiden Anstrichen herabzusetzen.

d) Die Vorsorgewerte der Tabelle 4.1 finden für Böden und Bodenhorizonte mit einem Humusgehalt von mehr als 8 Prozent keine Anwendung. Für diese Böden können die zuständigen Behörden ggf. gebietsbezogene Festsetzungen treffen.

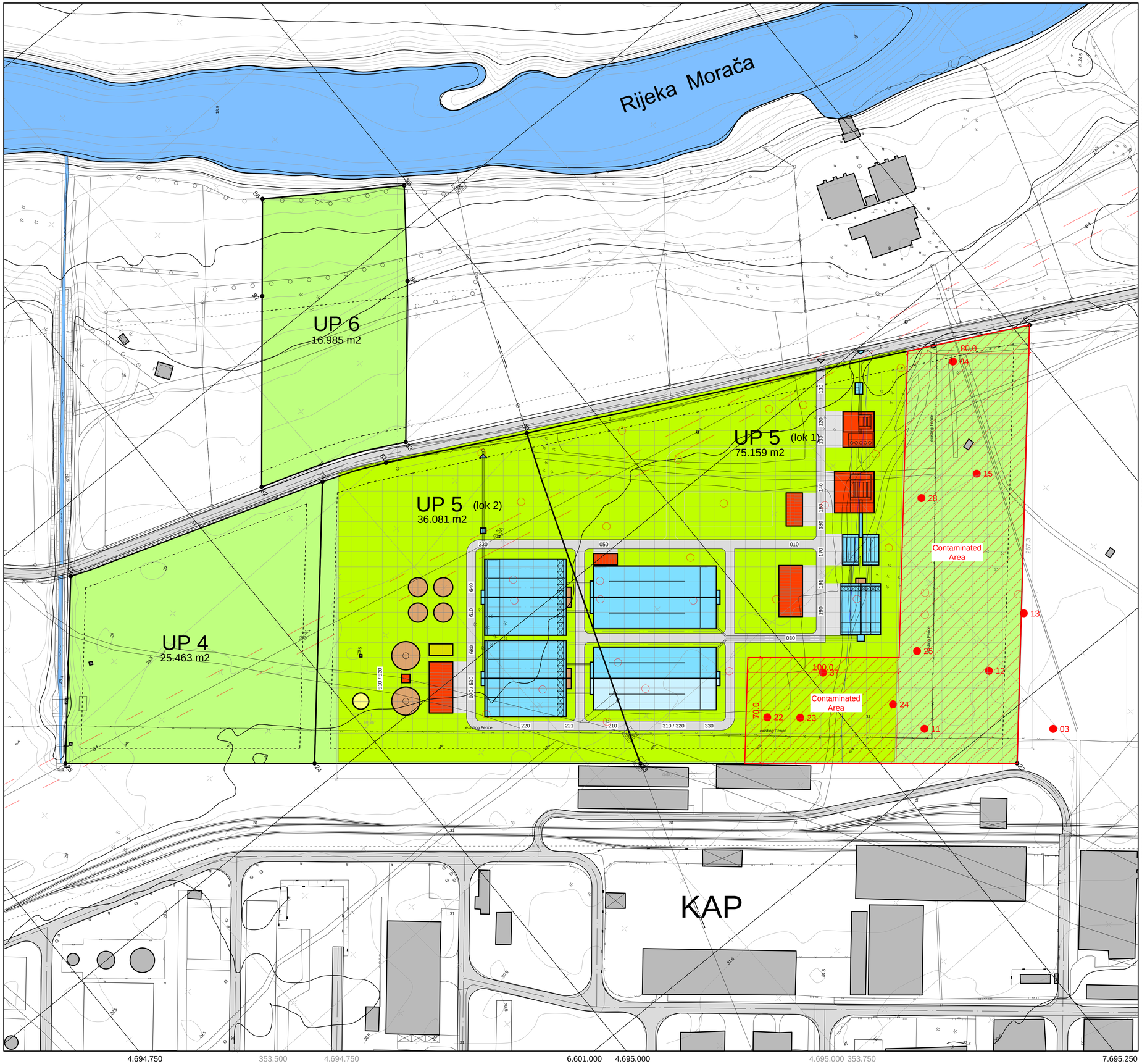
5. Zulässige zusätzliche jährliche Frachten an Schadstoffen über alle Wirkungspfade
nach § 8 Abs. 2 Nr. 2 des Bundes-Bodenschutzgesetzes (in Gramm je Hektar)

Element	Fracht (g/ha x a)
Blei	400
Cadmium	6
Chrom	300
Kupfer	360
Nickel	100
Quecksilber	1,5
Zink	1 200

zum Seitenanfang Datenschutz Seite ausdrucken

Annex 4

REVISED WWTP LAYOUT PLAN CONSIDERING THE RECOMMENDATIONS OF THE PRESENT NOTE



LEGEND: AREA CODES

000	Infrastructure
010	Administration Building
020	MV/LV Distribution Building
030	Garage, Workshop and Warehouse
040	Screen House with Pumping Station
050	Blower House
060	Sludge Treatment Building
070	Sludge Dewatering Building
080	Service Water Station
090	Roads & Exterior Installations
091	Interconnections & Yard Piping
100	Primary Wastewater Treatment
110	Interception Chamber
120	Coarse Screen
130	Inlet Pumping Station
140	Fine Screen
150	Faecal Receiving Station
160	Odour Control
170	Grit & Grease Chamber
180	Flow Measurement and Sampling
190	Primary Clarifier
200	Secondary Wastewater Treatment
210	Carbon (BOD) Removal
220	Final Clarifier
230	Effluent Control Manhole
300	Tertiary Wastewater Treatment
310	Nitrification
320	Denitrification
330	Biological P-Removal (EBPR)
340	P-Precipitation (CPR)
500	Sludge Treatment
510	Sludge Digestion (anaerobic stabi)
520	Digester Gas Treatment & Storage
530	CHP - Digester Gas Utilization
600	Sludge Dewatering
610	Primary Thickener/Sludge Storage
620	Mechanical Pre-Thickening
630	not used
640	Secondary Thickener
650	Mechanical Sludge Dewatering
660	Sludge Storage Area
670	Supernatant Pumping Station
680	Odour Control
690	To Sludge Incineration

Legend: AoI WWTP

- Property of the Capital City of Podgorica
- Area of the WWTP 81.105 m2
- Built Grid of the WWTP 10 m

0 25 50 75 100 125 m

North

Coordinate Reference System: TM - MGI Balkans Zone 6 / UTM 34 North - WGS 84

No.	Description of Revision	Date	Name
.	.	.	.
c	Shift of WWTP / Indication of contaminated Area	07.03.2018	T.Blanche
b	AoI of WWTP shifted 60 m north east	10.10.2016	T. Blanche
a	660 Area removed, 070 / 530 Area reduced	25.09.2016	T. Blanche

Client:

MONTENEGRO
VODOVOD I KANALIZACIJA (VIK)
D.O.O. PODGORICA

Funding Agency:

KfW Entwicklungsbank

Consultant:

FICHTNER WATER & TRANSPORTATION *In association with* EWA CONSULT d.o.o.

Project:

CONSULTING SERVICES FOR THE PREPARATION OF AN UPDATED FEASIBILITY STUDY FOR THE CONSTRUCTION OF WASTEWATER TREATMENT PLANT AND THE EXTENSION OF THE SEWER NETWORK IN PODGORICA

Drawing Title:

Layout Plan - WWTP Podgorica

Base Proposal - Simultaneous / Intermittent Denitrification with Rectangular Secondary Sedimentation Tanks

Designed by:	**Thomas Blanche**		
Checked by:	**Mathias Blanche**		
Approved by:	**Stéphane Meistermann**		
Scale:	**1: 2.500 A3**	Drawing no.: **FS-4 - 1-01**	Rev.: **C**
Date:	**March 2018**		

SECTOR FOR LABORATORY DIAGNOSTIC AND RADIATION PROTECTION

Number: 00-1654/1

REPORT OF THE SOIL ANALYSIS FROM THE LOCATION OF THE FUTURE WASTEWATER TREATMENT PLANT

P O D G O R I C A, DECEMBER 2 0 1 7.

REPORT No. 00-1654/1

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Introduction

In accordance with the signed agreement between Fichtner Water & Transportation GmbH - Germany and Center for Ecotoxicological Research Podgorica - Montenegro (CETI), CETI team has sampled and analyzed soil samples from the location of future wastewater treatment plants for the purpose of assessing possible pollution from neighboring plant Aluminum Plant (KAP). Sampling of soil samples was carried out from 41 boreholes (map attached to Annex 2).

Soil sampling

At the given location, drilling was performed with the rotation method and with continuous nucleation of exploration boreholes from which the soil for analysis was sampled.

Sampling was performed in order to obtain a clear picture of the state of "0" state of pollution of the soil in the investigated area.

From all boreholes, the core was excavated at intervals (1 m each), and the complete profiles of all boreholes were deposited in lids.

Soil samples were sampled from the surface layers as borehole as from the deeper layers of the borehole.

Appendix 2 provides a map with locations where drilling of exploration boreholes has been carried out. A total of 64 soil samples were analyzed.

Zakonodavni okvir Crne Gore

THE LEGISLATIVE FRAMEWORK FOR TOXICANTS IN SOIL

The content of hazardous and harmful substances in soil is regulated in Montenegro Rulebook on permitted amounts of hazardous and harmful substances in soil and methods of investigation ("Off. Gazette of Montenegro", No. 18/97). The Rulebook provides the maximum allowable amount of hazardous and harmful substances in the soil, which can lead to its pollution and resulting improper use of fertilizers and pesticides by individuals and legal entities as well as the discharge of waste from various sources. The pollution of land is determined on the basis of the norms prescribed in this Rulebook, and substances which are not prescribed norms, the comparison of soil samples from soil samples of the same type and a certain distance for which it is assumed that it is not contaminated with contentious factors. National legislation are primaly related to agricultural land.Table 2. gives an overview of the maximum allowable concentration of standard specified in the Rulebook.

Table 2. Overview of the maximum allowable concentration in MNE

	Parameter	MPL (mg/kg)
1.	Cadmium	2
2.	Lead	50
3.	Mercury	1.5

4.	Arsenic	20
5.	Chromium	50
6.	Nickel	50
7.	Fluorine	300
8.	Copper	100
9.	Zinc	300
10.	Boron	5
11.	Cobalt	50
12.	Molybdenum	10

Maximum permissible concentrations (according to the above Rulebook) of toxic and carcinogenic substances in the soil amounts to:

- Polycyclic aromatic hydrocarbons (PAHs) - 0.6 mg/kg
- Polychlorinated biphenyls and terphenyls (PCBs PTC) for each of congeners (28, 52, 101, 118, 138, 153 and 180) – 0.004 mg/kg
- Organotin compounds (TVT, TMT) - 0.005 mg/kg

As in Montenegro there is no legislation for recommended or maximum permissible concentrations of pollutants in land used for other purposes such as residential, commercial, industrial and so on, the results of the analysis of soil samples have been observed in relation to the recommendations of the Dutch (Table 2) and the Italian standard for the examined parameters. The target level defines the quality of non-polluted soil while the highest level (Intervention Level) defines the case when remediation is necessary.

Table 2. *The Dutch Soil/ Quality Standard*

Contaminant	**Soil**	
Metals and trace elements	**Target value (mg/kg)**	**Intervention value (mg/kg)**
Antimony	3.0	15
Arsenic	29	55
Barium	160	625
Cadmium	0.8	12
Chromium	100	380
Cobalt	9	240
Copper	36	190

Mercury	0.3	10
Lead	85	530
Molybdenum	10	200
Nickel	35	210
Selenium	0.7	100
Zinc	140	720
Cyanides	**Target value (mg/kg)**	**Intervention value (mg/kg)**
Free	1	20
Complex (pH<5)	5	650
Complex (pH>5)	5	50
Thiocyanate	-	-
Aromatics contaminants	**Target value (mg/kg)**	**Intervention value (mg/kg)**
Benzene	0.01	1
Ethylbenzene	0.03	50
Phenol	0.05	40
Toluene	0.01	130
Xylene	0.1	25
Cresoles (sum)	0.05	5
Catechol	0.05	20
Resorcinol	0.05	10
Polycyclic Aromatic Hydrocarbons (PAH)	**Target value (mg/kg)**	**Intervention value (mg/kg)**
Anthracene	-	-
Benzo(a)pyrene	-	-
Fluoroanthrene	-	-

Naphtalene	-	-
Phenanthrene	-	-
Benzo(a)anthracene	-	-
Chrysene	-	-
Benzo(k)fluoranthrene	-	-
Benzo(g,h,i)perylene	-	-
Indenol(1,2,3-c,d)pyrene	-	-
Total PAHs (10)	1	40
Chlorinated Hydrocarbons	**Target value (mg/kg)**	**Intervention value (mg/kg)**
Dichloromethane	0.4	10
1,1 Dichloroethane	0.02	15
1,2 Dichloroethane	0.02	4
1,1 Dichloroethene	0.1	0.3
Tetrachloromethane	0.4	1
Tetrachloroethene	0.002	4
Trichloromethane	0.02	10
Trichloroethene	0.1	60
Vinylchloride	0.01	0.1
Monochlorobenzene		-
Dichlorobenzene (sum)	-	-
Trichlorobenzene (sum)	-	-
Tetrachlorobenzene (sum)	-	-
Chlorobenzenes:		
Pentachlorobenzene	-	-

Hexachlorobenzene	-	-
Total chlorobenzenes:	0.03	30
Chlorphenols:		
Monochlorophenols (sum)	-	-
Dichlorophenols (sum)	-	-
Trichlorophenols (sum)	-	-
Tetrachlorophenols (sum)	-	-
Pentachlorophenol	-	-
Chlorophenols (total)	0.01	10
Chloronapthylene	-	10
PolychloroBiphenyls (total)	0.02	1
Pesticides	**Target value (mg/kg)**	**Intervention value (mg/kg)**
DDT/DDD/DDE (total)	0.01	4
Aldrin	0.00006	-
Dieldrin	0.0005	-
Endrin	0.00004	-
Drins (total)	0.005	4
alpha HCH	0.003	-
beta HCH	0.009	-
gamma HCH	0.00005	-
HCH total	0.01	2
Carbaryl	0.00003	5
Carbofuran	0.00002	2
Maneb	0.00002	35

Atrazin	0.00002	6
Miscellaneous	**Target value (mg/kg)**	**Intervention value (mg/kg)**
Tetrahydrofuran	0.1	2
Pyridine	0.1	0.5
Tetrahydrothiophene	0.1	90
Cyclohexanone	0.1	45
Mineral Oil	50	5000
Phthalates (total)	0.1	60

Table 3 shows the Italian standard on soil quality.

The maximum permitted limit for soil according to their purpose are defined in this standard:

• Residential soil / soil for public use (parks)

• Soil for industrial / commercial use

Table 3. Italian soil quality standard

ITALY

Limit values for surface and subsurface soil according to land use

Compounds	Residential/ Public (green) use mg/Kg on dry	Industrial/ Commercial use mg/Kg on dry
Inorganic compounds		
Antimony	10	30
Arsenic	20	50
Beryllium	2	10
Cadmium	2	15
Cobalt	20	250
Total Chromium	150	800
Chromium (VI)	2	15
Mercury	1	5
Nickel	120	500
Lead	100	1000
Copper	120	600
Selenium	3	15
Thallium	1	350
Tin	1	10
Vanadium	90	250
Zinc	150	1500
Free Cyanides (Total Cyanides*) *Revision proposed by National Institute of Health (ISS)	1	100
Fluoruride	100	2000
Organic aromatic compounds		
Benzene	0,1	2
Ethyl benzene	0,5	50
Styrene	0,5	50
Toluene	0,5	50
Xylene	0,5	50
Sum of aromatic compounds (from 20 to 23)	1	100
Polycyclic aromatic compounds		
Benzo(a)anthracene	0,5	10
Benzo(a)pyrene	0,1	10
Benzo(b)fluoranthene	0,5	10
Benzo(k)fluoranthene	0,5	10
Benzo(g,h,i)perylene	0,1	10
Chrysene	5	50
Dibenzo(a)pyrene (Dibenzo(a,e)pyrene, Dibenzo(a,i)pyrene, Dibenzo(a,l)pyrene, Dibenzo(a,h)pyrene either*) *Revision proposed by National Institute of Health (ISS)	0,1	10
Dibenzo(a,h)anthracene	0,1	10
Indeno(1,2,3-c,d)pyrene	0,1	5
Pyrene	5	50
Sum of polycyclic aromatic compounds (from 25 to 34)	10	100
Aliphatic chlorinated compounds (carcinogens)		
Chloromethane	0,1	5
Dichloromethane	0,1	5
Trichloromethane	0,1	5
Vinyl chloride	0,01	0,1
1,2-Dichloroetane	0,2	5
1,1-Dichloroethylene	0,1	1
1,2-Dichloropropane	0,3	5
1,1,2-Trichloroethane	0,5	15
Trichloroethylene	1	10
1,2,3-Trichloropropane	0,1 (1**)	1 (10**)
1,1,2,2-Tetrachloroethane	0,5	10
Tetrachloroethylene (PCE)	0,5	20
Aliphatic chlorinated compounds (not carcinogens)		
1,1-Dichloroethane	0,5	30
1,2-Dichloroethylene	0,3	15
1,1,1-Trichloroethane	0,5	50
Aliphatic halogenated compounds (carcinogens)		
Tribromomethane (bromoforme)	0,5	10
1,2-Dibromoehtane	0,01	0,1
Dibromochloromethane	0,5	10
Bromodichloromethane	0,5	10

Compounds	Residential/ Public (green) use mg/Kg on dry	Industrial/ Commercial use mg/Kg on dry
Nitro-aromatic compounds		
Nitrobenzene	0,5	30
1,2-Dinitrobenzene	0,1	25
1,3-Dinitrobenzene	0,1	25
Chloronitrobenzenes (each)	0,1	10
Chlorinated aromatic compounds		
Monochlorobenzene	0,5	50
1,2-Dichlorobenzene (not carcinogenic)	1	50
1,4-Dichlorobenzene (carcinogenic)	0,1	10
1,2,4-Trichlorobenzene	1	50
1,2,4,5-Tetrachlorobenzene	1	25
Pentachlorobenzene	0,1	50
Hexachlorobenzene	0,05	5
Phenols (not chlorinated)		
Metylphenols (o-, m-, p-)	0,1	25
Phenol	1	60
Chlorinated phenols		
2-Chlorophenol	0,5	25
2,4-Dichlorophenol	0,5	50
2,4,6-Trichlorophenol	0,01	5
Pentachlorophenol	0,01	5
Aromatic amine		
Aniline	0,05	5
o-Anisidine	0,1	10
m,p-Anisidine	0,1	10
Diphenylamine	0,1	10
p-Toluidine	0,1	5
Sum of aromatic amine (from 73 to 77)	0,5	25
Pesticides		
Alachlor	0,01	1
Aldrin	0,01	0,1
Atrazine	0,01	1
□ -hexachlorohexane	0,01	0,1
□ -hexachlorohexane	0,01	0,5
□ -hexachlorohexane (Lindane)	0,01	0,5
Chlordane	0,01	0,1
DDD,DDT, DDE	0,01	0,1
Dieldrin	0,01	0,1
Endrin	0,01	2
Dioxins and furans		
Sum of PCDD, PCDF (conversion T.E.)	$1x10^{-5}$	$1x10^{-4}$
PCB	0,001 (0,06*)	5
Hydrocarbons		
Hydrocarbons C<12 (light) (Hydrocarbons C≤12*) *Revision proposed by National Institute of Health (ISS)	10	250
Hydrocarbons C>12 (heavy)	50	750
Others		
Asbestos (free fibers***) ***This sentence has to be excluded, according to proposal of National Institute of Health (ISS)	1000	1000
Phthalic acid esters	10	60

Compounds	Residential/ Public (green) use mg/Kg on dry	Industrial/ Commercial use mg/Kg on dry
Aliphatic halogenated compounds (carcinogens)		
Carbon tetrachloride	0,1	5
1,1,1,2-Tetrachloroethane	0,5	10
Pentachloroetane	0,5	10
Hexachloroetane	0,5	10
Hexachlorobutane	0,5	10
Aliphatic halogenated compounds (not carcinogens)		
Hexachlorobutadiene	0,5	10
Freon 11 (Fluorotrichloromethane)	0,1	5
Tetrachlorobutadienes	0,5	10
Freon 113 (1,1,2-Trichlorotrifluoroethane)	1	15
Pentachlorobutadienes	0,5	10
Chlorobenzenic compounds		
1,3 Dichlorobenzene		
1,2,3-Trichlorobenzene	1	50
1,3,5-Trichlorobenzene	1	50
1,2,3,5-Tetrachlorobenzene	1	25
Pentachloronitrobenzene	0,1	50
Nitrobenzene		
2,5-Dichloronitrobenzene	0,1	10
3,4-Dichloronitrobenzene	0,1	10
Aromatic amine		
o-Toluidine	0,05	5
2,6-Diethylaniline	0,05	5
□-naphtylamine	0,05	5
o-Nitroaniline	0,05	5
m-Nitroaniline	0,05	5
p-Nitroaniline	0,05	5
o-Chloroaniline	0,05	5
m-Chloroaniline	0,05	5
p-Chloroaniline	0,05	5
3,5-Dichloroaniline	0,05	5
2,6-Dichloroaniline	0,05	5
2,3-Dichloroaniline	0,05	5
3,4-Dichloroaniline	0,05	5
5-Chloro-2-toluidine	0,05	5
4-Chloro-2-anisidine	0,1	10
2-Nitro-4-chloroaniline	0,05	5
4-Nitro-2-chloroaniline	0,05	5
2,6-Dichloro-4-nitroaniline	0,05	5
2-Aminobiphenyl	0,1	10
4-Aminobiphenyl	0,05	5
Benzidine	0,05	5
2-Chloro-4-methylaniline	0,05	5
2-Chloro-5-methylaniline	0,05	5
2-Chloro-6-methylaniline	0,05	5
3-Chloro-4-methylaniline	0,05	5
4-Chloro-n-methylaniline	0,05	5
4-Chloro-5-methylaniline	0,05	5
2-Chloro-5-nitroaniline	0,05	5
4-Chloro-3-nitroaniline	0,05	5
5-Chloro-2-nitroaniline	0,05	5
N,N-Dimethylaniline	0,05	5
2,3-Dimethylaniline	0,05	5
2,4-Dimethylaniline	0,05	5
2,5-Dimethylaniline	0,05	5
2,6-Dimethylaniline	0,05	5
3,4-Dimethylaniline	0,05	5
3,5-Dimethylaniline	0,05	5
3,3'-Dimethylbenzidine	0,05	5
2,4-Dimethoxyaniline	0,1	10
2,5-Dimethoxyaniline	0,1	10
3,4-Dimethoxyaniline	0,1	10
3,5-Dimethoxyaniline	0,1	10
2,4-Dichloroaniline	0,05	5
2,5-Dichloroaniline	0,05	5
3,3'-Dimethoxybenzidine	0,05	5

Compounds	Residential/ Public (green) use mg/Kg on dry	Industrial/ Commercial use mg/Kg on dry
3,3'-Dichlorobenzidine	0,05	5
2,4-Dinitroaniline	0,05	5
N-ethylaniline	0,05	5
2-Ethylaniline	0,05	5
3-Ethylaniline	0,05	5
4-Ethylaniline	0,05	5
2-Ethoxyaniline	0,1	10
N-Ethyl-3-methylaniline	0,05	5
4-Phenylazoaniline	0,05	5
1,2-Phenylendiamine	0,05	5
1,3-Phenylendiamine	0,05	5
N-Methylaniline	0,05	5
3-Methylaniline	0,05	5
N-Methyl-2-nitroaniline	0,05	5
N-Methyl-4-nitroaniline	0,05	5
2-Methyl-3-nitroaniline	0,05	5
2-Methyl-4-nitroaniline	0,05	5
2-Methyl-5-nitroaniline	0,05	5
2-Methyl-6-nitroaniline	0,05	5
3-Methyl-2-nitroaniline	0,05	5
4-Methyl-2-nitroaniline	0,05	5
4-Methyl-3-nitroaniline	0,05	5
2,4,6-Trimethylaniline	0,05	5
2,3,4-Trichloroaniline	0,05	5
2,4,5-Trichloroaniline	0,05	5
2,4,6-Trichloroaniline	0,05	5
3,4,5-Trichloroaniline	0,05	5
1-Naphthylamine	0,1	10
3-Chloro-2-methylaniline	0,05	5
4-Methylaniline	0,05	5
Sum of aromatic amines in this table + Sum of aromatic amines D.M. 471/99	0,5	25
Not chlorinated phenols		
2,4-Dimethylphenol	0,1	25
2,4,6-Trimethylphenol	0,1	25
o-Ethylphenol	0,1	25
2-Nitrophenol	0,5	30
4-Nitrophenol	0,5	30
2,4-Dinitrophenol	0,1	25
Chlorinated phenols		
m-chlorophenol	0,1	25
p-chlorophenol	0,1	25
4-chloro, 3-methylphenol	0,1	25
2,3,4,5-tetrachlorophenol	0,01	5
Polycyclic aromatic compounds		
Naphthalene	5	50
Acenaphthylene	5	50
Acenaphthene	5	50
Fluorene	5	50
Phenanthrene	5	50
Anthracene	5	50
Fluoranthene	5	50
Benzo(j)fluoranthene	0,5	10
Dibenzo(ae)pyrene	0,5	10
Sum of polycyclic aromatic compounds in this table + Sum of polycyclic aromatic compounds D.M. 471/99	10	100
Naphthalensulfonic compounds of thioaminic		
Meta-aminophenol (3-aminophenol)	0,1	10
2-amino-8-hydroxy-6-naphthalensulfonic acid (gamma acid)	0,1	10
2-amino-5-hydroxy-7-naphthalensulfonic acid (isogamma acid)	0,1	10
2-naphthylamino-5,7-disulfonic acid (aminoisogamma acid)	0,1	10
2-naphthylamino-6,8-disulfonic acid (amino g acid)	0,1	10
2-amino-8-naphthalensulfonic acid	0,1	10
2-naphthylamino-1-sulfonic acid (tobias acid)	0,1	10
Para-anilinesulfonic acid (acido sulphanilic)	0,1	10
Meta-anilinesulfonic acid (metanilic acid)	0,1	10
Ortho-anilinesulfonic acid (orthanilic acid)	0,1	10
Sum of naphthalensulfonic compounds of thioaminic	0,5	25

REPORT No. 00-1654/1

RESULTS OF ANALYSES

BOREHOLE			23			Method
Coordinates			600915.23 4695228.87			
Depth			0-0.5 m	0.5-1.0 m	1.0-2.0 m	
Protocol number			636/04	636/04/1	637/04	
Date of sampling			19.10.2017.	19.10.2017.	19.10.2017.	
No.	Parameter	Unit	Results	Results	Results	
1.	Arsenic	mg/kg	9,4±0,9	<2	<2	EPA 3051A*
2.	Barium	mg/kg	128	29	18	EPA 3051A
3.	Cadmium	mg/kg	0,42±0,03	0,22±0,02	0,16±0,01	EPA 3051A*
4.	Total chromium	mg/kg	79±6	24±2	14±1	EPA 3051A*
5.	Copper	mg/kg	33±2	10,2±0,5	14±1	EPA 3051A*
6.	Mercury	mg/kg	0,26±0,04	0,20±0,03	0,16±0,03	AMA-112*
7.	Molybdenum	mg/kg	1,5±0,2	<1	<1	EPA 3051A*
8.	Nickel	mg/kg	95±9	23±2	15±1	EPA 3051A*
9.	Lead	mg/kg	42±3	6,8±0,5	4,0±0,3	EPA 3051A*
10.	Antimony	mg/kg	<1	<1	<1	EPA 3051A
11.	Selenium	mg/kg	<1	<1	<1	EPA 3051A

12.	Zinc	mg/kg	103±4	24±1	16±1	EPA 3051A*
13.	Tin	mg/kg	<1	<1	<1	EPA 3051A
14.	Cobalt	mg/kg	19±2	4,6±0,7	3,1±0,4	EPA 3051A*
15.	Silver	mg/kg	<1	<1	<1	EPA 3051A
16.	Manganese	mg/kg	1618±262	484±78	358±58	EPA 3051A*
17.	Vanadium	mg/kg	72	15	10	EPA 3051A
18.	Fluorine	mg/kg	1898	251	172	AF-ISM
19.	Thallium	mg/kg	<1	<1	<1	EPA 3051A
20.	Total cyanide (CN)	mg/kg	8	9	10	EPA 9010C
21.	Chlorinated Hydrocarbons (CHC)/(VOX):					
	Chlorobenzene	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	1,3-Dichlorobenzene	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	1,4-Dichlorobenzene	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	1,2-Dichlorobenzene	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	1,2,4-Trichlorobenzene	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	1,2,3-Trichlorobenzene	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	Chloroethane	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	Chloromethane	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	Bromomethane	mg/kg	<0,01	<0,01	<0,01	EPA 5021A

	Trichlorofluoromethane	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021A**
	Bromobenzene	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021A**
	Organochlorine pesticides:					
	***p,p′*-DDT**	**mg/kg**	**<0,001**	**<0,001**	**<0,001**	**EPA 8270 C***
	***o,p′*-DDT**	**mg/kg**	**<0,001**	**<0,001**	**<0,001**	**EPA 8270 C***
	***p,p′*-DDD**	**mg/kg**	**<0,001**	**<0,001**	**<0,001**	**EPA 8270 C***
	***p,p′*-DDE**	**mg/kg**	**<0,001**	**<0,001**	**<0,001**	**EPA 8270 C***
22.	**Aromatic hydrocarbons (BTEX):**					
	Benzene	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021 A**
	Toluene	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021 A**
	Ethylbenzene	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021 A**
	m/p-Xylene	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021 A**
	o-Xylene	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021 A**
23.	**Total Petroleum Hydrocarbon (TPH) (C10-C40)**	**mg/kg**	**219**	**143**	**17**	**ISO 16703:2004**
24.	**Polycyclic Aromatic Hydrocarbons:**					
	Naphtalene	**mg/kg**	**0,053±0,015**	**0,012±0,003**	**0,005±0,001**	**EPA 8270***
	2-Methylnaphtalene	**mg/kg**	**0,041±0,011**	**0,008±0,002**	**0,004±0,001**	**EPA 8270***

	1-Methylnaphtalene	mg/kg	0,034±0,009	0,005±0,001	<0,005	EPA 8270*
	Acenaphtylene	mg/kg	0,004±0,001	<0,005	<0,005	EPA 8270*
	Acenaphtene	mg/kg	0,12±0,02	0,015±0,003	<0,005	EPA 8270*
	Fluorene	mg/kg	0,062±0,010	0,009±0,001	<0,005	EPA 8270*
	Phenanthrene	mg/kg	1,1±0,2	0,13±0,02	0,029±0,004	EPA 8270*
	Anthracene	mg/kg	0,18±0,02	0,028±0,003	0,005±0,001	EPA 8270*
	Fluoranthene	mg/kg	2,6±0,4	0,35±0,05	0,065±0,010	EPA 8270*
	Pyrene	mg/kg	2,2±0,3	0,29±0,05	0,055±0,009	EPA 8270*
	Benzo(a)anthracene	mg/kg	1,5±0,2	0,19±0,03	0,033±0,004	EPA 8270*
	Chrysene	mg/kg	2,1±0,3	0,31±0,05	0,063±0,010	EPA 8270*
	Benzo(b)fluoranthene	mg/kg	2,7±0,4	0,42±0,06	0,083±0,013	EPA 8270*
	Benzo(k)fluoranthene	mg/kg	0,90±0,22	0,15±0,04	0,031±0,008	EPA 8270*
	Benzo(a)pyrene	mg/kg	1,7±0,2	0,24±0,03	0,044±0,006	EPA 8270*
	Indeno(1,2,3-cd)pyrene	mg/kg	2,4±0,4	0,36±0,07	0,071±0,011	EPA 8270*
	Dibenzo(a,h)anthracene	mg/kg	0,12±0,03	0,061±0,014	0,012±0,003	EPA 8270*
	Benzo(g,h,i)perylene	mg/kg	2,1±0,4	0,33±0,06	0,065±0,012	EPA 8270*
	ΣPAHs	mg/kg	20±3	2,9±0,5	0,57±0,10	EPA 8270*
25.	Polychlorinated biphenyls – PCB					
	PCB 18	mg/kg	<0,002	<0,002	<0,002	EPA 8270 C*

	PCB 31	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 28	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 52	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 44	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 101	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 149	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 118	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 153	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 138	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 180	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 194	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***

* - accredited method

OPINION

According to the results of the physico-chemical analysis , the soil sample from the B23 borehole from 0-0.5 m depth (No. 636/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of chromium, nickel, fluorine and polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

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The results of the physico-chemical analysis of the soil sample from the B23 borehole at a depth of 0-0.5 m (No. 636/04) observed in relation to the Dutch standard show that the content of nickel, cobalt, PAHs and total hydrocarbons (TPH) is above the lowest level (target value), which defines the quality of the unpolluted soil but below the intervention level. According to the Italian standard, the results of soil sample analysis show that the content of all the analyzed parameters is below the limit value for the soil for industrial and commercial use.

According to the results of the physico-chemical analysis, soil sample from the borehole B23 from the depth of 0.5-1 m (No. 636/04/1) **does not comply** with the requirements of the Rulebook on the permitted amount of dangerous and harmful substances in the soil and the methods for its examination ("Official Gazette of RS" RCG ", No. 18/97) due to the increased content of polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of soil samples from the B23 borehole at a depth of 0.5-1 m (No. 636/04/1) observed in relation to the Dutch standard show that the content of PAHs and total hydrocarbons (TPH) is above the lowest level (target value) which defines the quality of unpolluted soil but below the intervention level, while according to the Italian standard, the results of soil sample analysis show that the content of all the analyzed parameters is below the limit value for soil for industrial and commercial use.

According to the results of the physico-chemical analysis, the soil sample from the borehole B23 at a depth of 1-2 m (No. 637/04) is **in compliance** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and methods for its examination ("Official Gazette of the Republic of Montenegro" No. 18/97).

The results of the physico-chemical analysis of soil samples from the B23 borehole at a depth of 1-2 m (No. 637/04) observed in relation of the Dutch standard show that the content of all analyzed parameters is below of the lowest value (target value) which defines quality of unpolluted soil. According to the Italian standard, the results of the soil sample analysis show that the content of all the analyzed parameters is below the limit value pertaining to the soil for industrial and commercial use.

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RESULTS OF ANALYSES

BOREHOLE			22	21	10	Method
Coordinates			600901.31 4695212.22	600835.83 4695161.62	600836.63 4695128.42	
Depth			0-0.5 m	0-0.5 m	0-0.7 m	
Protocol number			639/04	642/04	645/04	
Date of sampling			19.10.2017.	19.10.2017.	19.10.2017.	
No.	Parameter	Unit	Results	Results	Results	
1.	Arsenic	mg/kg	8,4±0,8	8,3±0,8	13,4±1,3	EPA 3051A*
2.	Barium	mg/kg	169	160	223	EPA 3051A
3.	Cadmium	mg/kg	0,47±0,03	0,52±0,04	0,47±0,03	EPA 3051A*
4.	Total chromium	mg/kg	73±6	68±5	95±8	EPA 3051A*
5.	Copper	mg/kg	31±2	30±2	36±2	EPA 3051A*
6.	Mercury	mg/kg	0,16±0,03	0,15±0,02	0,13±0,02	AMA-112*
7.	Molybdenum	mg/kg	1,4±0,2	1,2±0,2	1,5±0,2	EPA 3051A*
8.	Nickel	mg/kg	96±9	87±8	116±11	EPA 3051A*
9.	Lead	mg/kg	35±2	32±2	33±2	EPA 3051A*
10.	Antimony	mg/kg	<1	<1	<1	EPA 3051A
11.	Selenium	mg/kg	<1	<1	<1	EPA 3051A

12.	Zinc	mg/kg	94±3	80±3	92±3	EPA 3051A*
13.	Tin	mg/kg	1,7	1,6	2,0	EPA 3051A
14.	Cobalt	mg/kg	18±2	17±2	22±3	EPA 3051A*
15.	Silver	mg/kg	<1	<1	<1	EPA 3051A
16.	Manganese	mg/kg	1680±270	1267±200	1408±228	EPA 3051A*
17.	Vanadium	mg/kg	63	61	85	EPA 3051A
18.	Fluorine	mg/kg	998	894	1100	AF-ISM
19.	Thallium	mg/kg	1,1	1,0	1,4	EPA 3051A
20.	Total cyanide (CN)	mg/kg	7,5	8,7	10,5	EPA 9010C
21.	Chlorinated Hydrocarbons (CHC)/(VOX):					
	Chlorobenzene	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	1,3-Dichlorobenzene	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	1,4-Dichlorobenzene	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	1,2-Dichlorobenzene	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	1,2,4-Trichlorobenzene	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	1,2,3-Trichlorobenzene	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	Chloroethane	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	Chloromethane	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	Bromomethane	mg/kg	<0,01	<0,01	<0,01	EPA 5021A

	Trichlorofluoromethane	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021A**
	Bromobenzene	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021A**
	Organochlorine pesticides:					
	***p,p′*-DDT**	**mg/kg**	**<0,001**	**<0,001**	**<0,001**	**EPA 8270 C***
	***o,p′*-DDT**	**mg/kg**	**<0,001**	**<0,001**	**<0,001**	**EPA 8270 C***
	***p,p′*-DDD**	**mg/kg**	**<0,001**	**<0,001**	**<0,001**	**EPA 8270 C***
	***p,p′*-DDE**	**mg/kg**	**<0,001**	**<0,001**	**<0,001**	**EPA 8270 C***
22.	**Aromatic hydrocarbons (BTEX):**					
	Benzene	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021 A**
	Toluene	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021 A**
	Ethylbenzene	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021 A**
	m/p-Xylene	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021 A**
	o-Xylene	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021 A**
23.	**Total Petroleum Hydrocarbon (TPH) (C10-C40)**	**mg/kg**	**21**	**27**	**16**	**ISO 16703:2004**
24.	**Polycyclic Aromatic Hydrocarbons:**					
	Naphtalene	**mg/kg**	**0,021±0,006**	**0,012±0,003**	**0,008±0,002**	**EPA 8270***
	2-Methylnaphtalene	**mg/kg**	**0,013±0,004**	**0,009±0,002**	**0,005±0,001**	**EPA 8270***

	1-Methylnaphtalene	mg/kg	0,010±0,003	0,008±0,002	<0,005	EPA 8270*
	Acenaphtylene	mg/kg	<0,005	<0,005	<0,005	EPA 8270*
	Acenaphtene	mg/kg	0,076±0,014	0,050±0,009	0,021±0,004	EPA 8270*
	Fluorene	mg/kg	0,040±0,007	0,027±0,004	0,012±0,002	EPA 8270*
	Phenanthrene	mg/kg	0,65±0,10	0,44±0,07	0,19±0,03	EPA 8270*
	Anthracene	mg/kg	0,12±0,01	0,085±0,010	0,039±0,005	EPA 8270*
	Fluoranthene	mg/kg	1,6±0,2	1,1±0,2	0,44±0,07	EPA 8270*
	Pyrene	mg/kg	1,3±0,2	0,86±0,13	0,34±0,05	EPA 8270*
	Benzo(a)anthracene	mg/kg	0,90±0,12	0,55±0,07	0,23±0,03	EPA 8270*
	Chrysene	mg/kg	1,2±0,2	0,75±0,12	0,34±0,05	EPA 8270*
	Benzo(b)fluoranthene	mg/kg	1,6±0,2	0,93±0,14	0,44±0,06	EPA 8270*
	Benzo(k)fluoranthene	mg/kg	0,53±0,13	0,32±0,08	0,14±0,04	EPA 8270*
	Benzo(a)pyrene	mg/kg	1,0±0,1	0,55±0,07	0,27±0,04	EPA 8270*
	Indeno(1,2,3-cd)pyrene	mg/kg	1,33±0,21	0,70±0,11	0,31±0,05	EPA 8270*
	Dibenzo(a,h)anthracene	mg/kg	0,069±0,016	0,14±0,03	0,070±0,016	EPA 8270*
	Benzo(g,h,i)perylene	mg/kg	1,3±0,2	0,62±0,12	0,28±0,05	EPA 8270*
	ΣPAHs	mg/kg	11±2	7,1±1,2	3,1±0,5	EPA 8270*
25.	Polychlorinated biphenyls – PCB	mg/kg				
	PCB 18	mg/kg	<0,002	<0,002	<0,002	EPA 8270 C*

	PCB 31	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 28	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 52	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 44	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 101	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 149	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 118	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 153	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 138	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 180	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 194	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***

* - accredited method

OPINION

According to the results of the physico-chemical analysis , soil samplefrom the borehole B22 from 0-0.5 m depth (No. 639/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of chromium, nickel, fluorine and polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of the soil sample from the B22 borehole at a depth of 0-0.5 m (No. 639/04) observed in relation to the Dutch standard show that the content of barium, nickel, cobalt and PAHs is above the lowest level (target value) which defines the quality of unpolluted soil but below the intervention level. According to the Italian standard, the results of the soil sample analysis show that the content of all the analyzed parameters is below the limit value referring to the soil for industrial and commercial use.

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According to the results of the physico-chemical analysis , the soil sample from the B21 borehole from 0-0.5 m depth (No. 642/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of chromium, nickel, fluorine and polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of soil samples from the B21 borehole depth 0-0.5 m (No. 642/04) observed in relation to the Dutch standard show that the content of nickel, cobalt and PAHs is above the lowest level (target value) which defines the quality of unpolluted soil but below the intervention level, while according to the Italian standard, the results of the soil sample analysis show that the content of all the analyzed parameters is below the limit value referring to the soil for industrial and commercial use.

According to the results of the physico-chemical analysis , the soil sample from the B10 borehole from 0-0.7 m depth (No. 645/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of chromium, nickel, fluorine and polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of the soil sample from borehole B10 at depth 0-0.7 m (No. 645/04) observed in relation to Dutch standards show that the content of barium, nickel, cobalt and PAHs is above the lowest level (target value) which defines the quality of unpolluted soil but below the intervention level, while according to the Italian standard results of soil sample analyses shows that the content of all analyzed parameters are below the limit values related to land for industrial and commercial use.

RESULTS OF ANALYSES

BOREHOLE			20	19	18	Method
Coordinates			600811.41 4695158.49	600772.46 4695175.49	600762.97 4695182.80	
Depth			0-0.4 m	0-0.7 m	0-0.5 m	
Protocol number			649/04	653/04	657/04	
Date of sampling			20.10.2017.	20.10.2017.	19.10.2017.	
No.	Parameter	Unit	Results	Results	Results	
1.	Arsenic	mg/kg	13,3±1,3	8,5±0,8	16±1	EPA 3051A*
2.	Barium	mg/kg	214	150	219	EPA 3051A
3.	Cadmium	mg/kg	0,79±0,05	0,51±0,04	0,41±0,03	EPA 3051A*
4.	Total chromium	mg/kg	83±7	82±7	85±7	EPA 3051A*
5.	Copper	mg/kg	37±2	36±2	36±2	EPA 3051A*
6.	Mercury	mg/kg	0,15±0,02	0,10±0,02	0,17±0,03	AMA-112*
7.	Molybdenum	mg/kg	1,4±0,2	1,3±0,2	1,0±0,2	EPA 3051A*
8.	Nickel	mg/kg	111±11	104±10	138±13	EPA 3051A*
9.	Lead	mg/kg	36±3	33±3	28±2	EPA 3051A*
10.	Antimony	mg/kg	<1	<1	<1	EPA 3051A
11.	Selenium	mg/kg	<1	<1	<1	EPA 3051A
12.	Zinc	mg/kg	92±3	99±4	94±3	EPA 3051A*

13.	Tin	mg/kg	2,0	1,7	<1	EPA 3051A
14.	Cobalt	mg/kg	22±3	20±3	21±3	EPA 3051A*
15.	Silver	mg/kg	<1	<1	<1	EPA 3051A
16.	Manganese	mg/kg	1610±260	1355±219	1295±209	EPA 3051A*
17.	Vanadium	mg/kg	80	88	90	EPA 3051A
18.	Fluorine	mg/kg	867	1028	1000	AF-ISM
19.	Thallium	mg/kg	1,1	1,0	1,2	EPA 3051A
20.	Total cyanide (CN)	mg/kg	8,1	11,6	10,1	EPA 9010C
21.	Chlorinated Hydrocarbons (CHC)/(VOX):					
	Chlorobenzene	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	1,3-Dichlorobenzene	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	1,4-Dichlorobenzene	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	1,2-Dichlorobenzene	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	1,2,4-Trichlorobenzene	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	1,2,3-Trichlorobenzene	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	Chloroethane	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	Chloromethane	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	Bromomethane	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	Trichlorofluoromethane	mg/kg	<0,01	<0,01	<0,01	EPA 5021A

	Bromobenzene	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021A**
	Organochlorine pesticides:					
	***p,p′*-DDT**	**mg/kg**	**<0,001**	**<0,001**	**<0,001**	**EPA 8270 C***
	***o,p′*-DDT**	**mg/kg**	**<0,001**	**<0,001**	**<0,001**	**EPA 8270 C***
	***p,p′*-DDD**	**mg/kg**	**<0,001**	**<0,001**	**<0,001**	**EPA 8270 C***
	***p,p′*-DDE**	**mg/kg**	**<0,001**	**<0,001**	**<0,001**	**EPA 8270 C***
22.	**Aromatic hydrocarbons (BTEX):**					
	Benzene	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021 A**
	Toluene	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021 A**
	Ethylbenzene	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021 A**
	m/p-Xylene	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021 A**
	o-Xylene	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021 A**
23.	**Total Petroleum Hydrocarbon (TPH) (C10-C40)**	**mg/kg**	**14**	**31**	**<10**	**ISO 16703:2004**
24.	**Polycyclic Aromatic Hydrocarbons:**					
	Naphtalene	**mg/kg**	**0,010±0,003**	**0,024±0,007**	**0,005±0,001**	**EPA 8270***
	2-Methylnaphtalene	**mg/kg**	**0,007±0,002**	**0,014±0,004**	**<0,005**	**EPA 8270***
	1-Methylnaphtalene	**mg/kg**	**0,006±0,002**	**0,010±0,003**	**<0,005**	**EPA 8270***

	Acenaphtylene	mg/kg	<0,005	<0,005	<0,005	EPA 8270*
	Acenaphtene	mg/kg	0,033±0,006	0,051±0,009	0,010±0,002	EPA 8270*
	Fluorene	mg/kg	0,018±0,003	0,025±0,004	0,006±0,001	EPA 8270*
	Phenanthrene	mg/kg	0,29±0,05	0,43±0,06	0,090±0,014	EPA 8270*
	Anthracene	mg/kg	0,049±0,006	0,074±0,009	0,017±0,002	EPA 8270*
	Fluoranthene	mg/kg	0,73±0,11	1,2±0,2	0,21±0,03	EPA 8270*
	Pyrene	mg/kg	0,56±0,09	0,88±0,14	0,17±0,03	EPA 8270*
	Benzo(a)anthracene	mg/kg	0,38±0,05	0,71±0,10	0,10±0,01	EPA 8270*
	Chrysene	mg/kg	0,55±0,09	1,0±0,2	0,16±0,03	EPA 8270*
	Benzo(b)fluoranthene	mg/kg	0,75±0,11	1,7±0,3	0,19±0,03	EPA 8270*
	Benzo(k)fluoranthene	mg/kg	0,25±0,06	0,53±0,13	0,069±0,017	EPA 8270*
	Benzo(a)pyrene	mg/kg	0,37±0,05	0,85±0,11	0,095±0,012	EPA 8270*
	Indeno(1,2,3-cd)pyrene	mg/kg	0,57±0,09	1,3±0,2	0,15±0,02	EPA 8270*
	Dibenzo(a,h)anthracene	mg/kg	0,13±0,03	0,30±0,07	0,025±0,006	EPA 8270*
	Benzo(g,h,i)perylene	mg/kg	0,48±0,09	1,1±0,2	0,13±0,02	EPA 8270*
	ΣPAHs	mg/kg	5,2±0,9	10±1	1,4±0,2	EPA 8270*
25.	Polychlorinated biphenyls – PCB	mg/kg				
	PCB 18	mg/kg	<0,002	<0,002	<0,002	EPA 8270 C*
	PCB 31	mg/kg	<0,002	<0,002	<0,002	EPA 8270 C*

	PCB 28	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 52	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 44	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 101	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 149	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 118	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 153	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 138	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 180	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 194	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***

* - accredited method

OPINION

According to the results of the physico-chemical analysis , the soil sample from the B20 borehole from 0-0.4 m depth (No. 649/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of chromium, nickel, fluorine and polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of soil samples from the B20 borehole at a depth of 0-0.4 m (No. 649/04) observed in relation to the Dutch standard show that the content of barium, nickel, cobalt and PAHs is above the lowest level (target value) which defines the quality of unpolluted soil but below the intervention level. According to the Italian standard, the results of the soil sample analysis show that the content of all the analyzed parameters is below the limit value referring to the soil for industrial and commercial use.

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According to the results of the physico-chemical analysis, the soil sample from the B19 borehole from 0-0.7 m depth (No. 653/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of chromium, nickel, fluorine and polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of soil samples from the B19 borehole at a depth of 0-0.7 m (No. 653/04) observed in relation to the Dutch standard show that the content of nickel, cobalt and PAHs is above the lowest level (target value) which defines quality of the unpolluted soil, but below the intervention level, while according to the Italian standard, the results of the soil sample analysis show that the content of all the analyzed parameters is below the limit value referring to the soil for industrial and commercial use.

According to the results of the physico-chemical analysis, the soil sample from the B18 borehole from 0-0.5 m depth (No. 657/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of chromium, nickel, fluorine and polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of soil samples from the B18 borehole at a depth of 0-0.5 m (No. 657/04) observed in relation to the Dutch standard show that the content of barium, nickel and cobalt is above the lowest level (target value) which defines the quality of unpolluted soil but below the intervention level, while according to the Italian standard, the results of the soil sample analysis show that the content of all the analyzed parameters is below the limit value referring to the soil for industrial and commercial use.

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RESULTS OF ANALYSES

BOREHOLE			35	36	17	Method
Coordinates			600811.32 4695222.48	600861.95 4695211.99	600738.39 4695208.77	
Depth			0-0.6 m	0-0.5 m	0-0.5 m	
Protocol number			661/04	665/04	669/04	
Date of sampling			22.10.2017.	22.10.2017.	19.10.2017.	
No.	Parameter	Unit	Results	Results	Results	
1.	Arsenic	mg/kg	13±1	13±1	14±1	EPA 3051A*
2.	Barium	mg/kg	172	180	175	EPA 3051A
3.	Cadmium	mg/kg	0,50±0,04	0,44±0,03	0,69±0,05	EPA 3051A*
4.	Total chromium	mg/kg	93±7	76±6	88±7	EPA 3051A*
5.	Copper	mg/kg	36±2	33±2	37±2	EPA 3051A*
6.	Mercury	mg/kg	0,28±0,05	0,22±0,04	0,23±0,04	AMA-112*
7.	Molybdenum	mg/kg	1,3±0,2	1,2±0,2	1,0±0,1	EPA 3051A*
8.	Nickel	mg/kg	89±9	75±7	95±9	EPA 3051A*
9.	Lead	mg/kg	33±2	30±2	30±2	EPA 3051A*
10.	Antimony	mg/kg	<1	<1	<1	EPA 3051A
11.	Selenium	mg/kg	<1	<1	1,4	EPA 3051A

12.	Zinc	mg/kg	86±3	67±2	79±3	EPA 3051A*
13.	Tin	mg/kg	1,7	1,3	1,5	EPA 3051A
14.	Cobalt	mg/kg	21±3	21±3	22±3	EPA 3051A*
15.	Silver	mg/kg	<1	<1	<1	EPA 3051A
16.	Manganese	mg/kg	1662±269	1446±234	1349±218	EPA 3051A*
17.	Vanadium	mg/kg	80	65	72	EPA 3051A
18.	Fluorine	mg/kg	1152	759	780	AF-ISM
19.	Thallium	mg/kg	1,2	<1	<1	EPA 3051A
20.	Total cyanide (CN)	mg/kg	9	7,9	7,9	EPA 9010C
21.	Chlorinated Hydrocarbons (CHC)/(VOX):					
	Chlorobenzene	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	1,3-Dichlorobenzene	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	1,4-Dichlorobenzene	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	1,2-Dichlorobenzene	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	1,2,4-Trichlorobenzene	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	1,2,3-Trichlorobenzene	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	Chloroethane	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	Chloromethane	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	Bromomethane	mg/kg	<0,01	<0,01	<0,01	EPA 5021A

	Trichlorofluoromethane	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021A**
	Bromobenzene	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021A**
	Organochlorine pesticides:					
	***p,p′*-DDT**	**mg/kg**	**<0,001**	**<0,001**	**<0,001**	**EPA 8270 C***
	***o,p′*-DDT**	**mg/kg**	**<0,001**	**<0,001**	**<0,001**	**EPA 8270 C***
	***p,p′*-DDD**	**mg/kg**	**<0,001**	**<0,001**	**<0,001**	**EPA 8270 C***
	***p,p′*-DDE**	**mg/kg**	**<0,001**	**<0,001**	**<0,001**	**EPA 8270 C***
22.	**Aromatic hydrocarbons (BTEX):**					
	Benzene	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021 A**
	Toluene	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021 A**
	Ethylbenzene	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021 A**
	m/p-Xylene	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021 A**
	o-Xylene	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021 A**
23.	**Total Petroleum Hydrocarbon (TPH) (C10-C40)**	**mg/kg**	**<10**	**<10**	**<10**	**ISO 16703:2004**
24.	**Polycyclic Aromatic Hydrocarbons:**					
	Naphtalene	**mg/kg**	**0,006±0,002**	**0,005±0,001**	**<0,005**	**EPA 8270***
	2-Methylnaphtalene	**mg/kg**	**<0,005**	**0,005±0,001**	**<0,005**	**EPA 8270***

	1-Methylnaphtalene	mg/kg	0,005±0,001	0,005±0,001	<0,005	EPA 8270*
	Acenaphtylene	mg/kg	<0,005	<0,005	<0,005	EPA 8270*
	Acenaphtene	mg/kg	0,023±0,004	0,024±0,004	0,009±0,002	EPA 8270*
	Fluorene	mg/kg	0,015±0,002	0,016±0,003	0,008±0,001	EPA 8270*
	Phenanthrene	mg/kg	0,19±0,03	0,21±0,03	0,071±0,011	EPA 8270*
	Anthracene	mg/kg	0,028±0,003	0,033±0,004	0,014±0,002	EPA 8270*
	Fluoranthene	mg/kg	0,47±0,07	0,48±0,07	0,16±0,03	EPA 8270*
	Pyrene	mg/kg	0,38±0,06	0,39±0,06	0,13±0,02	EPA 8270*
	Benzo(a)anthracene	mg/kg	0,26±0,04	0,25±0,03	0,088±0,012	EPA 8270*
	Chrysene	mg/kg	0,33±0,05	0,32±0,05	0,12±0,02	EPA 8270*
	Benzo(b)fluoranthene	mg/kg	0,56±0,09	0,47±0,07	0,18±0,03	EPA 8270*
	Benzo(k)fluoranthene	mg/kg	0,18±0,04	0,16±0,04	0,058±0,014	EPA 8270*
	Benzo(a)pyrene	mg/kg	0,33±0,04	0,30±0,04	0,098±0,013	EPA 8270*
	Indeno(1,2,3-cd)pyrene	mg/kg	0,27±0,04	0,23±0,04	0,087±0,014	EPA 8270*
	Dibenzo(a,h)anthracene	mg/kg	0,066±0,016	0,059±0,014	0,026±0,006	EPA 8270*
	Benzo(g,h,i)perylene	mg/kg	0,24±0,05	0,21±0,04	0,079±0,015	EPA 8270*
	ΣPAHs	mg/kg	3,4±0,6	3,2±0,6	1,1±0,2	EPA 8270*
25.	Polychlorinated biphenyls – PCB	mg/kg				
	PCB 18	mg/kg	<0,002	<0,002	<0,002	EPA 8270 C*

	PCB 31	mg/kg	<0,002	<0,002	<0,002	EPA 8270 C*
	PCB 28	mg/kg	<0,002	<0,002	<0,002	EPA 8270 C*
	PCB 52	mg/kg	<0,002	<0,002	<0,002	EPA 8270 C*
	PCB 44	mg/kg	<0,002	<0,002	<0,002	EPA 8270 C*
	PCB 101	mg/kg	<0,002	<0,002	<0,002	EPA 8270 C*
	PCB 149	mg/kg	<0,002	<0,002	<0,002	EPA 8270 C*
	PCB 118	mg/kg	<0,002	<0,002	<0,002	EPA 8270 C*
	PCB 153	mg/kg	<0,002	<0,002	<0,002	EPA 8270 C*
	PCB 138	mg/kg	<0,002	<0,002	<0,002	EPA 8270 C*
	PCB 180	mg/kg	<0,002	<0,002	<0,002	EPA 8270 C*
	PCB 194	mg/kg	<0,002	<0,002	<0,002	EPA 8270 C*

* - accredited method

OPINION

According to the results of physico-chemical analysis , soil samples from the B35 borehole from 0-0.6 m depth (No. 661/04) do not comply with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of chromium, nickel, fluorine and polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of the soil sample from the B35 borehole at a depth of 0-0.6 m (No. 661/04) observed in relation to the Dutch standard show that the content of barium, nickel, cobalt and PAHs above the lowest level (target value) which defines the quality of unpolluted soil but below the intervention level, while according to the Italian standard, the results of the soil sample analysis show that the content of all the analyzed parameters is below the limit value referring to the soil for industrial and commercial use.

According to the results of physico-chemical analysis , soil samples from the B36 borehole from 0-0.5 m depth (No. 665/04) do not comply with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of chromium, nickel, fluorine and polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of the soil sample from the B36 borehole at a depth of 0-0.5 m (No. 665/04) observed in relation to the Dutch standard show that the content is that the content of barium, nickel, cobalt and PAHs above the lowest level (target value) which defines the quality of unpolluted soil but below the intervention level, while according to the Italian standard, the results of the soil sample analysis show that the content of all the analyzed parameters is below the limit value referring to the soil for industrial and commercial use.

According to the results of the physico-chemical analysis , the soil sample from the B17 borehole from 0-0.5 m depth (No. 669/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of chromium, nickel, fluorine and polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of the soil sample from the B17 borehole at a depth of 0-0.5 m (No. 669/04) observed in relation to the Dutch standard show that the content of barium, nickel, selenium and cobalt is above the lowest level (target value) which defines the quality of unpolluted soil, but below the intervention level, while according to the Italian standard, the results of the soil sample analysis show that the content of all the analyzed parameters is below the limit value referring to the soil for industrial and commercial use.

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RESULTS OF ANALYSES

BOREHOLE			6	5	7	Method
Coordinates			600690.79 4695174.65	600696.62 4695256.06	600726.55 4695138.61	
Depth			0-0.4 m	0-0.7 m	0-0.7 m	
Protocol number			673/04	677/04	681/04	
Date of sampling			22.10.2017.	22.10.2017.	19.10.2017.	
No.	Parameter	Unit	Results	Results	Results	
1.	Arsenic	mg/kg	11±1	14±1	13±1	EPA 3051A*
2.	Barium	mg/kg	125	172	168	EPA 3051A
3.	Cadmium	mg/kg	0,66±0,05	0,50±0,04	0,50±0,04	EPA 3051A*
4.	Total chromium	mg/kg	67±5	79±6	83±7	EPA 3051A*
5.	Copper	mg/kg	30±2	35±2	37±2	EPA 3051A*
6.	Mercury	mg/kg	0,20±0,03	0,18±0,03	0,15±0,02	AMA-112*
7.	Molybdenum	mg/kg	<1	1,3±0,2	1,2±0,2	EPA 3051A*
8.	Nickel	mg/kg	62±6	93±9	86±8	EPA 3051A*
9.	Lead	mg/kg	26±2	30±2	28±2	EPA 3051A*
10.	Antimony	mg/kg	<1	<1	<1	EPA 3051A
11.	Selenium	mg/kg	<1	<1	<1	EPA 3051A
12.	Zinc	mg/kg	64±2	75±3	82±3	EPA 3051A*

13.	Tin	mg/kg	1,0	1,5	1,4	EPA 3051A
14.	Cobalt	mg/kg	17±2	20±3	21±3	EPA 3051A*
15.	Silver	mg/kg	<1	<1	<1	EPA 3051A
16.	Manganese	mg/kg	1378±223	1353±219	1361±220	EPA 3051A*
17.	Vanadium	mg/kg	57	68	75	EPA 3051A
18.	Fluorine	mg/kg	721	807	799	AF-ISM
19.	Thallium	mg/kg	<1	<1	<1	EPA 3051A
20.	Total cyanide (CN)	mg/kg	9,4	8,2	8	EPA 9010C
21.	Chlorinated Hydrocarbons (CHC)/(VOX):					
	Chlorobenzene	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	1,3-Dichlorobenzene	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	1,4-Dichlorobenzene	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	1,2-Dichlorobenzene	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	1,2,4-Trichlorobenzene	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	1,2,3-Trichlorobenzene	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	Chloroethane	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	Chloromethane	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	Bromomethane	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	Trichlorofluoromethane	mg/kg	<0,01	<0,01	<0,01	EPA 5021A

	Bromobenzene	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021A**
	Organochlorine pesticides:					
	***p,p′*-DDT**	**mg/kg**	**<0,001**	**<0,001**	**<0,001**	**EPA 8270 C***
	***o,p′*-DDT**	**mg/kg**	**<0,001**	**<0,001**	**<0,001**	**EPA 8270 C***
	***p,p′*-DDD**	**mg/kg**	**<0,001**	**<0,001**	**<0,001**	**EPA 8270 C***
	***p,p′*-DDE**	**mg/kg**	**<0,001**	**<0,001**	**<0,001**	**EPA 8270 C***
22.	**Aromatic hydrocarbons (BTEX):**					
	Benzene	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021 A**
	Toluene	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021 A**
	Ethylbenzene	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021 A**
	m/p-Xylene	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021 A**
	o-Xylene	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021 A**
23.	**Total Petroleum Hydrocarbon (TPH) (C10-C40)**	**mg/kg**	**<10**	**<10**	**<10**	**ISO 16703:2004**
24.	**Polycyclic Aromatic Hydrocarbons:**					
	Naphtalene	**mg/kg**	**<0,005**	**0,006±0,002**	**0,004±0,001**	**EPA 8270***
	2-Methylnaphtalene	**mg/kg**	**<0,005**	**<0,005**	**<0,005**	**EPA 8270***
	1-Methylnaphtalene	**mg/kg**	**<0,005**	**<0,005**	**<0,005**	**EPA 8270***

	Acenaphtylene	mg/kg	<0,005	<0,005	<0,005	EPA 8270*
	Acenaphtene	mg/kg	0,016±0,003	0,011±0,002	0,013±0,002	EPA 8270*
	Fluorene	mg/kg	0,012±0,002	0,006±0,001	0,007±0,001	EPA 8270*
	Phenanthrene	mg/kg	0,15±0,02	0,10±0,02	0,12±0,02	EPA 8270*
	Anthracene	mg/kg	0,023±0,003	0,021±0,003	0,020±0,002	EPA 8270*
	Fluoranthene	mg/kg	0,36±0,06	0,24±0,04	0,30±0,05	EPA 8270*
	Pyrene	mg/kg	0,30±0,05	0,19±0,03	0,24±0,04	EPA 8270*
	Benzo(a)anthracene	mg/kg	0,20±0,03	0,12±0,02	0,15±0,02	EPA 8270*
	Chrysene	mg/kg	0,25±0,04	0,19±0,03	0,24±0,04	EPA 8270*
	Benzo(b)fluoranthene	mg/kg	0,40±0,06	0,25±0,04	0,30±0,05	EPA 8270*
	Benzo(k)fluoranthene	mg/kg	0,13±0,03	0,083±0,020	0,099±0,024	EPA 8270*
	Benzo(a)pyrene	mg/kg	0,25±0,03	0,077±0,010	0,170±0,022	EPA 8270*
	Indeno(1,2,3-cd)pyrene	mg/kg	0,20±0,03	0,19±0,03	0,24±0,04	EPA 8270*
	Dibenzo(a,h)anthracene	mg/kg	0,050±0,012	0,034±0,008	0,010±0,002	EPA 8270*
	Benzo(g,h,i)perylene	mg/kg	0,18±0,03	0,16±0,03	0,21±0,04	EPA 8270*
	ΣPAHs	mg/kg	2,5±0,4	1,7±0,3	2,1±0,4	EPA 8270*
25.	Polychlorinated biphenyls – PCB	mg/kg				
	PCB 18	mg/kg	<0,002	<0,002	<0,002	EPA 8270 C*
	PCB 31	mg/kg	<0,002	<0,002	<0,002	EPA 8270 C*

	PCB 28	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 52	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 44	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 101	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 149	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 118	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 153	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 138	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 180	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 194	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***

* - accredited method

OPINION

According to the results of the physico-chemical analysis , the soil sample from the B6 borehole from 0-0.4 m depth (No. 673/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of chromium, nickel, fluorine and polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of the soil sample from the B6 borehole at a depth of 0-0.4 m (No. 673/04) observed in relation to the Dutch standard show that the content of nickel, cobalt and PAHs is above the lowest level (target value) which defines the quality of unpolluted soil, but below the intervention level, while according to the Italian standard, the results of the soil sample analysis show that the content of all the analyzed parameters is below the limit value referring to the soil for industrial and commercial use.

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According to the results of the physico-chemical analysis, the soil sample from the B5 borehole from 0-0.7 m depth (No. 677/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of chromium, nickel, fluorine and polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of the soil sample from the B5 borehole at a depth of 0-0.7 m (No. 677/04) observed in relation to the Dutch standard show that the content of barium, nickel, cobalt and PAHs is above the lowest level (target value) which defines the quality of unpolluted soil but below the intervention level, while according to the Italian standard, the results of the soil sample analysis show that the content of all the analyzed parameters is below the limit value referring to the soil for industrial and commercial use.

According to the results of the physico-chemical analysis, the soil sample from the B7 borehole from 0-0.7 m depth (No. 681/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of chromium, nickel, fluorine and polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of soil samples from the B7 borehole from 0-0.7 m depth (No. 681/04) observed in relation to the Dutch standard show that the content of barium, nickel, cobalt and PAHs above the lowest level (target value) which defines the quality of unpolluted soil but below the intervention level, while according to the Italian standard, the results of the soil sample analysis show that the content of all the analyzed parameters is below the limit value referring to the soil for industrial and commercial use.

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RESULTS OF ANALYSES

BOREHOLE			8	9	38	Method
Coordinates			600737.29 4695130.66	600793.27 4695108.35	600878.28 4695307.44	
Depth			0-1 m	0-0.3 m	0-1 m	
Protocol number			685/04	688/04	703/04	
Date of sampling			22.10.2017.	22.10.2017.	25.10.2017.	
No.	Parameter	Unit	Results	Results	Results	
1.	Arsenic	mg/kg	15±1	12±1	14±1	EPA 3051A*
2.	Barium	mg/kg	173	190	169	EPA 3051A
3.	Cadmium	mg/kg	0,45±0,03	0,70±0,05	0,44±0,03	EPA 3051A*
4.	Total chromium	mg/kg	92±7	83±7	85±7	EPA 3051A*
5.	Copper	mg/kg	40±2	35±2	39±2	EPA 3051A*
6.	Mercury	mg/kg	0,12±0,02	0,20±0,03	0,47±0,08	AMA-112*
7.	Molybdenum	mg/kg	1,2±0,2	1,2±0,2	1,1±0,2	EPA 3051A*
8.	Nickel	mg/kg	110±11	87±8	106±10	EPA 3051A*
9.	Lead	mg/kg	29±2	28±2	27±2	EPA 3051A*
10.	Antimony	mg/kg	<1	<1	<1	EPA 3051A
11.	Selenium	mg/kg	1,2	1,3	<1	EPA 3051A

12.	Zinc	mg/kg	86±3	82±3	69±2	EPA 3051A*
13.	Tin	mg/kg	1,5	1,3	1,7	EPA 3051A
14.	Cobalt	mg/kg	23±3	21±3	19±3	EPA 3051A*
15.	Silver	mg/kg	<1	<1	<1	EPA 3051A
16.	Manganese	mg/kg	1229±199	1445±234	1400±226	EPA 3051A*
17.	Vanadium	mg/kg	80	66	67	EPA 3051A
18.	Fluorine	mg/kg	793	887	526	AF-ISM
19.	Thallium	mg/kg	<1	<1	<1	EPA 3051A
20.	Total cyanide (CN)	mg/kg	6,9	7,8	8,1	EPA 9010C
21.	Chlorinated Hydrocarbons (CHC)/(VOX):					
	Chlorobenzene	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	1,3-Dichlorobenzene	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	1,4-Dichlorobenzene	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	1,2-Dichlorobenzene	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	1,2,4-Trichlorobenzene	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	1,2,3-Trichlorobenzene	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	Chloroethane	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	Chloromethane	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	Bromomethane	mg/kg	<0,01	<0,01	<0,01	EPA 5021A

	Trichlorofluoromethane	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021A**
	Bromobenzene	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021A**
	Organochlorine pesticides:					
	***p,p′*-DDT**	**mg/kg**	**<0,001**	**<0,001**	**<0,001**	**EPA 8270 C***
	***o,p′*-DDT**	**mg/kg**	**<0,001**	**<0,001**	**<0,001**	**EPA 8270 C***
	***p,p′*-DDD**	**mg/kg**	**<0,001**	**<0,001**	**<0,001**	**EPA 8270 C***
	***p,p′*-DDE**	**mg/kg**	**<0,001**	**<0,001**	**<0,001**	**EPA 8270 C***
22.	**Aromatic hydrocarbons (BTEX):**					
	Benzene	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021 A**
	Toluene	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021 A**
	Ethylbenzene	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021 A**
	m/p-Xylene	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021 A**
	o-Xylene	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021 A**
23.	**Total Petroleum Hydrocarbon (TPH) (C10-C40)**	**mg/kg**	**15**	**<10**	**22**	**ISO 16703:2004**
24.	**Polycyclic Aromatic Hydrocarbons:**					
	Naphtalene	**mg/kg**	**0,008±0,002**	**<0,005**	**0,005±0,001**	**EPA 8270***
	2-Methylnaphtalene	**mg/kg**	**<0,005**	**<0,005**	**0,005±0,001**	**EPA 8270***

	1-Methylnaphtalene	mg/kg	<0,005	<0,005	<0,005	EPA 8270*
	Acenaphtylene	mg/kg	<0,005	<0,005	<0,005	EPA 8270*
	Acenaphtene	mg/kg	0,016±0,003	0,015±0,003	0,018±0,003	EPA 8270*
	Fluorene	mg/kg	0,009±0,001	0,008±0,001	0,013±0,002	EPA 8270*
	Phenanthrene	mg/kg	0,14±0,02	0,12±0,02	0,15±0,02	EPA 8270*
	Anthracene	mg/kg	0,028±0,003	0,026±0,003	0,025±0,003	EPA 8270*
	Fluoranthene	mg/kg	0,32±0,05	0,31±0,05	0,32±0,05	EPA 8270*
	Pyrene	mg/kg	0,26±0,04	0,25±0,04	0,26±0,04	EPA 8270*
	Benzo(a)anthracene	mg/kg	0,17±0,02	0,15±0,02	0,21±0,03	EPA 8270*
	Chrysene	mg/kg	0,25±0,04	0,23±0,04	0,25±0,04	EPA 8270*
	Benzo(b)fluoranthene	mg/kg	0,32±0,05	0,31±0,05	0,42±0,06	EPA 8270*
	Benzo(k)fluoranthene	mg/kg	0,11±0,03	0,11±0,03	0,14±0,04	EPA 8270*
	Benzo(a)pyrene	mg/kg	0,079±0,010	0,19±0,02	0,27±0,04	EPA 8270*
	Indeno(1,2,3-cd)pyrene	mg/kg	0,039±0,006	0,25±0,04	0,23±0,04	EPA 8270*
	Dibenzo(a,h)anthracene	mg/kg	0,011±0,003	0,042±0,010	0,059±0,014	EPA 8270*
	Benzo(g,h,i)perylene	mg/kg	0,19±0,04	0,22±0,04	0,21±0,04	EPA 8270*
	ΣPAHs	mg/kg	2,0±0,3	2,2±0,4	2,6±0,4	EPA 8270*
25.	Polychlorinated biphenyls – PCB	mg/kg				
	PCB 18	mg/kg	<0,002	<0,002	<0,002	EPA 8270 C*

	PCB 31	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 28	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 52	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 44	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 101	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 149	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 118	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 153	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 138	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 180	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 194	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***

* - accredited method

OPINION

According to the results of the physico-chemical analysis , the sample of soil from the B8 borehole from 0-1 m depth (No. 685/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of chromium, nickel, fluorine and polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of soil samples from the B8 borehole at 0-1 m depth (No. 685/04) observed in relation to the Dutch standard show that the content of barium, copper, nickel, selenium, cobalt and PAHs is above the lowest of the target value, which defines the quality of the unpolluted soil but below the intervention level. According to the Italian standard, the results of soil sample analysis show that the content of all the analyzed parameters is below the limit value for the soil for industrial and commercial use.

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According to the results of the physico-chemical analysis , the soil sample from the B9 borehole from 0-0.3 m depth (No. 688/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of chromium, nickel, fluorine and polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of soil samples from the B9 borehole at 0-0.3 m depth (No. 688/04) observed in relation to the Dutch standard show that the content of barium, nickel, selenium, cobalt and PAHs is above the lowest level target value) which defines the quality of unpolluted soil but below the intervention level. According to the Italian standard, the results of soil sample analysis show that the content of all the analyzed parameters is below the limit value referring to the soil for industrial and commercial use.

According to the results of the physico-chemical analysis , the sample of soil from the borehole B38 from 0-1 m depth (No. 703/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of chromium, nickel, fluorine and polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of the soil sample from the B38 borehole at 0-1 m depth (No. 703/04) observed in relation to the Dutch standard show that the content of barium, copper, mercury, nickel, cobalt and PAHs above the lowest of the target value, which defines the quality of the unpolluted soil but below the intervention level. According to the Italian standard, the results of soil sample analysis show that the content of all the analyzed parameters is below the limit value for the soil for industrial and commercial use.

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RESULTS OF ANALYSES

BOREHOLE			30	31	32	Method
Coordinates			600757.38 4695360.25	600745.71 4695340.86	600734.09 4695272.92	
Depth			0-1 m	0-0.4 m	0-0.6 m	
Protocol number			706/04	709/04	713/04	
Date of sampling			25.10.2017.	25.10.2017.	25.10.2017.	
No.	Parameter	Unit	Results	Results	Results	
1.	Arsenic	mg/kg	15±1	13±1	15±1	EPA 3051A*
2.	Barium	mg/kg	185	139	148	EPA 3051A
3.	Cadmium	mg/kg	0,41±0,03	0,30±0,02	0,53±0,04	EPA 3051A*
4.	Total chromium	mg/kg	91±7	61±5	67±5	EPA 3051A*
5.	Copper	mg/kg	43±2	28±2	34±2	EPA 3051A*
6.	Mercury	mg/kg	0,25±0,04	0,29±0,05	0,21±0,03	AMA-112*
7.	Molybdenum	mg/kg	1,1±0,2	<1	<1	EPA 3051A*
8.	Nickel	mg/kg	195±19	86±8	98±9	EPA 3051A*
9.	Lead	mg/kg	29±2	30±2	31±2	EPA 3051A*
10.	Antimony	mg/kg	<1	<1	<1	EPA 3051A
11.	Selenium	mg/kg	<1	<1	11	EPA 3051A

12.	Zinc	mg/kg	62±2	68±3	60±2	EPA 3051A*
13.	Tin	mg/kg	1,5	1,1	1,2	EPA 3051A
14.	Cobalt	mg/kg	17±2	16±2	18±2	EPA 3051A*
15.	Silver	mg/kg	<1	<1	<1	EPA 3051A
16.	Manganese	mg/kg	1536±248	1470±238	1436±232	EPA 3051A*
17.	Vanadium	mg/kg	75	49	57	EPA 3051A
18.	Fluorine	mg/kg	651	750	743	AF-ISM
19.	Thallium	mg/kg	<1	<1	<1	EPA 3051A
20.	Total cyanide (CN)	mg/kg	8,7	8,2	8	EPA 9010C
21.	Chlorinated Hydrocarbons (CHC)/(VOX):					
	Chlorobenzene	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	1,3-Dichlorobenzene	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	1,4-Dichlorobenzene	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	1,2-Dichlorobenzene	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	1,2,4-Trichlorobenzene	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	1,2,3-Trichlorobenzene	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	Chloroethane	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	Chloromethane	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	Bromomethane	mg/kg	<0,01	<0,01	<0,01	EPA 5021A

	Trichlorofluoromethane	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021A**
	Bromobenzene	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021A**
	Organochlorine pesticides:					
	***p,p′*-DDT**	**mg/kg**	**<0,001**	**<0,001**	**<0,001**	**EPA 8270 C***
	***o,p′*-DDT**	**mg/kg**	**<0,001**	**<0,001**	**<0,001**	**EPA 8270 C***
	***p,p′*-DDD**	**mg/kg**	**<0,001**	**<0,001**	**<0,001**	**EPA 8270 C***
	***p,p′*-DDE**	**mg/kg**	**<0,001**	**<0,001**	**<0,001**	**EPA 8270 C***
22.	**Aromatic hydrocarbons (BTEX):**					
	Benzene	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021 A**
	Toluene	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021 A**
	Ethylbenzene	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021 A**
	m/p-Xylene	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021 A**
	o-Xylene	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021 A**
23.	**Total Petroleum Hydrocarbon (TPH) (C10-C40)**	**mg/kg**	**<10**	**<10**	**21**	**ISO 16703:2004**
24.	**Polycyclic Aromatic Hydrocarbons:**					
	Naphtalene	**mg/kg**	**<0,005**	**0,005±0,001**	**0,005±0,001**	**EPA 8270***
	2-Methylnaphtalene	**mg/kg**	**<0,005**	**0,005±0,001**	**0,005±0,001**	**EPA 8270***

	1-Methylnaphtalene	mg/kg	<0,005	0,005±0,001	0,005±0,001	EPA 8270*
	Acenaphtylene	mg/kg	<0,005	<0,005	<0,005	EPA 8270*
	Acenaphtene	mg/kg	0,012±0,002	0,020±0,004	0,015±0,003	EPA 8270*
	Fluorene	mg/kg	0,010±0,002	0,014±0,002	0,011±0,002	EPA 8270*
	Phenanthrene	mg/kg	0,10±0,02	0,17±0,03	0,12±0,02	EPA 8270*
	Anthracene	mg/kg	0,018±0,002	0,026±0,003	0,019±0,002	EPA 8270*
	Fluoranthene	mg/kg	0,21±0,03	0,37±0,06	0,26±0,04	EPA 8270*
	Pyrene	mg/kg	0,17±0,03	0,30±0,05	0,21±0,03	EPA 8270*
	Benzo(a)anthracene	mg/kg	0,13±0,02	0,21±0,03	0,16±0,02	EPA 8270*
	Chrysene	mg/kg	0,15±0,02	0,26±0,04	0,19±0,03	EPA 8270*
	Benzo(b)fluoranthene	mg/kg	0,30±0,05	0,76±0,12	0,34±0,05	EPA 8270*
	Benzo(k)fluoranthene	mg/kg	0,10±0,02	0,25±0,06	0,11±0,03	EPA 8270*
	Benzo(a)pyrene	mg/kg	0,18±0,02	0,45±0,06	0,22±0,03	EPA 8270*
	Indeno(1,2,3-cd)pyrene	mg/kg	0,14±0,02	0,37±0,06	0,17±0,03	EPA 8270*
	Dibenzo(a,h)anthracene	mg/kg	0,037±0,009	0,087±0,020	0,046±0,011	EPA 8270*
	Benzo(g,h,i)perylene	mg/kg	0,13±0,02	0,34±0,06	0,17±0,03	EPA 8270*
	ΣPAHs	mg/kg	1,7±0,3	3,6±0,6	2,0±0,4	EPA 8270*
25.	Polychlorinated biphenyls – PCB	mg/kg				
	PCB 18	mg/kg	<0,002	<0,002	<0,002	EPA 8270 C*

	PCB 31	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 28	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 52	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 44	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 101	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 149	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 118	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 153	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 138	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 180	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 194	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***

* - accredited method

OPINION

According to the results of the physico-chemical analysis , the soil sample from the B30 borehole from 0-1 m depth (No. 706/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of chromium, nickel, fluorine and polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of the soil sample from the B30 borehole at 0-1 m depth (No. 706/04) observed in relation to the Dutch standard show that the content of barium, copper, nickel, cobalt and PAHs is above the lowest level target value) which defines the quality of unpolluted soil but below the intervention level, while according to the Italian standard, the results of soil sample analysis show that the content of all the analyzed parameters is below the limit value referring to the soil for industrial and commercial use.

According to the results of the physico-chemical analysis, the sample of soil from the borehole B31 from 0-0.4 m depth (No. 709/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of chromium, nickel, fluorine and polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of the soil sample from the B31 borehole from 0-0.4 m depth (No. 709/04) observed in relation to the Dutch standard show that the content of nickel, cobalt and PAHs is above the lowest level (target value) the quality of the unpolluted soil is defined, but below the intervention level. According to the Italian standard, the results of the soil sample analysis show that the content of all the analyzed parameters is below the limit value referring to the soil for industrial and commercial use.

According to the results of the physico-chemical analysis , the soil sample from the B32 borehole from 0-0.6 m depth (No. 713/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of chromium, nickel, fluorine and polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of the soil sample from the B32 borehole at a depth of 0-0.6 m (No. 713/04) observed in relation to the Dutch standard show that the content of nickel, cobalt and PAHs is above the lowest level (target value) which defines the quality of unpolluted soil, but below the intervention level. According to the Italian standard, the results of the soil sample analysis show that the content of all the analyzed parameters is below the limit value referring to the soil for industrial and commercial use.

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RESULTS OF ANALYSES

BOREHOLE			34	1	33	Method
Coordinates			600788.60 4695238.82	600650.44 4695174.29	600774.94 4695278.51	
Depth			0-0.4 m	0-0.2 m	0-0.6 m	
Protocol number			717/04	721/04	728/04	
Date of sampling			25.10.2017.	25.10.2017.	25.10.2017.	
No.	Parameter	Unit	Results	Results	Results	
1.	Arsenic	mg/kg	15±1	13±1	17±2	EPA 3051A*
2.	Barium	mg/kg	157	117	185	EPA 3051A
3.	Cadmium	mg/kg	0,49±0,03	0,33±0,02	0,73±0,02	EPA 3051A*
4.	Total chromium	mg/kg	65±5	56±4	86±7	EPA 3051A*
5.	Copper	mg/kg	33±2	27±1	40±2	EPA 3051A*
6.	Mercury	mg/kg	0,17±0,03	0,18±0,03	0,12±0,02	AMA-112*
7.	Molybdenum	mg/kg	1,4±0,2	<1	1,8±0,2	EPA 3051A*
8.	Nickel	mg/kg	100±10	62±6	105±10	EPA 3051A*
9.	Lead	mg/kg	30±2	24±2	30±2	EPA 3051A*
10.	Antimony	mg/kg	<1	<1	<1	EPA 3051A
11.	Selenium	mg/kg	1,1	<1	<1	EPA 3051A

12.	Zinc	mg/kg	59±2	70±3	72±3	EPA 3051A*
13.	Tin	mg/kg	1,4	<1	1,6	EPA 3051A
14.	Cobalt	mg/kg	18,2±2	15±2	21±3	EPA 3051A*
15.	Silver	mg/kg	<1	<1	<1	EPA 3051A
16.	Manganese	mg/kg	1375±222	1160±188	1404±227	EPA 3051A*
17.	Vanadium	mg/kg	59	46	72	EPA 3051A
18.	Fluorine	mg/kg	893	585	687	AF-ISM
19.	Thallium	mg/kg	<1	<1	1,1	EPA 3051A
20.	Total cyanide (CN)	mg/kg	7,9	8,1	7,9	EPA 9010C
21.	Chlorinated Hydrocarbons (CHC)/(VOX):					
	Chlorobenzene	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	1,3-Dichlorobenzene	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	1,4-Dichlorobenzene	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	1,2-Dichlorobenzene	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	1,2,4-Trichlorobenzene	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	1,2,3-Trichlorobenzene	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	Chloroethane	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	Chloromethane	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	Bromomethane	mg/kg	<0,01	<0,01	<0,01	EPA 5021A

	Trichlorofluoromethane	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021A**
	Bromobenzene	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021A**
	Organochlorine pesticides:					
	***p,p′*-DDT**	**mg/kg**	**<0,001**	**<0,001**	**<0,001**	**EPA 8270 C***
	***o,p′*-DDT**	**mg/kg**	**<0,001**	**<0,001**	**<0,001**	**EPA 8270 C***
	***p,p′*-DDD**	**mg/kg**	**<0,001**	**<0,001**	**<0,001**	**EPA 8270 C***
	***p,p′*-DDE**	**mg/kg**	**<0,001**	**<0,001**	**<0,001**	**EPA 8270 C***
22.	**Aromatic hydrocarbons (BTEX):**					
	Benzene	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021 A**
	Toluene	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021 A**
	Ethylbenzene	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021 A**
	m/p-Xylene	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021 A**
	o-Xylene	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021 A**
23.	**Total Petroleum Hydrocarbon (TPH) (C10-C40)**	**mg/kg**	**<10**	**<10**	**38**	**ISO 16703:2004**
24.	**Polycyclic Aromatic Hydrocarbons:**					
	Naphtalene	**mg/kg**	**0,006±0,002**	**<0,005**	**<0,005**	**EPA 8270***
	2-Methylnaphtalene	**mg/kg**	**0,005±0,001**	**<0,005**	**<0,005**	**EPA 8270***

	1-Methylnaphtalene	mg/kg	0,005±0,001	<0,005	<0,005	EPA 8270*
	Acenaphtylene	mg/kg	<0,005	<0,005	<0,005	EPA 8270*
	Acenaphtene	mg/kg	0,033±0,006	<0,005	0,008±0,001	EPA 8270*
	Fluorene	mg/kg	0,020±0,003	0,005±0,001	0,008±0,001	EPA 8270*
	Phenanthrene	mg/kg	0,27±0,04	0,022±0,003	0,062±0,009	EPA 8270*
	Anthracene	mg/kg	0,038±0,005	0,007±0,001	0,013±0,002	EPA 8270*
	Fluoranthene	mg/kg	0,62±0,10	0,047±0,007	0,14±0,02	EPA 8270*
	Pyrene	mg/kg	0,51±0,08	0,040±0,006	0,12±0,02	EPA 8270*
	Benzo(a)anthracene	mg/kg	0,38±0,05	0,028±0,004	0,094±0,013	EPA 8270*
	Chrysene	mg/kg	0,47±0,07	0,036±0,006	0,12±0,02	EPA 8270*
	Benzo(b)fluoranthene	mg/kg	1,0±0,2	0,11±0,02	0,30±0,05	EPA 8270*
	Benzo(k)fluoranthene	mg/kg	0,33±0,08	0,035±0,009	0,10±0,03	EPA 8270*
	Benzo(a)pyrene	mg/kg	0,63±0,08	0,060±0,008	0,17±0,02	EPA 8270*
	Indeno(1,2,3-cd)pyrene	mg/kg	0,48±0,08	0,053±0,008	0,15±0,02	EPA 8270*
	Dibenzo(a,h)anthracene	mg/kg	0,028±0,007	0,009±0,002	0,015±0,004	EPA 8270*
	Benzo(g,h,i)perylene	mg/kg	0,47±0,09	0,049±0,009	0,15±0,03	EPA 8270*
	ΣPAHs	mg/kg	5,3±0,9	0,50±0,09	1,5±0,3	EPA 8270*
25.	Polychlorinated biphenyls – PCB	mg/kg				
	PCB 18	mg/kg	<0,002	<0,002	<0,002	EPA 8270 C*

	PCB 31	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 28	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 52	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 44	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 101	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 149	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 118	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 153	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 138	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 180	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 194	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***

* - accredited method

OPINION

According to the results of the physico-chemical analysis, the soil sample from the B34 borehole from 0-0.4 m depth (No. 717/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of chromium, nickel, fluorine and polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of soil samples from the B34 borehole at a depth of 0-0.4 m (No. 717/04) observed in relation to the Dutch standard show that the content of nickel, cobalt and PAHs is above the lowest level (target value) which defines the quality of unpolluted soil, but below the intervention level, while according to the Italian standard, the results of the soil sample analysis show that the content of all the analyzed parameters is below the limit value referring to the soil for industrial and commercial use.

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According to the results of the physico-chemical analysis, the soil sample from the B1 borehole from 0-0.2 m depth (No. 721/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of chromium, nickel and fluorine in relation to the prescribed value.

The results of the physico-chemical analysis of soil samples from the B1 borehole from 0-0.2 m depth (No. 721/04) observed in relation to the Dutch standard show that the content of nickel and cobalt is above the lowest level (target value) which defines the quality of unpolluted soil but below the intervention level, while according to the Italian standard, the results of the soil sample analysis show that the content of all analyzed parameters is below the limit value for the soil for industrial and commercial use.

According to the results of the physico-chemical analysis, soil samplefrom the borehole B33 from 0-0.6 m depth (No. 728/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of chromium, nickel, fluorine and polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of the soil sample from the B33 borehole at 0-0.6 m depth (No. 728/04) observed in relation to the Dutch standard show that the content of barium, copper, nickel and cobalt is above the lowest limit (target value) which defines the quality of unpolluted soil, but below the intervention level, while according to the Italian standard, the results of the soil sample analysis show that the content of all the analyzed parameters is below the limit value referring to the soil for industrial and commercial use.

RESULTS OF ANALYSES

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BOREHOLE			2	39	Method
Coordinates			600782.30 4695069.65	600865.30 4695345.24	
Depth			0-0.4 m	0-0.5 m	
Protocol number			732/04	739/04	
Date of sampling			25.10.2017.	25.10.2017.	
No.	Parameter	Unit	Results	Results	
1.	Arsenic	mg/kg	18±2	17±2	EPA 3051A*
2.	Barium	mg/kg	241	176	EPA 3051A
3.	Cadmium	mg/kg	0,54±0,04	0,49±0,03	EPA 3051A*
4.	Total chromium	mg/kg	91±7	84±7	EPA 3051A*
5.	Copper	mg/kg	39±2	38±2	EPA 3051A*
6.	Mercury	mg/kg	0,12±0,02	0,11±0,02	AMA-112*
7.	Molybdenum	mg/kg	1,6±0,2	1,4±0,2	EPA 3051A*
8.	Nickel	mg/kg	116±11	94±9	EPA 3051A*
9.	Lead	mg/kg	32±2	33±2	EPA 3051A*
10.	Antimony	mg/kg	<1	<1	EPA 3051A
11.	Selenium	mg/kg	<1	<1	EPA 3051A
12.	Zinc	mg/kg	88±3	76±3	EPA 3051A*
13.	Tin	mg/kg	1,9	1,5	EPA 3051A

14.	Cobalt	mg/kg	22±3	20±3	EPA 3051A*
15.	Silver	mg/kg	<1	<1	EPA 3051A
16.	Manganese	mg/kg	1391±225	1538±225	EPA 3051A*
17.	Vanadium	mg/kg	85	73	EPA 3051A
18.	Fluorine	mg/kg	1023	949	AF-ISM
19.	Thallium	mg/kg	1,4	1,2	EPA 3051A
20.	Total cyanide (CN)	mg/kg	7,3	7,4	EPA 9010C
21.	Chlorinated Hydrocarbons (CHC)/(VOX):				
	Chlorobenzene	mg/kg	<0,01	<0,01	EPA 5021A
	1,3-Dichlorobenzene	mg/kg	<0,01	<0,01	EPA 5021A
	1,4-Dichlorobenzene	mg/kg	<0,01	<0,01	EPA 5021A
	1,2-Dichlorobenzene	mg/kg	<0,01	<0,01	EPA 5021A
	1,2,4-Trichlorobenzene	mg/kg	<0,01	<0,01	EPA 5021A
	1,2,3-Trichlorobenzene	mg/kg	<0,01	<0,01	EPA 5021A
	Chloroethane	mg/kg	<0,01	<0,01	EPA 5021A
	Chloromethane	mg/kg	<0,01	<0,01	EPA 5021A
	Bromomethane	mg/kg	<0,01	<0,01	EPA 5021A
	Trichlorofluoromethane	mg/kg	<0,01	<0,01	EPA 5021A
	Bromobenzene	mg/kg	<0,01	<0,01	EPA 5021A

	Organochlorine pesticides:				
	***p,p′*-DDT**	**mg/kg**	**<0,001**	**<0,001**	**EPA 8270 C***
	***o,p′*-DDT**	**mg/kg**	**<0,001**	**<0,001**	**EPA 8270 C***
	***p,p′*-DDD**	**mg/kg**	**<0,001**	**<0,001**	**EPA 8270 C***
	***p,p′*-DDE**	**mg/kg**	**<0,001**	**<0,001**	**EPA 8270 C***
22.	**Aromatic hydrocarbons (BTEX):**				
	Benzene	**mg/kg**	**<0,01**	**<0,01**	**EPA 5021 A**
	Toluene	**mg/kg**	**<0,01**	**<0,01**	**EPA 5021 A**
	Ethylbenzene	**mg/kg**	**<0,01**	**<0,01**	**EPA 5021 A**
	m/p-Xylene	**mg/kg**	**<0,01**	**<0,01**	**EPA 5021 A**
	o-Xylene	**mg/kg**	**<0,01**	**<0,01**	**EPA 5021 A**
23.	**Total Petroleum Hydrocarbon (TPH) (C10-C40)**	**mg/kg**	**42**	**20**	**ISO 16703:2004**
24.	**Polycyclic Aromatic Hydrocarbons:**				
	Naphtalene	**mg/kg**	**0,007±0,002**	**<0,005**	**EPA 8270***
	2-Methylnaphtalene	**mg/kg**	**0,006±0,002**	**<0,005**	**EPA 8270***
	1-Methylnaphtalene	**mg/kg**	**0,005±0,001**	**<0,005**	**EPA 8270***
	Acenaphtylene	**mg/kg**	**<0,005**	**<0,005**	**EPA 8270***

	Acenaphtene	mg/kg	0,019±0,003	0,020±0,004	EPA 8270*
	Fluorene	mg/kg	0,012±0,002	0,011±0,002	EPA 8270*
	Phenanthrene	mg/kg	0,16±0,02	0,17±0,03	EPA 8270*
	Anthracene	mg/kg	0,021±0,003	0,031±0,004	EPA 8270*
	Fluoranthene	mg/kg	0,40±0,06	0,38±0,06	EPA 8270*
	Pyrene	mg/kg	0,34±0,05	0,31±0,05	EPA 8270*
	Benzo(a)anthracene	mg/kg	0,21±0,03	0,22±0,03	EPA 8270*
	Chrysene	mg/kg	0,32±0,05	0,30±0,05	EPA 8270*
	Benzo(b)fluoranthene	mg/kg	0,62±0,09	0,51±0,08	EPA 8270*
	Benzo(k)fluoranthene	mg/kg	0,23±0,06	0,17±0,04	EPA 8270*
	Benzo(a)pyrene	mg/kg	0,39±0,05	0,33±0,04	EPA 8270*
	Indeno(1,2,3-cd)pyrene	mg/kg	0,49±0,08	0,44±0,07	EPA 8270*
	Dibenzo(a,h)anthracene	mg/kg	0,085±0,020	0,10±0,02	EPA 8270*
	Benzo(g,h,i)perylene	mg/kg	0,47±0,09	0,37±0,07	EPA 8270*
	ΣPAHs	mg/kg	3,8±0,7	3,4±0,6	EPA 8270*
25.	Polychlorinated biphenyls – PCB	mg/kg			
	PCB 18	mg/kg	<0,002	<0,002	EPA 8270 C*
	PCB 31	mg/kg	<0,002	<0,002	EPA 8270 C*
	PCB 28	mg/kg	<0,002	<0,002	EPA 8270 C*

	PCB 52	**mg/kg**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 44	**mg/kg**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 101	**mg/kg**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 149	**mg/kg**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 118	**mg/kg**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 153	**mg/kg**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 138	**mg/kg**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 180	**mg/kg**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 194	**mg/kg**	**<0,002**	**<0,002**	**EPA 8270 C***

* - accredited method

OPINION

According to the results of the physico-chemical analysis, the soil sample from the Borehole B2 from the depth 0-0.4 m (No. 732/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of chromium, nickel, fluorine and polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of soil samples from the Borehole B2 from depth 0-0.4 m (No. 732/04) observed in relation to the Dutch standard show that the content of barium, copper, nickel, cobalt and PAHs is above the lowest level (target value) which defines the quality of unpolluted soil but below the intervention level, while according to the Italian standard, the results of soil sample analysis show that the content of all the analyzed parameters is below the limit value for soil for industrial and commercial use.

According to the results of the physico-chemical analysis, the soil sample from the B39 borehole from 0-0.5 m depth (No. 739/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of chromium, nickel, fluorine and polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

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The results of the physico-chemical analysis of soil samples from the B39 borehole at 0-0.5 m depth (No. 739/04) observed in relation to the Dutch standard show that the content of barium, nickel, cobalt and PAHs above the lowest level (target value) which defines the quality of unpolluted soil but below the intervention level, while according to the Italian standard, the results of the soil sample analysis show that the content of all the analyzed parameters is below the limit value referring to the soil for industrial and commercial use.

RESULTS OF ANALYSES

BOREHOLE	**37**		**Method**
Coordinates	**600901.70 4695259.33**		
Depth	**0-0.9 m**	**0.9-1.0 m**	
Protocol number	**743/04**	**744/04**	

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Date of sampling			25.10.2017.	25.10.2017.	
No.	Parameter	Unit	Results	Results	
1.	Arsenic	mg/kg	16±1	8±1	EPA 3051A*
2.	Barium	mg/kg	214	36	EPA 3051A
3.	Cadmium	mg/kg	0,61±0,04	0,43±0,03	EPA 3051A*
4.	Total chromium	mg/kg	73±6	24±2	EPA 3051A*
5.	Copper	mg/kg	44±2	18±1	EPA 3051A*
6.	Mercury	mg/kg	0,09±0,01	0,09±0,01	AMA-112*
7.	Molybdenum	mg/kg	1,4±0,2	<1	EPA 3051A*
8.	Nickel	mg/kg	108±10	30±3	EPA 3051A*
9.	Lead	mg/kg	33±2	7,0±0,5	EPA 3051A*
10.	Antimony	mg/kg	<1	<1	EPA 3051A
11.	Selenium	mg/kg	<1	<1	EPA 3051A
12.	Zinc	mg/kg	71±7	25±1	EPA 3051A*
13.	Tin	mg/kg	1,8	<1	EPA 3051A
14.	Cobalt	mg/kg	20±3	6±1	EPA 3051A*
15.	Silver	mg/kg	<1	<1	EPA 3051A
16.	Manganese	mg/kg	1300±210	540±87	EPA 3051A*
17.	Vanadium	mg/kg	62	18	EPA 3051A

18.	Fluorine	mg/kg	3982	470	AF-ISM
19.	Thallium	mg/kg	<1	<1	EPA 3051A
20.	Total cyanide (CN)	mg/kg	7	7,1	EPA 9010C
21.	Chlorinated Hydrocarbons (CHC)/(VOX):				
	Chlorobenzene	mg/kg	<0,01	<0,01	EPA 5021A
	1,3-Dichlorobenzene	mg/kg	<0,01	<0,01	EPA 5021A
	1,4-Dichlorobenzene	mg/kg	<0,01	<0,01	EPA 5021A
	1,2-Dichlorobenzene	mg/kg	<0,01	<0,01	EPA 5021A
	1,2,4-Trichlorobenzene	mg/kg	<0,01	<0,01	EPA 5021A
	1,2,3-Trichlorobenzene	mg/kg	<0,01	<0,01	EPA 5021A
	Chloroethane	mg/kg	<0,01	<0,01	EPA 5021A
	Chloromethane	mg/kg	<0,01	<0,01	EPA 5021A
	Bromomethane	mg/kg	<0,01	<0,01	EPA 5021A
	Trichlorofluoromethane	mg/kg	<0,01	<0,01	EPA 5021A
	Bromobenzene	mg/kg	<0,01	<0,01	EPA 5021A
	Organochlorine pesticides:				
	p,p′-DDT	mg/kg	<0,001	<0,001	EPA 8270 C*
	o,p′-DDT	mg/kg	<0,001	<0,001	EPA 8270 C*
	p,p′-DDD	mg/kg	<0,001	<0,001	EPA 8270 C*

	p,p′-DDE	mg/kg	<0,001	<0,001	EPA 8270 C*
22.	Aromatic hydrocarbons (BTEX):				
	Benzene	mg/kg	<0,01	<0,01	EPA 5021 A
	Toluene	mg/kg	<0,01	<0,01	EPA 5021 A
	Ethylbenzene	mg/kg	<0,01	<0,01	EPA 5021 A
	m/p-Xylene	mg/kg	<0,01	<0,01	EPA 5021 A
	o-Xylene	mg/kg	<0,01	<0,01	EPA 5021 A
23.	Total Petroleum Hydrocarbon (TPH) (C10-C40)	mg/kg	49	39	ISO 16703:2004
24.	Polycyclic Aromatic Hydrocarbons:				
	Naphtalene	mg/kg	0,017±0,005	0,006±0,002	EPA 8270*
	2-Methylnaphtalene	mg/kg	0,024±0,007	0,017±0,005	EPA 8270*
	1-Methylnaphtalene	mg/kg	0,018±0,005	0,008±0,002	EPA 8270*
	Acenaphtylene	mg/kg	<0,005	<0,005	EPA 8270*
	Acenaphtene	mg/kg	0,074±0,013	<0,005	EPA 8270*
	Fluorene	mg/kg	0,039±0,006	0,005±0,001	EPA 8270*
	Phenanthrene	mg/kg	0,51±0,08	0,025±0,004	EPA 8270*
	Anthracene	mg/kg	0,12±0,01	<0,005	EPA 8270*

	Fluoranthene	mg/kg	1,1±0,2	0,043±0,007	EPA 8270*
	Pyrene	mg/kg	0,87±0,14	0,040±0,006	EPA 8270*
	Benzo(a)anthracene	mg/kg	0,66±0,09	0,029±0,004	EPA 8270*
	Chrysene	mg/kg	0,86±0,13	0,042±0,007	EPA 8270*
	Benzo(b)fluoranthene	mg/kg	1,6±0,2	0,055±0,008	EPA 8270*
	Benzo(k)fluoranthene	mg/kg	0,59±0,15	0,020±0,005	EPA 8270*
	Benzo(a)pyrene	mg/kg	1,0±0,1	0,036±0,005	EPA 8270*
	Indeno(1,2,3-cd)pyrene	mg/kg	1,6±0,3	0,053±0,008	EPA 8270*
	Dibenzo(a,h)anthracene	mg/kg	0,35±0,08	0,010±0,002	EPA 8270*
	Benzo(g,h,i)perylene	mg/kg	1,3±0,3	0,049±0,009	EPA 8270*
	ΣPAHs	mg/kg	11±2	0,44±0,08	EPA 8270*
25.	Polychlorinated biphenyls – PCB	mg/kg			
	PCB 18	mg/kg	<0,002	<0,002	EPA 8270 C*
	PCB 31	mg/kg	<0,002	<0,002	EPA 8270 C*
	PCB 28	mg/kg	<0,002	<0,002	EPA 8270 C*
	PCB 52	mg/kg	<0,002	<0,002	EPA 8270 C*
	PCB 44	mg/kg	<0,002	<0,002	EPA 8270 C*
	PCB 101	mg/kg	<0,002	<0,002	EPA 8270 C*
	PCB 149	mg/kg	<0,002	<0,002	EPA 8270 C*

	PCB 118	**mg/kg**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 153	**mg/kg**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 138	**mg/kg**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 180	**mg/kg**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 194	**mg/kg**	**<0,002**	**<0,002**	**EPA 8270 C***

* - accredited method

OPINION

According to the results of the physico-chemical analysis, the soil sample from the B37 borehole from 0-0.9 m depth (No. 743/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of chromium, nickel, fluorine and polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of the soil sample from the B37 borehole at a depth of 0-0.9 m (No. 743/04) observed in relation to the Dutch standard show that the content of barium, copper, nickel, cobalt and PAHs is above the lowest level (target value) which defines the quality of the unpolluted soil but below the intervention level, while according to the Italian standard, the results of the soil sample analysis show that the content of the fluorine is above the limit value for soil for industrial and commercial use.

According to the results of the physico-chemical analysis, soil samplefrom the borehole B37 from the depth of 0.9-1 m (No. 744/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to increased fluorine content in relation to the prescribed value.

The results of the physico-chemical analysis of the soil sample from the B37 borehole at a depth of 0.9-1 m (No. 744/04) observed in relation to the Dutch standard show that the content of all analyzed parameters is below the lowest value (target value) which defines the quality of unpolluted soil. According to the Italian standard, the results of the soil sample analysis show that the content of all the analyzed parameters is below the limit value pertaining to the soil for industrial and commercial use.

REPORT No. 00-1654/1

RESULTS OF ANALYSES

BOREHOLE			24		Method
Coordinates			600947.24 4695282.21		
Depth			0-0.5 m	0.5-1.0 m	
Protocol number			747/04	748/04	
Date of sampling			25.10.2017.	25.10.2017.	
No.	Parameter	Unit	Results	Results	

1.	Arsenic	mg/kg	15±1	6,2±0,6	EPA 3051A*
2.	Barium	mg/kg	181	34	EPA 3051A
3.	Cadmium	mg/kg	0,51±0,04	0,28±0,02	EPA 3051A*
4.	Total chromium	mg/kg	78±6	23±2	EPA 3051A*
5.	Copper	mg/kg	41±2	16±1	EPA 3051A*
6.	Mercury	mg/kg	0,10±0,02	0,09±0,01	AMA-112*
7.	Molybdenum	mg/kg	1,6±0,2	<1	EPA 3051A*
8.	Nickel	mg/kg	107±10	27±3	EPA 3051A*
9.	Lead	mg/kg	35±2	5,3±0,4	EPA 3051A*
10.	Antimony	mg/kg	<1	<1	EPA 3051A
11.	Selenium	mg/kg	<1	<1	EPA 3051A
12.	Zinc	mg/kg	88±3	25±1	EPA 3051A*
13.	Tin	mg/kg	1,9	<1	EPA 3051A
14.	Cobalt	mg/kg	20±3	4,4±0,6	EPA 3051A*
15.	Silver	mg/kg	<1	<1	EPA 3051A
16.	Manganese	mg/kg	1547±250	573±93	EPA 3051A*
17.	Vanadium	mg/kg	74	20	EPA 3051A
18.	Fluorine	mg/kg	8654	4485	AF-ISM
19.	Thallium	mg/kg	1,1	<1	EPA 3051A

20.	**Total cyanide (CN)**	**mg/kg**	**7**	**7,1**	**EPA 9010C**
21.	**Chlorinated Hydrocarbons (CHC)/(VOX):**				
	Chlorobenzene	**mg/kg**	**<0,01**	**<0,01**	**EPA 5021A**
	1,3-Dichlorobenzene	**mg/kg**	**<0,01**	**<0,01**	**EPA 5021A**
	1,4-Dichlorobenzene	**mg/kg**	**<0,01**	**<0,01**	**EPA 5021A**
	1,2-Dichlorobenzene	**mg/kg**	**<0,01**	**<0,01**	**EPA 5021A**
	1,2,4-Trichlorobenzene	**mg/kg**	**<0,01**	**<0,01**	**EPA 5021A**
	1,2,3-Trichlorobenzene	**mg/kg**	**<0,01**	**<0,01**	**EPA 5021A**
	Chloroethane	**mg/kg**	**<0,01**	**<0,01**	**EPA 5021A**
	Chloromethane	**mg/kg**	**<0,01**	**<0,01**	**EPA 5021A**
	Bromomethane	**mg/kg**	**<0,01**	**<0,01**	**EPA 5021A**
	Trichlorofluoromethane	**mg/kg**	**<0,01**	**<0,01**	**EPA 5021A**
	Bromobenzene	**mg/kg**	**<0,01**	**<0,01**	**EPA 5021A**
	Organochlorine pesticides:				
	***p,p′*-DDT**	**mg/kg**	**<0,001**	**<0,001**	**EPA 8270 C***
	***o,p′*-DDT**	**mg/kg**	**<0,001**	**<0,001**	**EPA 8270 C***
	***p,p′*-DDD**	**mg/kg**	**<0,001**	**<0,001**	**EPA 8270 C***
	***p,p′*-DDE**	**mg/kg**	**<0,001**	**<0,001**	**EPA 8270 C***
22.	**Aromatic hydrocarbons**				

	(BTEX):				
	Benzene	**mg/kg**	**<0,01**	**<0,01**	**EPA 5021 A**
	Toluene	**mg/kg**	**<0,01**	**<0,01**	**EPA 5021 A**
	Ethylbenzene	**mg/kg**	**<0,01**	**<0,01**	**EPA 5021 A**
	m/p-Xylene	**mg/kg**	**<0,01**	**<0,01**	**EPA 5021 A**
	o-Xylene	**mg/kg**	**<0,01**	**<0,01**	**EPA 5021 A**
23.	**Total Petroleum Hydrocarbon (TPH) (C10-C40)**	**mg/kg**	**35**	**26**	**ISO 16703:2004**
24.	**Polycyclic Aromatic Hydrocarbons:**				
	Naphtalene	**mg/kg**	**0,036±0,010**	**<0,005**	**EPA 8270***
	2-Methylnaphtalene	**mg/kg**	**0,022±0,006**	**<0,005**	**EPA 8270***
	1-Methylnaphtalene	**mg/kg**	**0,020±0,006**	**<0,005**	**EPA 8270***
	Acenaphtylene	**mg/kg**	**0,011±0,002**	**<0,005**	**EPA 8270***
	Acenaphtene	**mg/kg**	**0,15±0,03**	**0,005±0,001**	**EPA 8270***
	Fluorene	**mg/kg**	**0,083±0,014**	**<0,005**	**EPA 8270***
	Phenanthrene	**mg/kg**	**1,3±0,2**	**0,046±0,007**	**EPA 8270***
	Anthracene	**mg/kg**	**0,22±0,03**	**0,009±0,001**	**EPA 8270***
	Fluoranthene	**mg/kg**	**2,8±0,4**	**0,11±0,02**	**EPA 8270***
	Pyrene	**mg/kg**	**2,3±0,4**	**0,093±0,015**	**EPA 8270***

	Benzo(a)anthracene	mg/kg	1,8±0,2	0,059±0,008	EPA 8270*
	Chrysene	mg/kg	2,5±0,4	0,10±0,02	EPA 8270*
	Benzo(b)fluoranthene	mg/kg	6,0±0,9	0,13±0,02	EPA 8270*
	Benzo(k)fluoranthene	mg/kg	2,1±0,5	0,047±0,012	EPA 8270*
	Benzo(a)pyrene	mg/kg	3,5±0,4	0,078±0,010	EPA 8270*
	Indeno(1,2,3-cd)pyrene	mg/kg	5,2±0,8	0,10±0,02	EPA 8270*
	Dibenzo(a,h)anthracene	mg/kg	1,2±0,3	0,023±0,005	EPA 8270*
	Benzo(g,h,i)perylene	mg/kg	4,5±0,9	0,097±0,018	EPA 8270*
	ΣPAHs	mg/kg	34±6	0,90±0,16	EPA 8270*
25.	Polychlorinated biphenyls – PCB	mg/kg			
	PCB 18	mg/kg	<0,002	<0,002	EPA 8270 C*
	PCB 31	mg/kg	<0,002	<0,002	EPA 8270 C*
	PCB 28	mg/kg	<0,002	<0,002	EPA 8270 C*
	PCB 52	mg/kg	<0,002	<0,002	EPA 8270 C*
	PCB 44	mg/kg	<0,002	<0,002	EPA 8270 C*
	PCB 101	mg/kg	<0,002	<0,002	EPA 8270 C*
	PCB 149	mg/kg	<0,002	<0,002	EPA 8270 C*
	PCB 118	mg/kg	<0,002	<0,002	EPA 8270 C*
	PCB 153	mg/kg	<0,002	<0,002	EPA 8270 C*

	PCB 138	**mg/kg**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 180	**mg/kg**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 194	**mg/kg**	**<0,002**	**<0,002**	**EPA 8270 C***

* - accredited method

OPINION

According to the results of the physico-chemical analysis, the soil sample from the B24 borehole from 0-0.5 m depth (No. 747/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of chromium, nickel, fluorine and polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of the soil sample from the B24 borehole at a depth of 0-0.5 m (No. 747/04) observed in relation to the Dutch standard show that the content of barium, copper, nickel, cobalt and PAHs is above the lowest level (target value) which defines the quality of the unpolluted soil but below the intervention level, while according to the Italian standard, the results of the soil sample analysis show that the content of the fluorine is above the limit value for soil for industrial and commercial use.

According to the results of the physico-chemical analysis , the soil sample from the B24 borehole from 0.5-1 m depth (No. 748/04) **does not comply** to the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of fluorine and polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of the soil sample from the B24 borehole at a depth of 0.5-1 m (No. 748/04) observed in relation to the Dutch standard show that the content of all analyzed parameters is below the lowest level (target value) which defines the quality of the unpolluted soil. According to the Italian standard, the results of the soil sample analysis show that the content of all the analyzed parameters is below the limit value pertaining to the soil for industrial and commercial use.

REPORT No. 00-1654/1

RESULTS OF ANALYSES

BOREHOLE			27	26	Method
Coordinates			600903.26 4695345.34	600914.51 4695335.95	
Depth			0-0.4 m	0-0.5 m	
Protocol number			769/04	773/04	
Date of sampling			27.10.2017.	27.10.2017.	
No.	Parameter	Unit	Results	Results	
1.	Arsenic	mg/kg	12±1	17±2	EPA 3051A*

2.	Barium	mg/kg	168	241	EPA 3051A
3.	Cadmium	mg/kg	0,42±0,03	0,57±0,04	EPA 3051A*
4.	Total chromium	mg/kg	76±6	107±9	EPA 3051A*
5.	Copper	mg/kg	38±2	49±3	EPA 3051A*
6.	Mercury	mg/kg	0,07±0,01	0,11±0,02	AMA-112*
7.	Molybdenum	mg/kg	1,2±2	1,6±0,2	EPA 3051A*
8.	Nickel	mg/kg	93±9	145±14	EPA 3051A*
9.	Lead	mg/kg	34±2	37±3	EPA 3051A*
10.	Antimony	mg/kg	<1	<1	EPA 3051A
11.	Selenium	mg/kg	1,2	1,6	EPA 3051A
12.	Zinc	mg/kg	77±3	242±9	EPA 3051A*
13.	Tin	mg/kg	<1	2,2	EPA 3051A
14.	Cobalt	mg/kg	21±3	26±4	EPA 3051A*
15.	Silver	mg/kg	<1	<1	EPA 3051A
16.	Manganese	mg/kg	1735±281	1640±265	EPA 3051A*
17.	Vanadium	mg/kg	65	90	EPA 3051A
18.	Fluorine	mg/kg	763	957	AF-ISM
19.	Thallium	mg/kg	1,1	1,4	EPA 3051A
20.	Total cyanide (CN)	mg/kg	10,6	9,6	EPA 9010C

21.	**Chlorinated Hydrocarbons (CHC)/(VOX):**				
	Chlorobenzene	**mg/kg**	**<0,01**	**<0,01**	**EPA 5021A**
	1,3-Dichlorobenzene	**mg/kg**	**<0,01**	**<0,01**	**EPA 5021A**
	1,4-Dichlorobenzene	**mg/kg**	**<0,01**	**<0,01**	**EPA 5021A**
	1,2-Dichlorobenzene	**mg/kg**	**<0,01**	**<0,01**	**EPA 5021A**
	1,2,4-Trichlorobenzene	**mg/kg**	**<0,01**	**<0,01**	**EPA 5021A**
	1,2,3-Trichlorobenzene	**mg/kg**	**<0,01**	**<0,01**	**EPA 5021A**
	Chloroethane	**mg/kg**	**<0,01**	**<0,01**	**EPA 5021A**
	Chloromethane	**mg/kg**	**<0,01**	**<0,01**	**EPA 5021A**
	Bromomethane	**mg/kg**	**<0,01**	**<0,01**	**EPA 5021A**
	Trichlorofluoromethane	**mg/kg**	**<0,01**	**<0,01**	**EPA 5021A**
	Bromobenzene	**mg/kg**	**<0,01**	**<0,01**	**EPA 5021A**
	Organochlorine pesticides:				
	***p,p′*-DDT**	**mg/kg**	**<0,001**	**<0,001**	**EPA 8270 C***
	***o,p′*-DDT**	**mg/kg**	**<0,001**	**<0,001**	**EPA 8270 C***
	***p,p′*-DDD**	**mg/kg**	**<0,001**	**<0,001**	**EPA 8270 C***
	***p,p′*-DDE**	**mg/kg**	**<0,001**	**<0,001**	**EPA 8270 C***
22.	**Aromatic hydrocarbons (BTEX):**				

	Benzene	**mg/kg**	**<0,01**	**<0,01**	**EPA 5021 A**
	Toluene	**mg/kg**	**<0,01**	**<0,01**	**EPA 5021 A**
	Ethylbenzene	**mg/kg**	**<0,01**	**<0,01**	**EPA 5021 A**
	m/p-Xylene	**mg/kg**	**<0,01**	**<0,01**	**EPA 5021 A**
	o-Xylene	**mg/kg**	**<0,01**	**<0,01**	**EPA 5021 A**
23.	**Total Petroleum Hydrocarbon (TPH) (C10-C40)**	**mg/kg**	**<10**	**64**	**ISO 16703:2004**
24.	**Polycyclic Aromatic Hydrocarbons:**				
	Naphtalene	**mg/kg**	**0,014±0,004**	**0,013±0,004**	**EPA 8270***
	2-Methylnaphtalene	**mg/kg**	**0,006±0,002**	**0,011±0,003**	**EPA 8270***
	1-Methylnaphtalene	**mg/kg**	**0,005±0,001**	**0,009±0,002**	**EPA 8270***
	Acenaphtylene	**mg/kg**	**<0,005**	**<0,005**	**EPA 8270***
	Acenaphtene	**mg/kg**	**0,032±0,006**	**0,035±0,006**	**EPA 8270***
	Fluorene	**mg/kg**	**0,016±0,003**	**0,019±0,003**	**EPA 8270***
	Phenanthrene	**mg/kg**	**0,25±0,04**	**0,31±0,05**	**EPA 8270***
	Anthracene	**mg/kg**	**0,049±0,006**	**0,059±0,007**	**EPA 8270***
	Fluoranthene	**mg/kg**	**0,56±0,09**	**0,72±0,11**	**EPA 8270***
	Pyrene	**mg/kg**	**0,45±0,07**	**0,59±0,09**	**EPA 8270***
	Benzo(a)anthracene	**mg/kg**	**0,31±0,04**	**0,41±0,05**	**EPA 8270***

	Chrysene	mg/kg	0,48±0,07	0,57±0,09	EPA 8270*
	Benzo(b)fluoranthene	mg/kg	0,59±0,09	0,69±0,10	EPA 8270*
	Benzo(k)fluoranthene	mg/kg	0,22±0,05	0,25±0,06	EPA 8270*
	Benzo(a)pyrene	mg/kg	0,32±0,04	0,27±0,03	EPA 8270*
	Indeno(1,2,3-cd)pyrene	mg/kg	0,51±0,08	0,59±0,09	EPA 8270*
	Dibenzo(a,h)anthracene	mg/kg	0,025±0,006	0,030±0,007	EPA 8270*
	Benzo(g,h,i)perylene	mg/kg	0,45±0,09	0,50±0,10	EPA 8270*
	ΣPAHs	mg/kg	4,3±0,7	5,1±0,9	EPA 8270*
25.	Polychlorinated biphenyls – PCB	mg/kg			
	PCB 18	mg/kg	<0,002	<0,002	EPA 8270 C*
	PCB 31	mg/kg	<0,002	<0,002	EPA 8270 C*
	PCB 28	mg/kg	<0,002	<0,002	EPA 8270 C*
	PCB 52	mg/kg	<0,002	<0,002	EPA 8270 C*
	PCB 44	mg/kg	<0,002	<0,002	EPA 8270 C*
	PCB 101	mg/kg	<0,002	<0,002	EPA 8270 C*
	PCB 149	mg/kg	<0,002	<0,002	EPA 8270 C*
	PCB 118	mg/kg	<0,002	<0,002	EPA 8270 C*
	PCB 153	mg/kg	<0,002	<0,002	EPA 8270 C*
	PCB 138	mg/kg	<0,002	<0,002	EPA 8270 C*

	PCB 180	**mg/kg**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 194	**mg/kg**	**<0,002**	**<0,002**	**EPA 8270 C***

* - accredited method

OPINION

According to the results of the physico-chemical analysis , the sample of soil from the borehole B27 from 0-0.4 m depth (No. 769/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of chromium, nickel, fluorine and polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of the soil sample from the B27 borehole at a depth of 0-0.4 m (No. 769/04) observed in relation to the Dutch standard show that the content of barium, nickel, selenium, cobalt and PAHs is above the lowest level target value) which defines the quality of unpolluted soil but below the intervention level, while according to the Italian standard, the results of soil sample analysis show that the content of all the analyzed parameters is below the limit value referring to the soil for industrial and commercial use.

According to the results of the physico-chemical analysis , soil samples from the B26 borehole from 0-0.5 m depth (No. 773/04) do not comply with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of chromium, nickel, fluorine and polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of soil samples from the B26 borehole at a depth of 0-0.5 m (No. 773/04) observed in relation to the Dutch standard show that the content of barium, copper, nickel, selenium, zinc, cobalt, PAHs and total hydrocarbons (TPH) above the lowest level (target value) that defines the quality of unpolluted soil but below the intervention level, while according to the Italian standard, the results of soil sample analysis show that the content of all analyzed parameters is below the limit value related to the soil for industrial and commercial use.

REPORT No. 00-1654/1

RESULTS OF ANALYSES

BOREHOLE			25		Method
Coordinates			600929.94 4695316.84		
Depth			0-0.5 m	0.5-1.0 m	
Protocol number			777/04	778/04	
Date of sampling			27.10.2017.	27.10.2017.	
No.	Parameter	Unit	Results	Results	
1.	Arsenic	mg/kg	15±1	2,4±0,2	EPA 3051A*

2.	Barium	mg/kg	218	32	EPA 3051A
3.	Cadmium	mg/kg	0,76±0,06	0,26±0,02	EPA 3051A*
4.	Total chromium	mg/kg	91±7	25±2	EPA 3051A*
5.	Copper	mg/kg	43±2	15±1	EPA 3051A*
6.	Mercury	mg/kg	0,09±0,01	0,06±0,01	AMA-112*
7.	Molybdenum	mg/kg	1,4±0,2	<1	EPA 3051A*
8.	Nickel	mg/kg	117±11	26±2	EPA 3051A*
9.	Lead	mg/kg	37±3	6,1±0,4	EPA 3051A*
10.	Antimony	mg/kg	<1	<1	EPA 3051A
11.	Selenium	mg/kg	<1	<1	EPA 3051A
12.	Zinc	mg/kg	90±3	26±1	EPA 3051A*
13.	Tin	mg/kg	1,9	<1	EPA 3051A
14.	Cobalt	mg/kg	24±3	5,2±0,8	EPA 3051A*
15.	Silver	mg/kg	<1	<1	EPA 3051A
16.	Manganese	mg/kg	1916±310	450±73	EPA 3051A*
17.	Vanadium	mg/kg	78	19	EPA 3051A
18.	Fluorine	mg/kg	2452	370	AF-ISM
19.	Thallium	mg/kg	1,2	<1	EPA 3051A
20.	Total cyanide (CN)	mg/kg	9,6	9,6	EPA 9010C

21.	**Chlorinated Hydrocarbons (CHC)/(VOX):**				
	Chlorobenzene	**mg/kg**	**<0,01**	**<0,01**	**EPA 5021A**
	1,3-Dichlorobenzene	**mg/kg**	**<0,01**	**<0,01**	**EPA 5021A**
	1,4-Dichlorobenzene	**mg/kg**	**<0,01**	**<0,01**	**EPA 5021A**
	1,2-Dichlorobenzene	**mg/kg**	**<0,01**	**<0,01**	**EPA 5021A**
	1,2,4-Trichlorobenzene	**mg/kg**	**<0,01**	**<0,01**	**EPA 5021A**
	1,2,3-Trichlorobenzene	**mg/kg**	**<0,01**	**<0,01**	**EPA 5021A**
	Chloroethane	**mg/kg**	**<0,01**	**<0,01**	**EPA 5021A**
	Chloromethane	**mg/kg**	**<0,01**	**<0,01**	**EPA 5021A**
	Bromomethane	**mg/kg**	**<0,01**	**<0,01**	**EPA 5021A**
	Trichlorofluoromethane	**mg/kg**	**<0,01**	**<0,01**	**EPA 5021A**
	Bromobenzene	**mg/kg**	**<0,01**	**<0,01**	**EPA 5021A**
	Organochlorine pesticides:				
	***p,p′*-DDT**	**mg/kg**	**<0,001**	**<0,001**	**EPA 8270 C***
	***o,p′*-DDT**	**mg/kg**	**<0,001**	**<0,001**	**EPA 8270 C***
	***p,p′*-DDD**	**mg/kg**	**<0,001**	**<0,001**	**EPA 8270 C***
	***p,p′*-DDE**	**mg/kg**	**<0,001**	**<0,001**	**EPA 8270 C***
22.	**Aromatic hydrocarbons (BTEX):**				

	Benzene	**mg/kg**	**<0,01**	**<0,01**	**EPA 5021 A**
	Toluene	**mg/kg**	**<0,01**	**<0,01**	**EPA 5021 A**
	Ethylbenzene	**mg/kg**	**<0,01**	**<0,01**	**EPA 5021 A**
	m/p-Xylene	**mg/kg**	**<0,01**	**<0,01**	**EPA 5021 A**
	o-Xylene	**mg/kg**	**<0,01**	**<0,01**	**EPA 5021 A**
23.	**Total Petroleum Hydrocarbon (TPH) (C10-C40)**	**mg/kg**	**<10**	**669**	**ISO 16703:2004**
24.	**Polycyclic Aromatic Hydrocarbons:**				
	Naphtalene	**mg/kg**	**0,030±0,008**	**0,055±0,015**	**EPA 8270***
	2-Methylnaphtalene	**mg/kg**	**0,023±0,006**	**0,63±0,18**	**EPA 8270***
	1-Methylnaphtalene	**mg/kg**	**0,017±0,005**	**0,39±0,11**	**EPA 8270***
	Acenaphtylene	**mg/kg**	**0,006±0,001**	**<0,005**	**EPA 8270***
	Acenaphtene	**mg/kg**	**0,042±0,007**	**<0,005**	**EPA 8270***
	Fluorene	**mg/kg**	**0,032±0,005**	**0,025±0,004**	**EPA 8270***
	Phenanthrene	**mg/kg**	**0,42±0,06**	**0,13±0,02**	**EPA 8270***
	Anthracene	**mg/kg**	**0,062±0,008**	**0,030±0,004**	**EPA 8270***
	Fluoranthene	**mg/kg**	**0,94±0,14**	**0,10±0,02**	**EPA 8270***
	Pyrene	**mg/kg**	**0,67±0,105**	**0,16±0,02**	**EPA 8270***
	Benzo(a)anthracene	**mg/kg**	**0,47±0,06**	**0,060±0,008**	**EPA 8270***

	Chrysene	mg/kg	0,73±0,11	0,096±0,015	EPA 8270*
	Benzo(b)fluoranthene	mg/kg	0,80±0,12	0,12±0,02	EPA 8270*
	Benzo(k)fluoranthene	mg/kg	0,29±0,07	0,046±0,011	EPA 8270*
	Benzo(a)pyrene	mg/kg	0,12±0,02	0,051±0,007	EPA 8270*
	Indeno(1,2,3-cd)pyrene	mg/kg	0,58±0,09	0,089±0,014	EPA 8270*
	Dibenzo(a,h)anthracene	mg/kg	0,029±0,007	0,015±0,004	EPA 8270*
	Benzo(g,h,i)perylene	mg/kg	0,31±0,06	0,076±0,014	EPA 8270*
	ΣPAHs	mg/kg	5,6±1,0	2,1±0,4	EPA 8270*
25.	Polychlorinated biphenyls – PCB	mg/kg			
	PCB 18	mg/kg	<0,002	<0,002	EPA 8270 C*
	PCB 31	mg/kg	<0,002	<0,002	EPA 8270 C*
	PCB 28	mg/kg	<0,002	<0,002	EPA 8270 C*
	PCB 52	mg/kg	<0,002	<0,002	EPA 8270 C*
	PCB 44	mg/kg	<0,002	<0,002	EPA 8270 C*
	PCB 101	mg/kg	<0,002	<0,002	EPA 8270 C*
	PCB 149	mg/kg	<0,002	<0,002	EPA 8270 C*
	PCB 118	mg/kg	<0,002	<0,002	EPA 8270 C*
	PCB 153	mg/kg	<0,002	<0,002	EPA 8270 C*
	PCB 138	mg/kg	<0,002	<0,002	EPA 8270 C*

	PCB 180	**mg/kg**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 194	**mg/kg**	**<0,002**	**<0,002**	**EPA 8270 C***

* - accredited method

OPINION

According to the results of the physico-chemical analysis, the soil sample from the B25 borehole from 0-0.5 m depth (No. 777/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of fluorine and polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of the soil sample from the B25 borehole at a depth of 0-0.5 m (No. 777/04) observed in relation to the Dutch standard show that the content of barium, copper, nickel, cobalt and PAHs is above the lowest level (target value) which defines the quality of the unpolluted soil but below the intervention level, while according to the Italian standard, the results of the soil sample analysis show that the content of the fluorine is above the limit value for soil for industrial and commercial use.

According to the results of the physico-chemical analysis , the sample of soil from the borehole B25 at a depth of 0.5-1 m (No.. 778/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of soil samples from the B25 borehole at a depth of 0.5-1 m (No. 778/04) observed in relation to the Dutch standard show that the content of PAHs and total hydrocarbons (TPH) is above the lowest level(target value) which defines the quality of unpolluted soil but below the intervention level, while according to the Italian standard, the results of the soil sample analysis show that the content of all the analyzed parameters is below the limit value referring to the soil for industrial and commercial use.

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RESULTS OF ANALYSES

BOREHOLE			11	28	29	Method
Coordinates			600972.93 4695288.13	600853.23 4695382.95	600812.14 4695377.36	
Depth			0-0.6 m	0-0.4 m	0-0.4 m	
Protocol number			781/04	785/04	789/04	
Date of sampling			27.10.2017.	27.10.2017.	27.10.2017.	
No.	Parameter	Unit	Results	Results	Results	
1.	Arsenic	mg/kg	13±1	11±1	9±1	EPA 3051A*
2.	Barium	mg/kg	174	143	110	EPA 3051A

3.	Cadmium	mg/kg	0,60±0,04	0,69±0,05	0,58±0,04	EPA 3051A*
4.	Total chromium	mg/kg	91±7	67±5	64±5	EPA 3051A*
5.	Copper	mg/kg	39±2	32±2	33±2	EPA 3051A*
6.	Mercury	mg/kg	0,07±0,01	0,09±0,01	0,09±0,01	AMA-112*
7.	Molybdenum	mg/kg	1,3±0,2	1,2±0,2	<1	EPA 3051A*
8.	Nickel	mg/kg	99±10	75±7	76±7	EPA 3051A*
9.	Lead	mg/kg	36±3	35±3	20±1	EPA 3051A*
10.	Antimony	mg/kg	<1	<1	<1	EPA 3051A
11.	Selenium	mg/kg	1,4	<1	<1	EPA 3051A
12.	Zinc	mg/kg	93±3	73±3	64±2	EPA 3051A*
13.	Tin	mg/kg	1,8	1,4	1,1	EPA 3051A
14.	Cobalt	mg/kg	20±3	18±3	14±2	EPA 3051A*
15.	Silver	mg/kg	<1	<1	<1	EPA 3051A
16.	Manganese	mg/kg	1580±255	1568±254	1210±196	EPA 3051A*
17.	Vanadium	mg/kg	75	61	50	EPA 3051A
18.	Fluorine	mg/kg	848	752	1227	AF-ISM
19.	Thallium	mg/kg	1,2	<1	<1	EPA 3051A
20.	Total cyanide (CN)	mg/kg	8,1	8,3	8	EPA 9010C
21.	Chlorinated Hydrocarbons (CHC)/(VOX):					

	Chlorobenzene	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021A**
	1,3-Dichlorobenzene	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021A**
	1,4-Dichlorobenzene	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021A**
	1,2-Dichlorobenzene	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021A**
	1,2,4-Trichlorobenzene	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021A**
	1,2,3-Trichlorobenzene	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021A**
	Chloroethane	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021A**
	Chloromethane	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021A**
	Bromomethane	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021A**
	Trichlorofluoromethane	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021A**
	Bromobenzene	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021A**
	Organochlorine pesticides:					
	***p,p′*-DDT**	**mg/kg**	**<0,001**	**<0,001**	**<0,001**	**EPA 8270 C***
	***o,p′*-DDT**	**mg/kg**	**<0,001**	**<0,001**	**<0,001**	**EPA 8270 C***
	***p,p′*-DDD**	**mg/kg**	**<0,001**	**<0,001**	**<0,001**	**EPA 8270 C***
	***p,p′*-DDE**	**mg/kg**	**<0,001**	**<0,001**	**<0,001**	**EPA 8270 C***
22.	**Aromatic hydrocarbons (BTEX):**					
	Benzene	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021 A**
	Toluene	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021 A**

	Ethylbenzene	mg/kg	<0,01	<0,01	<0,01	EPA 5021 A
	m/p-Xylene	mg/kg	<0,01	<0,01	<0,01	EPA 5021 A
	o-Xylene	mg/kg	<0,01	<0,01	<0,01	EPA 5021 A
23.	Total Petroleum Hydrocarbon (TPH) (C10-C40)	mg/kg	28	20	<10	ISO 16703:2004
24.	Polycyclic Aromatic Hydrocarbons:					
	Naphtalene	mg/kg	0,046±0,013	0,032±0,009	0,007±0,002	EPA 8270*
	2-Methylnaphtalene	mg/kg	0,031±0,009	0,026±0,007	0,005±0,001	EPA 8270*
	1-Methylnaphtalene	mg/kg	0,027±0,007	0,021±0,006	<0,005	EPA 8270*
	Acenaphtylene	mg/kg	0,005±0,001	0,005±0,001	<0,005	EPA 8270*
	Acenaphtene	mg/kg	0,21±0,04	0,091±0,016	<0,005	EPA 8270*
	Fluorene	mg/kg	0,12±0,02	0,059±0,010	<0,005	EPA 8270*
	Phenanthrene	mg/kg	1,8±0,3	0,92±0,14	0,020±0,003	EPA 8270*
	Anthracene	mg/kg	0,34±0,04	0,16±0,02	<0,005	EPA 8270*
	Fluoranthene	mg/kg	3,6±0,5	2,0±0,3	0,032±0,005	EPA 8270*
	Pyrene	mg/kg	2,9±0,5	1,6±0,2	0,030±0,005	EPA 8270*
	Benzo(a)anthracene	mg/kg	2,2±0,3	1,1±0,2	0,015±0,002	EPA 8270*
	Chrysene	mg/kg	2,8±0,4	1,6±0,2	0,034±0,005	EPA 8270*
	Benzo(b)fluoranthene	mg/kg	3,1±0,5	1,9±0,3	0,034±0,005	EPA 8270*

	Benzo(k)fluoranthene	mg/kg	1,1±0,3	0,63±0,16	0,015±0,004	EPA 8270*
	Benzo(a)pyrene	mg/kg	1,8±0,2	0,67±0,09	0,015±0,002	EPA 8270*
	Indeno(1,2,3-cd)pyrene	mg/kg	2,9±0,5	1,6±0,3	0,034±0,005	EPA 8270*
	Dibenzo(a,h)anthracene	mg/kg	0,13±0,03	0,083±0,020	0,006±0,001	EPA 8270*
	Benzo(g,h,i)perylene	mg/kg	2,5±0,5	1,3±0,2	0,034±0,006	EPA 8270*
	ΣPAHs	mg/kg	26±4	14±2	0,28±0,05	EPA 8270*
25.	Polychlorinated biphenyls – PCB	mg/kg				
	PCB 18	mg/kg	<0,002	<0,002	<0,002	EPA 8270 C*
	PCB 31	mg/kg	<0,002	<0,002	<0,002	EPA 8270 C*
	PCB 28	mg/kg	<0,002	<0,002	<0,002	EPA 8270 C*
	PCB 52	mg/kg	<0,002	<0,002	<0,002	EPA 8270 C*
	PCB 44	mg/kg	<0,002	<0,002	<0,002	EPA 8270 C*
	PCB 101	mg/kg	<0,002	<0,002	<0,002	EPA 8270 C*
	PCB 149	mg/kg	<0,002	<0,002	<0,002	EPA 8270 C*
	PCB 118	mg/kg	<0,002	<0,002	<0,002	EPA 8270 C*
	PCB 153	mg/kg	<0,002	<0,002	<0,002	EPA 8270 C*
	PCB 138	mg/kg	<0,002	<0,002	<0,002	EPA 8270 C*
	PCB 180	mg/kg	<0,002	<0,002	<0,002	EPA 8270 C*
	PCB 194	mg/kg	<0,002	<0,002	<0,002	EPA 8270 C*

* - accredited method

OPINION

According to the results of the physico-chemical analysis , the soil sample from the B11 borehole from 0-0.6 m depth (No. 781/04) **does not comply** with the requirements of the Rulebook on the permitted amount of dangerous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of chromium, nickel, fluorine and polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of the soil sample from the B11 borehole from 0-0.6 m depth (No. 781/04) observed in relation to the Dutch standard show that the content of barium, copper, nickel, selenium, cobalt and PAHs is above the lowest level (target value), which defines the quality of the unpolluted soil but below the intervention level, while according to the Italian standard, the results of soil sample analysis show that the content of all the analyzed parameters is below the limit value for the soil for industrial and commercial use.

According to the results of the physico-chemical analysis, soil samplefrom the borehole B28 from the depth 0-0.4 m (No. 785/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of chromium, nickel, fluorine and polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of soil samples from the B28 borehole at 0-0.4 m depth (No. 785/04) observed in relation to the Dutch standard show that the content of nickel, cobalt and PAHs is above the lowest level (target value) which defines the quality of the unpolluted soil, but below the intervention level, while according to the Italian standard, the results of the soil sample analysis show that the content of all the analyzed parameters is below the limit value referring to the soil for industrial and commercial use.

According to the results of the physico-chemical analysis , the soil sample from the B29 borehole from 0-0.4 m depth (No. 789/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of chromium, nickel and fluorine in relation to the prescribed value.

The results of the physico-chemical analysis of soil samples from the B29 borehole at 0-0.4 m depth (No. 789/04) observed in relation to the Dutch standard show that the content of nickel and cobalt is above the lowest level (target value), which defines the quality of the unpolluted but below the intervention level, while according to the Italian standard, the results of the soil sample analysis show that the content of all analyzed parameters is below the limit value for the soil for industrial and commercial use.

RESULTS OF ANALYSES

BOREHOLE			16	4	3	Method
Coordinates			600778.25 4695426.31	600796.02 4695456.12	601027.06 4695354.24	
Depth			0-0.4 m	0-0.4 m	0-0.5 m	
Protocol number			793/04	797/04	804/04	
Date of sampling			27.10.2017.	27.10.2017.	27.10.2017.	
No.	Parameter	Unit	Results	Results	Results	
1.	Arsenic	mg/kg	15±1	14±1	12±1	EPA 3051A*
2.	Barium	mg/kg	179	174	160	EPA 3051A
3.	Cadmium	mg/kg	0,73±0,05	0,68±0,05	0,67±0,05	EPA 3051A*
4.	Total chromium	mg/kg	95±8	94±8	67±5	EPA 3051A*
5.	Copper	mg/kg	43±2	48±2	36±2	EPA 3051A*

6.	Mercury	mg/kg	0,08±0,01	0,12±0,02	0,07±0,01	AMA-112*
7.	Molybdenum	mg/kg	1,4±0,2	1,1±0,2	1,2±0,2	EPA 3051A*
8.	Nickel	mg/kg	119±12	131±13	77±7	EPA 3051A*
9.	Lead	mg/kg	34±2	34±2	35±2	EPA 3051A*
10.	Antimony	mg/kg	<1	<1	<1	EPA 3051A
11.	Selenium	mg/kg	1,5	1,4	1,1	EPA 3051A
12.	Zinc	mg/kg	86±3	84±3	80±3	EPA 3051A*
13.	Tin	mg/kg	1,7	1,4	2,2	EPA 3051A
14.	Cobalt	mg/kg	25±4	26±4	19±3	EPA 3051A*
15.	Silver	mg/kg	<1	<1	<1	EPA 3051A
16.	Manganese	mg/kg	1657±268	1473±238	1380±223	EPA 3051A*
17.	Vanadium	mg/kg	78	70	62	EPA 3051A
18.	Fluorine	mg/kg	788	735	762	AF-ISM
19.	Thallium	mg/kg	1,1	<1	<1	EPA 3051A
20.	Total cyanide (CN)	mg/kg	8,1	9,5	9,3	EPA 9010C
21.	Chlorinated Hydrocarbons (CHC)/(VOX):					
	Chlorobenzene	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	1,3-Dichlorobenzene	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	1,4-Dichlorobenzene	mg/kg	<0,01	<0,01	<0,01	EPA 5021A

	1,2-Dichlorobenzene	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	1,2,4-Trichlorobenzene	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	1,2,3-Trichlorobenzene	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	Chloroethane	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	Chloromethane	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	Bromomethane	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	Trichlorofluoromethane	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	Bromobenzene	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	Organochlorine pesticides:					
	p,p′-DDT	mg/kg	<0,001	<0,001	<0,001	EPA 8270 C*
	o,p′-DDT	mg/kg	<0,001	<0,001	<0,001	EPA 8270 C*
	p,p′-DDD	mg/kg	<0,001	<0,001	<0,001	EPA 8270 C*
	p,p′-DDE	mg/kg	<0,001	<0,001	<0,001	EPA 8270 C*
22.	Aromatic hydrocarbons (BTEX):					
	Benzene	mg/kg	<0,01	<0,01	<0,01	EPA 5021 A
	Toluene	mg/kg	<0,01	<0,01	<0,01	EPA 5021 A
	Ethylbenzene	mg/kg	<0,01	<0,01	<0,01	EPA 5021 A
	m/p-Xylene	mg/kg	<0,01	<0,01	<0,01	EPA 5021 A
	o-Xylene	mg/kg	<0,01	<0,01	<0,01	EPA 5021 A

23.	Total Petroleum Hydrocarbon (TPH) (C10-C40)	mg/kg	<10	352	422	ISO 16703:2004
24.	Polycyclic Aromatic Hydrocarbons:					
	Naphtalene	mg/kg	0,005±0,001	0,041±0,011	2,2±0,61	EPA 8270*
	2-Methylnaphtalene	mg/kg	<0,005	0,16±0,04	2,0±0,5	EPA 8270*
	1-Methylnaphtalene	mg/kg	<0,005	0,093±0,026	1,5±0,4	EPA 8270*
	Acenaphtylene	mg/kg	<0,005	<0,005	0,16±0,03	EPA 8270*
	Acenaphtene	mg/kg	<0,005	0,026±0,005	5,4±1,0	EPA 8270*
	Fluorene	mg/kg	<0,005	0,041±0,007	3,8±0,6	EPA 8270*
	Phenanthrene	mg/kg	0,012±0,002	0,22±0,03	40±6	EPA 8270*
	Anthracene	mg/kg	<0,005	0,028±0,003	5,9±0,7	EPA 8270*
	Fluoranthene	mg/kg	0,018±0,003	0,43±0,07	55±8	EPA 8270*
	Pyrene	mg/kg	0,013±0,002	0,36±0,06	39±6	EPA 8270*
	Benzo(a)anthracene	mg/kg	0,010±0,001	0,25±0,03	26±3	EPA 8270*
	Chrysene	mg/kg	0,023±0,004	0,38±0,06	32±5	EPA 8270*
	Benzo(b)fluoranthene	mg/kg	0,021±0,003	0,41±0,06	41±6	EPA 8270*
	Benzo(k)fluoranthene	mg/kg	0,009±0,002	0,15±0,04	14±3	EPA 8270*
	Benzo(a)pyrene	mg/kg	0,005±0,001	0,14±0,02	26±3	EPA 8270*
	Indeno(1,2,3-cd)pyrene	mg/kg	<0,005	0,35±0,05	33±5	EPA 8270*

	Dibenzo(a,h)anthracene	mg/kg	<0,005	0,017±0,004	3,9±0,9	EPA 8270*
	Benzo(g,h,i)perylene	mg/kg	0,008±0,002	0,30±0,06	27±5	EPA 8270*
	ΣPAHs	mg/kg	0,12±0,02	3,4±0,6	356±62	EPA 8270*
25.	Polychlorinated biphenyls – PCB	mg/kg				
	PCB 18	mg/kg	<0,002	<0,002	<0,002	EPA 8270 C*
	PCB 31	mg/kg	<0,002	<0,002	<0,002	EPA 8270 C*
	PCB 28	mg/kg	<0,002	<0,002	<0,002	EPA 8270 C*
	PCB 52	mg/kg	<0,002	<0,002	<0,002	EPA 8270 C*
	PCB 44	mg/kg	<0,002	<0,002	<0,002	EPA 8270 C*
	PCB 101	mg/kg	<0,002	<0,002	<0,002	EPA 8270 C*
	PCB 149	mg/kg	<0,002	<0,002	<0,002	EPA 8270 C*
	PCB 118	mg/kg	<0,002	<0,002	<0,002	EPA 8270 C*
	PCB 153	mg/kg	<0,002	<0,002	<0,002	EPA 8270 C*
	PCB 138	mg/kg	<0,002	<0,002	<0,002	EPA 8270 C*
	PCB 180	mg/kg	<0,002	<0,002	<0,002	EPA 8270 C*
	PCB 194	mg/kg	<0,002	<0,002	<0,002	EPA 8270 C*

* - accredited method

OPINION

According to the results of the physico-chemical analysis, the sample of soil from the borehole B16 from 0-0.4 m depth (No. 793/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of chromium, nickel and fluorine in relation to the prescribed value.

The results of the physico-chemical analysis of the soil sample from the B16 borehole at a depth of 0-0.4 m (No. 793/04) observed in relation to the Dutch standard show that the content of barium, copper, nickel, selenium and cobalt is above the lowest level) which defines the quality of unpolluted soil but below the intervention level, while according to the Italian standard, the results of the soil sample analysis show that the content of all the analyzed parameters is below the limit value referring to the soil for industrial and commercial use.

According to the results of the physico-chemical analysis , the soil sample from the B4 borehole from 0-0.4 m depth (No. 797/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of chromium, nickel, fluorine and polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of soil samples from the B4 borehole at 0-0.4 m depth (No. 797/04) observed in relation to the Dutch standard show that the content of barium, copper, nickel, cobalt, PAHs and total hydrocarbons (TPH) above the lowest level (target value) that defines the quality of the unpolluted soil but below the intervention level, while according to the Italian standard, the results of the soil sample analysis show that the content of all the analyzed parameters is below the limit value referring to the soil for industrial and commercial use.

According to the results of the physico-chemical analysis, the soil sample from the B3 borehole from 0-0.5 m depth (No. 804/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of chromium, nickel, fluorine and polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of soil samples from the B3 borehole from 0-0.5 m depth (No. 804/04) observed in relation to the Dutch standard show that the content of nickel, selenium, zinc, cobalt and total hydrocarbons (TPH) above the lowest level (target value,) which defines the quality of the unpolluted soil but below the intervention level, while the PAH content is above the intervention level. According to the Italian standard, the results of soil sample analysis show that the content of PAHs is above the soil-use limit for industrial and commercial use.

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RESULTS OF ANALYSES

BOREHOLE			14	15	13	Method
Coordinates			600942.85 4695392.69	600863.46 4695421.87	600954.94 4695387.64	
Depth			0-0.5 m	0-1 m	0-0.4 m	
Protocol number			811/04	815/04	819/04	
Date of sampling			27.10.2017.	27.10.2017.	27.10.2017.	
No.	Parameter	Unit	Results	Results	Results	
1.	Arsenic	mg/kg	14±1	15±1	14±1	EPA 3051A*
2.	Barium	mg/kg	195	201	195	EPA 3051A
3.	Cadmium	mg/kg	0,64±0,04	0,45±0,03	0,59±0,04	EPA 3051A*
4.	Total chromium	mg/kg	76±6	96±8	101±8	EPA 3051A*
5.	Copper	mg/kg	40±2	44±2	44±2	EPA 3051A*
6.	Mercury	mg/kg	0,38±0,06	0,06±0,01	0,07±0,01	AMA-112*
7.	Molybdenum	mg/kg	1,4±0,2	1,3±0,2	1,4±0,2	EPA 3051A*
8.	Nickel	mg/kg	84±8	129±13	110±11	EPA 3051A*

9.	Lead	mg/kg	39±3	32±2	38±3	EPA 3051A*
10.	Antimony	mg/kg	<1	<1	<1	EPA 3051A
11.	Selenium	mg/kg	1,6	1,4	1,8	EPA 3051A
12.	Zinc	mg/kg	79±3	90±3	98±4	EPA 3051A*
13.	Tin	mg/kg	1,7	1,7	2	EPA 3051A
14.	Cobalt	mg/kg	23±3	25±3	24±3	EPA 3051A*
15.	Silver	mg/kg	<1	<1	<1	EPA 3051A
16.	Manganese	mg/kg	1865±302	1468±237	1746±282	EPA 3051A*
17.	Vanadium	mg/kg	71	80	89	EPA 3051A
18.	Fluorine	mg/kg	950	731	1115	AF-ISM
19.	Thallium	mg/kg	<1	1,1	1,6	EPA 3051A
20.	Total cyanide (CN)	mg/kg	8,3	8,1	8,3	EPA 9010C
21.	Chlorinated Hydrocarbons (CHC)/(VOX):					
	Chlorobenzene	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	1,3-Dichlorobenzene	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	1,4-Dichlorobenzene	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	1,2-Dichlorobenzene	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	1,2,4-Trichlorobenzene	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	1,2,3-Trichlorobenzene	mg/kg	<0,01	<0,01	<0,01	EPA 5021A

	Chloroethane	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021A**
	Chloromethane	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021A**
	Bromomethane	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021A**
	Trichlorofluoromethane	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021A**
	Bromobenzene	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021A**
	Organochlorine pesticides:					
	***p,p′*-DDT**	**mg/kg**	**<0,001**	**<0,001**	**<0,001**	**EPA 8270 C***
	***o,p′*-DDT**	**mg/kg**	**<0,001**	**<0,001**	**<0,001**	**EPA 8270 C***
	***p,p′*-DDD**	**mg/kg**	**<0,001**	**<0,001**	**<0,001**	**EPA 8270 C***
	***p,p′*-DDE**	**mg/kg**	**<0,001**	**<0,001**	**<0,001**	**EPA 8270 C***
22.	**Aromatic hydrocarbons (BTEX):**					
	Benzene	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021 A**
	Toluene	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021 A**
	Ethylbenzene	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021 A**
	m/p-Xylene	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021 A**
	o-Xylene	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021 A**
23.	**Total Petroleum Hydrocarbon (TPH) (C10-C40)**	**mg/kg**	**12**	**121**	**32**	**ISO 16703:2004**

24.	Polycyclic Aromatic Hydrocarbons:					
	Naphtalene	mg/kg	0,013±0,004	0,013±0,004	0,029±0,008	EPA 8270*
	2-Methylnaphtalene	mg/kg	0,007±0,002	0,058±0,016	0,020±0,006	EPA 8270*
	1-Methylnaphtalene	mg/kg	0,006±0,002	0,036±0,010	0,020±0,006	EPA 8270*
	Acenaphtylene	mg/kg	<0,005	<0,005	0,007±0,001	EPA 8270*
	Acenaphtene	mg/kg	0,037±0,007	0,019±0,003	0,18±0,03	EPA 8270*
	Fluorene	mg/kg	0,017±0,003	0,022±0,004	0,092±0,015	EPA 8270*
	Phenanthrene	mg/kg	0,33±0,05	0,18±0,03	1,7±0,3	EPA 8270*
	Anthracene	mg/kg	0,056±0,007	0,024±0,003	0,28±0,03	EPA 8270*
	Fluoranthene	mg/kg	1,0±0,2	0,41±0,06	4,2±0,6	EPA 8270*
	Pyrene	mg/kg	0,81±0,13	0,34±0,05	3,5±0,5	EPA 8270*
	Benzo(a)anthracene	mg/kg	0,57±0,08	0,22±0,03	2,7±0,4	EPA 8270*
	Chrysene	mg/kg	0,70±0,11	0,28±0,04	3,5±0,5	EPA 8270*
	Benzo(b)fluoranthene	mg/kg	0,96±0,15	0,42±0,06	4,1±0,6	EPA 8270*
	Benzo(k)fluoranthene	mg/kg	0,35±0,09	0,16±0,04	1,5±0,4	EPA 8270*
	Benzo(a)pyrene	mg/kg	0,27±0,03	0,20±0,03	2,2±0,3	EPA 8270*
	Indeno(1,2,3-cd)pyrene	mg/kg	0,82±0,13	0,30±0,05	4,0±0,6	EPA 8270*
	Dibenzo(a,h)anthracene	mg/kg	0,20±0,05	0,061±0,014	0,22±0,05	EPA 8270*
	Benzo(g,h,i)perylene	mg/kg	0,69±0,13	0,28±0,05	3,2±0,6	EPA 8270*

	ΣPAHs	**mg/kg**	**6,8±1,2**	**3,0±0,5**	**31±5**	**EPA 8270***
25.	**Polychlorinated biphenyls – PCB**	**mg/kg**				
	PCB 18	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 31	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 28	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 52	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 44	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 101	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 149	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 118	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 153	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 138	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 180	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 194	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***

* - accredited method

OPINION

According to the results of the physico-chemical analysis, the sample of soil from the borehole B14 from 0-0.5 m depth (No. 811/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of chromium, nickel, fluorine and polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

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The results of the physico-chemical analysis of soil samples from the B14 borehole at a depth of 0-0.5 m (No. 811/04) observed in relation to the Dutch standard show that the content of barium, copper, mercury, nickel, selenium, cobalt and PAHs above the lowest level (target value) which defines the quality of the unpolluted soil but below the intervention level, while according to the Italian standard, the results of soil sample analysis show that the content of all the analyzed parameters is below the limit value for the soil for industrial and commercial use.

According to the results of the physico-chemical analysis , the sample of soil from the borehole B15 from 0-1 m depth (No. 815/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of chromium, nickel, fluorine and polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of the soil sample from the B15 borehole at a depth of 0-1 m (No. 815/04) observed in relation to the Dutch standard show that the content of barium, copper, nickel, selenium, cobalt, PAHs and total hydrocarbons (TPH) is above the lowest level (target value) that defines the quality of the unpolluted soil but below the intervention level, while according to the Italian standard, the results of the soil sample analysis show that the content of all the analyzed parameters is below the limit values for soil for industrial and commercial use .

According to the results of the physico-chemical analysis , the soil sample from the B13 borehole from 0-0.4 m depth (No. 819/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of chromium, nickel, fluorine and polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of the soil sample from the B13 borehole at 0-0.4 m depth (No. 819/04) observed in relation to the Dutch standard show that the content of barium, copper, nickel, selenium, cobalt and PAHs is above the lowest of the target value, which defines the quality of the unpolluted soil, but below the intervention level, while according to the Italian standard, the results of soil sample analysis show that the content of all the analyzed parameters is below the limit value referring to the soil for industrial and commercial use.

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RESULTS OF ANALYSES

BOREHOLE			12	40	41	Method
Coordinates			600970.04 4695345.64	600817.11 4695329.66	600845.11 4695265.85	
Depth			0-0.4 m	0-0.4 m	0-0.5 m	
Protocol number			823/04	827/04	831/04	
Date of sampling			27.10.2017.	27.10.2017.	27.10.2017.	
No.	Parameter	Unit	Results	Results	Results	
1.	Arsenic	mg/kg	11±1	13±1	14±1	EPA 3051A*
2.	Barium	mg/kg	152	180	209	EPA 3051A
3.	Cadmium	mg/kg	0,68±0,05	0,73±0,05	0,52±0,04	EPA 3051A*
4.	Total chromium	mg/kg	77±6	73±6	88±7	EPA 3051A*
5.	Copper	mg/kg	34±2	36±2	39±2	EPA 3051A*
6.	Mercury	mg/kg	0,04±0,01	0,07±0,01	0,05±0,01	AMA-112*
7.	Molybdenum	mg/kg	<1	1,1±0,1	1,4±0,2	EPA 3051A*
8.	Nickel	mg/kg	85±8	85±8	112±11	EPA 3051A*
9.	Lead	mg/kg	32±2	33±2	34±2	EPA 3051A*
10.	Antimony	mg/kg	<1	<1	<1	EPA 3051A
11.	Selenium	mg/kg	<1	<1	1,5	EPA 3051A

12.	Zinc	mg/kg	78±3	70±3	89±4	EPA 3051A*
13.	Tin	mg/kg	1,6	1,5	1,9	EPA 3051A
14.	Cobalt	mg/kg	18±3	22±3	22±3	EPA 3051A*
15.	Silver	mg/kg	<1	<1	<1	EPA 3051A
16.	Manganese	mg/kg	1396±226	1654±260	1497±240	EPA 3051A*
17.	Vanadium	mg/kg	62	61	80	EPA 3051A
18.	Fluorine	mg/kg	755	814	830	AF-ISM
19.	Thallium	mg/kg	<1	<1	1,3	EPA 3051A
20.	Total cyanide (CN)	mg/kg	8,5	8,4	8,3	EPA 9010C
21.	Chlorinated Hydrocarbons (CHC)/(VOX):					
	Chlorobenzene	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	1,3-Dichlorobenzene	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	1,4-Dichlorobenzene	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	1,2-Dichlorobenzene	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	1,2,4-Trichlorobenzene	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	1,2,3-Trichlorobenzene	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	Chloroethane	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	Chloromethane	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	Bromomethane	mg/kg	<0,01	<0,01	<0,01	EPA 5021A

	Trichlorofluoromethane	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021A**
	Bromobenzene	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021A**
	Organochlorine pesticides:					
	***p,p′*-DDT**	**mg/kg**	**<0,001**	**<0,001**	**<0,001**	**EPA 8270 C***
	***o,p′*-DDT**	**mg/kg**	**<0,001**	**<0,001**	**<0,001**	**EPA 8270 C***
	***p,p′*-DDD**	**mg/kg**	**<0,001**	**<0,001**	**<0,001**	**EPA 8270 C***
	***p,p′*-DDE**	**mg/kg**	**<0,001**	**<0,001**	**<0,001**	**EPA 8270 C***
22.	**Aromatic hydrocarbons (BTEX):**					
	Benzene	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021 A**
	Toluene	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021 A**
	Ethylbenzene	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021 A**
	m/p-Xylene	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021 A**
	o-Xylene	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021 A**
23.	**Total Petroleum Hydrocarbon (TPH) (C10-C40)**	**mg/kg**	**102**	**<10**	**45**	**ISO 16703:2004**
24.	**Polycyclic Aromatic Hydrocarbons:**					
	Naphtalene	**mg/kg**	**0,034±0,009**	**0,007±0,002**	**0,013±0,004**	**EPA 8270***
	2-Methylnaphtalene	**mg/kg**	**0,022±0,006**	**<0,005**	**0,014±0,004**	**EPA 8270***

	1-Methylnaphtalene	mg/kg	0,035±0,010	<0,005	0,009±0,002	EPA 8270*
	Acenaphtylene	mg/kg	0,009±0,001	<0,005	<0,005	EPA 8270*
	Acenaphtene	mg/kg	0,44±0,08	0,024±0,004	0,025±0,004	EPA 8270*
	Fluorene	mg/kg	0,17±0,03	0,014±0,002	0,016±0,003	EPA 8270*
	Phenanthrene	mg/kg	4,3±0,7	0,23±0,03	0,23±0,04	EPA 8270*
	Anthracene	mg/kg	0,60±0,07	0,052±0,006	0,040±0,005	EPA 8270*
	Fluoranthene	mg/kg	8,8±1,3	0,52±0,08	0,51±0,08	EPA 8270*
	Pyrene	mg/kg	7,8±1,2	0,42±0,0	0,42±0,07	EPA 8270*
	Benzo(a)anthracene	mg/kg	7,5±1,0	0,27±0,04	0,29±0,04	EPA 8270*
	Chrysene	mg/kg	9,4±1,5	0,40±0,06	0,43±0,07	EPA 8270*
	Benzo(b)fluoranthene	mg/kg	8,9±1,3	0,44±0,07	0,52±0,08	EPA 8270*
	Benzo(k)fluoranthene	mg/kg	3,6±0,9	0,16±0,04	0,18±0,04	EPA 8270*
	Benzo(a)pyrene	mg/kg	6,0±0,8	0,22±0,03	0,22±0,03	EPA 8270*
	Indeno(1,2,3-cd)pyrene	mg/kg	9,2±1,4	0,40±0,06	0,43±0,07	EPA 8270*
	Dibenzo(a,h)anthracene	mg/kg	0,29±0,07	0,019±0,004	0,082±0,019	EPA 8270*
	Benzo(g,h,i)perylene	mg/kg	7,8±1,5	0,33±0,06	0,33±0,06	EPA 8270*
	ΣPAHs	mg/kg	75±13	3,5±0,6	3,8±0,7	EPA 8270*
25.	Polychlorinated biphenyls – PCB	mg/kg				
	PCB 18	mg/kg	<0,002	<0,002	<0,002	EPA 8270 C*

	PCB 31	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 28	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 52	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 44	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 101	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 149	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 118	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 153	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 138	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 180	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***
	PCB 194	**mg/kg**	**<0,002**	**<0,002**	**<0,002**	**EPA 8270 C***

* - accredited method

OPINION

According to the results of the physico-chemical analysis, the sample of soil from the borehole B12 from 0-0.4 m depth (No. 823/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of chromium, nickel, fluorine and polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of soil samples from the B12 borehole at a depth of 0-0.4 m (No. 823/04) observed in relation to the Dutch standard show that the content of nickel, cobalt and total hydrocarbons (TPH) above the lowest level) defining the quality of unpolluted soil but below the intervention level, while the content of PAHs is above the intervention level. According to the Italian standard, the results of the soil sample analysis show that the content of all the analyzed parameters is below the limit value pertaining to the soil for industrial and commercial use.

According to the results of the physico-chemical analysis, the soil sample from the B40 borehole from 0-0.4 m depth (No. 827/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of chromium, nickel, fluorine and polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of the soil sample from the B40 borehole at 0-0.4 m depth (No. 827/04) observed in relation to the Dutch standard show that the content of barium, nickel, cobalt and PAHs above the lowest level (target value) which defines the quality of unpolluted soil but below the intervention level, while according to the Italian standard, the results of the soil sample analysis show that the content of all the analyzed parameters is below the limit value referring to the soil for industrial and commercial use.

According to the results of the physico-chemical analysis, the sample of soil from the borehole B41 from 0-0.5 m depth (No. 831/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of chromium, nickel, fluorine and polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of soil samples from the B41 borehole at 0-0.5 m depth (No. 831/04) observed in relation to the Dutch standard show that the content of barium, copper, nickel, selenium, cobalt and PAHs above the lowest of the target value, which defines the quality of the unpolluted soil but below the intervention level, while according to the Italian standard, the results of soil sample analysis show that the content of all the analyzed parameters is below the limit value for the soil for industrial and commercial use.

ADDITIONAL TESTING

RESULTS OF ANALYSES

REPORT No. 00-1654/1

BOREHOLE			12	3	13	Method
Coordinates			600970.04 4695345.64	601027.06 4695354.24	600954.94 4695387.64	
Depth			0.4-1 m	0.5-1 m	0.4-1 m	
Protocol number			824/04	805/04	820/04	
Date of sampling			27.10.2017.	27.10.2017.	27.10.2017.	
No.	Parameter	Unit	Results	Results	Results	
1.	Arsenic	mg/kg	1,8±0,2	3,1±0,3	3,3±0,3	EPA 3051A*
2.	Barium	mg/kg	10	17	17	EPA 3051A
3.	Cadmium	mg/kg	0,20±0,01	0,33±0,02	0,29±0,02	EPA 3051A*
4.	Total chromium	mg/kg	17±1	19±2	25±2	EPA 3051A*
5.	Copper	mg/kg	14±1	16±1	17±1	EPA 3051A*
6.	Mercury	mg/kg	0,20±0,03	0,33±0,05	0,24±0,04	AMA-112*
7.	Molybdenum	mg/kg	<1	<1	<1	EPA 3051A*
8.	Nickel	mg/kg	25±2	30±3	37±4	EPA 3051A*
9.	Lead	mg/kg	2,6±0,2	5,0±0,4	4,5±0,3	EPA 3051A*
10.	Antimony	mg/kg	<1	<1	<1	EPA 3051A
11.	Selenium	mg/kg	<1	<1	<1	EPA 3051A
12.	Zinc	mg/kg	14±1	20±1	19±1	EPA 3051A*
13.	Tin	mg/kg	<1	<1	<1	EPA 3051A

14.	Cobalt	mg/kg	3,3±0,5	4,5±0,6	4,9±0,7	EPA 3051A*
15.	Silver	mg/kg	<1	<1	<1	EPA 3051A
16.	Manganese	mg/kg	348±56	448±72	442±71	EPA 3051A*
17.	Vanadium	mg/kg	10	16	15	EPA 3051A
18.	Fluorine	mg/kg	76	62	51	AF-ISM
19.	Thallium	mg/kg	<1	<1	<1	EPA 3051A
20.	Total cyanide (CN)	mg/kg	8,5	11,6	10,9	EPA 9010C
21.	Chlorinated Hydrocarbons (CHC)/(VOX):					
	Chlorobenzene	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	1,3-Dichlorobenzene	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	1,4-Dichlorobenzene	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	1,2-Dichlorobenzene	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	1,2,4-Trichlorobenzene	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	1,2,3-Trichlorobenzene	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	Chloroethane	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	Chloromethane	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	Bromomethane	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	Trichlorofluoromethane	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	Bromobenzene	mg/kg	<0,01	<0,01	<0,01	EPA 5021A

	Organochlorine pesticides:					
	***p,p′*-DDT**	**mg/kg**	**<0,001**	**<0,001**	**<0,001**	**EPA 8270 C***
	***o,p′*-DDT**	**mg/kg**	**<0,001**	**<0,001**	**<0,001**	**EPA 8270 C***
	***p,p′*-DDD**	**mg/kg**	**<0,001**	**<0,001**	**<0,001**	**EPA 8270 C***
	***p,p′*-DDE**	**mg/kg**	**<0,001**	**<0,001**	**<0,001**	**EPA 8270 C***
22.	**Aromatic hydrocarbons (BTEX):**					
	Benzene	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021 A**
	Toluene	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021 A**
	Ethylbenzene	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021 A**
	m/p-Xylene	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021 A**
	o-Xylene	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021 A**
23.	**Total Petroleum Hydrocarbon (TPH) (C10-C40)**	**mg/kg**	**13**	**49**	**<10**	**ISO 16703:2004**
24.	**Polycyclic Aromatic Hydrocarbons:**					
	Naphtalene	**mg/kg**	**<0,005**	**0,25±0,07**	**<0,005**	**EPA 8270***
	2-Methylnaphtalene	**mg/kg**	**<0,005**	**0,093±0,026**	**<0,005**	**EPA 8270***
	1-Methylnaphtalene	**mg/kg**	**<0,005**	**0,072±0,020**	**<0,005**	**EPA 8270***
	Acenaphtylene	**mg/kg**	**<0,005**	**0,009±0,001**	**<0,005**	**EPA 8270***

	Acenaphtene	mg/kg	<0,005	0,51±0,09	<0,005	EPA 8270*
	Fluorene	mg/kg	<0,005	0,30±0,05	<0,005	EPA 8270*
	Phenanthrene	mg/kg	0,069±0,010	3,1±0,5	0,049±0,007	EPA 8270*
	Anthracene	mg/kg	<0,005	0,41±0,05	<0,005	EPA 8270*
	Fluoranthene	mg/kg	0,15±0,02	4,1±0,6	0,12±0,02	EPA 8270*
	Pyrene	mg/kg	0,078±0,012	3,1±0,5	0,098±0,015	EPA 8270*
	Benzo(a)anthracene	mg/kg	0,060±0,008	2,1±0,3	0,060±0,008	EPA 8270*
	Chrysene	mg/kg	0,16±0,03	2,5±0,4	0,10±0,02	EPA 8270*
	Benzo(b)fluoranthene	mg/kg	0,18±0,03	3,2±0,5	0,12±0,02	EPA 8270*
	Benzo(k)fluoranthene	mg/kg	0,064±0,016	1,0±0,3	0,051±0,012	EPA 8270*
	Benzo(a)pyrene	mg/kg	0,053±0,007	2,0±0,3	0,069±0,009	EPA 8270*
	Indeno(1,2,3-cd)pyrene	mg/kg	0,096±0,015	2,6±0,4	0,10±0,02	EPA 8270*
	Dibenzo(a,h)anthracene	mg/kg	0,024±0,006	0,64±0,15	0,017±0,004	EPA 8270*
	Benzo(g,h,i)perylene	mg/kg	0,11±0,02	2,0±0,4	0,083±0,016	EPA 8270*
	ΣPAHs	mg/kg	1,0±0,2	28±5	0,87±0,15	EPA 8270*

* - accredited method

OPINION

According to the results of the physico-chemical analysis, the sample of soil from the borehole B12 at a depth of 0.4-1 m (No. 824/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of soil samples from the B12 borehole at a depth of 0.4-1 m (No. 824/04) observed in relation to the Dutch standard show that the content of all analyzed parameters is below the lowest value (target value) unprocessed soil, while according to the Italian standard, the results of soil sample analysis show that the content of all analyzed parameters is below the limit values for soil for industrial and commercial use.

According to the results of the physico-chemical analysis, the soil sample from the B3 borehole from 0.5-1 m depth (No. 805/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of soil samples from the B3 borehole at a depth of 0.5-1 m (No. 805/04) observed in relation to the Dutch standard show that the content of PAHs is above the lowest level (target value) defining the quality of the unpolluted but below the intervention level, while according to the Italian standard, the results of the soil sample analysis show that the content of all the analyzed parameters is below the limit value referring to the soil for industrial and commercial use.

According to the results of the physico-chemical analysis, soil samplefrom the borehole B13 at a depth of 0.4-1 m (No. 820/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of the soil sample from the B13 borehole at a depth of 0.4-1 m (No. 820/04) observed in relation to the Dutch standard show that the content of all analyzed parameters is below the lowest value (target value) unprocessed soil, while according to the Italian standard, the results of soil sample analysis show that the content of all analyzed parameters is below the limit values for soil for industrial and commercial use.

RESULTS OF ANALYSES

REPORT No. 00-1654/1

BOREHOLE			25	4	15	Method
Coordinates			600929.94 4695316.84	600796.02 4695456.12	600863.46 4695421.87	
Depth			1-2 m	0.5-1 m	1-1.5 m	
Protocol number			779/04	798/04	816/04	
Date of sampling			27.10.2017.	27.10.2017.	27.10.2017.	
No.	Parameter	Unit	Results	Results	Results	
1.	Arsenic	mg/kg	2,4±0,2	13±1	10±1	EPA 3051A*
2.	Barium	mg/kg	15	61	71	EPA 3051A
3.	Cadmium	mg/kg	0,22±0,01	0,60±0,04	0,60±0,04	EPA 3051A*
4.	Total chromium	mg/kg	18±1	136±11	72±6	EPA 3051A*
5.	Copper	mg/kg	15±1	59±3	34±2	EPA 3051A*
6.	Mercury	mg/kg	0,56±0,09	0,54±0,09	0,28±0,05	AMA-112*
7.	Molybdenum	mg/kg	<1	<1	<1	EPA 3051A*
8.	Nickel	mg/kg	29±3	235±23	107±10	EPA 3051A*
9.	Lead	mg/kg	3,7±0,3	18±1	14±1	EPA 3051A*
10.	Antimony	mg/kg	<1	<1	<1	EPA 3051A
11.	Selenium	mg/kg	<1	1,6	<1	EPA 3051A
12.	Zinc	mg/kg	17±1	80±3	58±2	EPA 3051A*
13.	Tin	mg/kg	<1	<1	<1	EPA 3051A

14.	Cobalt	mg/kg	4,0±0,6	28±4	15±2	EPA 3051A*
15.	Silver	mg/kg	<1	<1	<1	EPA 3051A
16.	Manganese	mg/kg	401±65	1100±178	910±140	EPA 3051A*
17.	Vanadium	mg/kg	12	68	56	EPA 3051A
18.	Fluorine	mg/kg	188	500	138	AF-ISM
19.	Thallium	mg/kg	<1	<1	<1	EPA 3051A
20.	Total cyanide (CN)	mg/kg	8,5	7,9	11,2	EPA 9010C
21.	Chlorinated Hydrocarbons (CHC)/(VOX):					
	Chlorobenzene	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	1,3-Dichlorobenzene	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	1,4-Dichlorobenzene	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	1,2-Dichlorobenzene	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	1,2,4-Trichlorobenzene	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	1,2,3-Trichlorobenzene	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	Chloroethane	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	Chloromethane	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	Bromomethane	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	Trichlorofluoromethane	mg/kg	<0,01	<0,01	<0,01	EPA 5021A
	Bromobenzene	mg/kg	<0,01	<0,01	<0,01	EPA 5021A

	Organochlorine pesticides:					
	***p,p′*-DDT**	**mg/kg**	**<0,001**	**<0,001**	**<0,001**	**EPA 8270 C***
	***o,p′*-DDT**	**mg/kg**	**<0,001**	**<0,001**	**<0,001**	**EPA 8270 C***
	***p,p′*-DDD**	**mg/kg**	**<0,001**	**<0,001**	**<0,001**	**EPA 8270 C***
	***p,p′*-DDE**	**mg/kg**	**<0,001**	**<0,001**	**<0,001**	**EPA 8270 C***
22.	**Aromatic hydrocarbons (BTEX):**					
	Benzene	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021 A**
	Toluene	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021 A**
	Ethylbenzene	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021 A**
	m/p-Xylene	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021 A**
	o-Xylene	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021 A**
23.	**Total Petroleum Hydrocarbon (TPH) (C10-C40)**	**mg/kg**	**576**	**213**	**990**	**ISO 16703:2004**
24.	**Polycyclic Aromatic Hydrocarbons:**					
	Naphtalene	**mg/kg**	**0,090±0,025**	**0,036±0,010**	**0,31±0,09**	**EPA 8270***
	2-Methylnaphtalene	**mg/kg**	**0,37±0,10**	**0,14±0,04**	**1,13±0,31**	**EPA 8270***
	1-Methylnaphtalene	**mg/kg**	**0,24±0,07**	**0,086±0,024**	**0,70±0,20**	**EPA 8270***
	Acenaphtylene	**mg/kg**	**<0,005**	**<0,005**	**<0,005**	**EPA 8270***

	Acenaphtene	mg/kg	0,021±0,004	0,008±0,001	0,046±0,008	EPA 8270*
	Fluorene	mg/kg	0,011±0,002	<0,005	0,11±0,02	EPA 8270*
	Phenanthrene	mg/kg	0,084±0,013	0,050±0,008	0,16±0,02	EPA 8270*
	Anthracene	mg/kg	0,009±0,001	0,008±0,001	0,018±0,002	EPA 8270*
	Fluoranthene	mg/kg	0,039±0,006	0,070±0,011	0,13±0,02	EPA 8270*
	Pyrene	mg/kg	0,080±0,013	0,067±0,010	0,19±0,03	EPA 8270*
	Benzo(a)anthracene	mg/kg	0,027±0,004	0,034±0,005	0,082±0,011	EPA 8270*
	Chrysene	mg/kg	0,045±0,007	0,064±0,010	0,12±0,02	EPA 8270*
	Benzo(b)fluoranthene	mg/kg	0,058±0,009	0,070±0,011	0,15±0,02	EPA 8270*
	Benzo(k)fluoranthene	mg/kg	0,021±0,005	0,028±0,007	0,057±0,014	EPA 8270*
	Benzo(a)pyrene	mg/kg	0,026±0,003	0,039±0,005	0,087±0,011	EPA 8270*
	Indeno(1,2,3-cd)pyrene	mg/kg	0,038±0,006	0,050±0,008	0,10±0,02	EPA 8270*
	Dibenzo(a,h)anthracene	mg/kg	0,007±0,002	0,007±0,002	0,018±0,004	EPA 8270*
	Benzo(g,h,i)perylene	mg/kg	0,035±0,007	0,048±0,009	0,11±0,02	EPA 8270*
	ΣPAHs	mg/kg	1,2±0,2	0,81±0,14	3,5±0,6	EPA 8270*

* - accredited method

OPINION

REPORT No. 00-1654/1

According to the results of the physico-chemical analysis , the sample of soil from the borehole B25 at a depth of 1-2 m (No. 779/04) **does not comply** with the requirements of the Rulebook on the permitted amount of dangerous and harmful substances in the soil and methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of soil samples from the B25 borehole at a depth of 1-2 m (No. 779/04) observed in relation to the Dutch standard show that the content of living and total hydrocarbons (TPH) is above the lowest target (s) the quality of the unpolluted soil is defined, but below the intervention level, while according to the Italian standard, the results of the soil sample analysis show that the content of all the analyzed parameters is below the limit value referring to the soil for industrial and commercial use.

According to the results of the physico-chemical analysis, the soil sample from the B4 borehole at a depth of 0.5-1 m (No. 798/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of chromium, nickel, fluorine and polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of the soil sample from the B4 borehole at a depth of 0.5-1 m (No. 798/04) observed in relation to the Dutch standard show that the content of chromium, copper, mercury, nickel, selenium, cobalt and total hydrocarbons TPH) above the lowest level (target value) that defines the quality of the unpolluted soil but below the intervention level, while according to the Italian standard, the results of the soil sample analysis show that the content of all the analyzed parameters is below the limit value referring to the soil for industrial and commercial use.

According to the results of the physico-chemical analysis , soil samplefrom the borehole B15 from the depth of 1-1.5 m (No. of Protocol No. 816/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of chromium, nickel and polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of the soil sample from the B15 borehole at a depth of 1-1.5 m (No. 816/04) observed in relation to the Dutch standard show that the content of nickel, cobalt, PAHs and total hydrocarbons (TPH) above the lowest of the target value, which defines the quality of the unpolluted soil, but below the intervention level, while according to the Italian standard, the results of soil sample analysis show that the content of TPH is above the limit value for soil for industrial and commercial use

RESULTS OF ANALYSES

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BOREHOLE			25	4	15	15	Method
Coordinates			600929.94 4695316.84	600796.02 4695456.12	600863.46 4695421.87		
Depth			2.0-3.0 m	1.0-2.0 m	1.5-2.0 m	2.0-3.0 m	
Protocol number			780/04	799/04	817/04	818/04	
Date of sampling			27.10.2017.	27.10.2017.	27.10.2017.	27.10.2017.	
No.	Parameter	Unit	Results	Results	Results	Results	
1.	Arsenic	mg/kg	3,1±0,3	2,8±0,3	2,0±0,2	3,1±0,3	EPA 3051A*
2.	Barium	mg/kg	21	23	22	40	EPA 3051A
3.	Cadmium	mg/kg	0,18±0,01	0,32±0,02	0,18±0,01	0,31±0,02	EPA 3051A*
4.	Total chromium	mg/kg	19±1	31±2	16±1	25±2	EPA 3051A*
5.	Copper	mg/kg	10,1±0,5	14±1	9,0±0,5	12±1	EPA 3051A*
6.	Mercury	mg/kg	0,06±0,01	0,06±0,01	0,05±0,01	0,05±0,01	AMA-112*
7.	Molybdenum	mg/kg	<1	<1	<1	<1	EPA 3051A*
8.	Nickel	mg/kg	28±3	53±5	25±2	37±3	EPA 3051A*
9.	Lead	mg/kg	3,3±0,2	5,6±0,4	3,7±0,3	5,6±0,4	EPA 3051A*
10.	Antimony	mg/kg	<1	<1	<1	<1	EPA 3051A
11.	Selenium	mg/kg	<1	<1	<1	<1	EPA 3051A
12.	Zinc	mg/kg	15±1	23±1	17±1	24±1	EPA 3051A*
13.	Tin	mg/kg	<1	<1	<1	<1	EPA 3051A

14.	Cobalt	mg/kg	3,6±0,5	6,2±0,9	3,5±0,5	5,2±0,7	EPA 3051A*
15.	Silver	mg/kg	<1	<1	<1	<1	EPA 3051A
16.	Manganese	mg/kg	304±49	476±77	310±50	558±90	EPA 3051A*
17.	Vanadium	mg/kg	12	15	12	19	EPA 3051A
18.	Fluorine	mg/kg	143	93	82	82	AF-ISM
19.	Thallium	mg/kg	<1	<1	<1	<1	EPA 3051A
20.	Total cyanide (CN)	mg/kg	8,1	7,4	8,3	7,9	EPA 9010C
21.	Chlorinated Hydrocarbons (CHC)/(VOX):						
	Chlorobenzene	mg/kg	<0,01	<0,01	<0,01	<0,01	EPA 5021A
	1,3-Dichlorobenzene	mg/kg	<0,01	<0,01	<0,01	<0,01	EPA 5021A
	1,4-Dichlorobenzene	mg/kg	<0,01	<0,01	<0,01	<0,01	EPA 5021A
	1,2-Dichlorobenzene	mg/kg	<0,01	<0,01	<0,01	<0,01	EPA 5021A
	1,2,4-Trichlorobenzene	mg/kg	<0,01	<0,01	<0,01	<0,01	EPA 5021A
	1,2,3-Trichlorobenzene	mg/kg	<0,01	<0,01	<0,01	<0,01	EPA 5021A
	Chloroethane	mg/kg	<0,01	<0,01	<0,01	<0,01	EPA 5021A
	Chloromethane	mg/kg	<0,01	<0,01	<0,01	<0,01	EPA 5021A
	Bromomethane	mg/kg	<0,01	<0,01	<0,01	<0,01	EPA 5021A
	Trichlorofluoromethane	mg/kg	<0,01	<0,01	<0,01	<0,01	EPA 5021A
	Bromobenzene	mg/kg	<0,01	<0,01	<0,01	<0,01	EPA 5021A

	Organochlorine pesticides:						
	***p,p′*-DDT**	**mg/kg**	**<0,001**	**<0,001**	**<0,001**	**<0,001**	**EPA 8270 C***
	***o,p′*-DDT**	**mg/kg**	**<0,001**	**<0,001**	**<0,001**	**<0,001**	**EPA 8270 C***
	***p,p′*-DDD**	**mg/kg**	**<0,001**	**<0,001**	**<0,001**	**<0,001**	**EPA 8270 C***
	***p,p′*-DDE**	**mg/kg**	**<0,001**	**<0,001**	**<0,001**	**<0,001**	**EPA 8270 C***
22.	**Aromatic hydrocarbons (BTEX):**						
	Benzene	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021 A**
	Toluene	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021 A**
	Ethylbenzene	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021 A**
	m/p-Xylene	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021 A**
	o-Xylene	**mg/kg**	**<0,01**	**<0,01**	**<0,01**	**<0,01**	**EPA 5021 A**
23.	**Total Petroleum Hydrocarbon (TPH) (C10-C40)**	**mg/kg**	**2164**	**460**	**2481**	**759**	**ISO 16703:2004**
24.	**Polycyclic Aromatic Hydrocarbons:**						
	Naphtalene	**mg/kg**	**1,1±0,3**	**0,080±0,022**	**1,1±0,3**	**0,14±0,04**	**EPA 8270***
	2-Methylnaphtalene	**mg/kg**	**3,0±0,8**	**0,37±0,10**	**3,1±0,9**	**0,58±0,16**	**EPA 8270***
	1-Methylnaphtalene	**mg/kg**	**1,9±0,5**	**0,24±0,07**	**1,9±0,5**	**0,37±0,10**	**EPA 8270***
	Acenaphtylene	**mg/kg**	**<0,005**	**<0,005**	**<0,005**	**<0,005**	**EPA 8270***

	Acenaphtene	mg/kg	0,079±0,014	0,020±0,004	0,098±0,017	0,029±0,005	EPA 8270*
	Fluorene	mg/kg	0,21±0,04	0,046±0,007	0,23±0,04	0,016±0,003	EPA 8270*
	Phenanthrene	mg/kg	0,23±0,03	0,088±0,013	0,25±0,04	0,083±0,013	EPA 8270*
	Anthracene	mg/kg	0,021±0,003	0,006±0,001	0,022±0,003	0,008±0,001	EPA 8270*
	Fluoranthene	mg/kg	0,025±0,004	0,093±0,014	0,029±0,004	0,036±0,005	EPA 8270*
	Pyrene	mg/kg	0,19±0,03	0,11±0,02	0,21±0,03	0,082±0,013	EPA 8270*
	Benzo(a)anthracene	mg/kg	0,018±0,002	0,048±0,006	0,021±0,003	0,021±0,003	EPA 8270*
	Chrysene	mg/kg	0,033±0,005	0,080±0,012	0,038±0,006	0,031±0,005	EPA 8270*
	Benzo(b)fluoranthene	mg/kg	0,037±0,006	0,084±0,013	0,040±0,006	0,040±0,006	EPA 8270*
	Benzo(k)fluoranthene	mg/kg	0,011±0,003	0,033±0,008	0,013±0,003	0,014±0,003	EPA 8270*
	Benzo(a)pyrene	mg/kg	0,015±0,002	0,044±0,006	0,021±0,003	0,025±0,003	EPA 8270*
	Indeno(1,2,3-cd)pyrene	mg/kg	0,025±0,004	0,061±0,010	0,029±0,005	0,028±0,004	EPA 8270*
	Dibenzo(a,h)anthracene	mg/kg	0,006±0,001	0,010±0,002	0,005±0,001	<0,005	EPA 8270*
	Benzo(g,h,i)perylene	mg/kg	0,038±0,007	0,052±0,010	0,035±0,007	0,029±0,006	EPA 8270*
	ΣPAHs	mg/kg	7,0±1,2	1,5±0,3	7,1±1,2	1,5±0,3	EPA 8270*

* - accredited method

OPINION

According to the results of the physico-chemical analysis , soil samplefrom the borehole B25 at a depth of 2-3 m (No. 780/04) **does not comply** with the requirements of the Rulebook on permitted amount of hazardous and harmful substances in soil and methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of the soil sample from the B25 borehole at a depth of 2-3 m (No. 780/04) observed in relation to the Dutch standard show that the content of PAHs and total hydrocarbons (TPH) is above the lowest level) which defines the quality of the unpolluted soil but below the intervention level, while according to the Italian standard, the results of soil sample analysis show that the content of TPH is above the limit value for soil for industrial and commercial use.

According to the results of the physico-chemical analysis, the sample of soil from the borehole B4 at a depth of 1-2 m (No. 799/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of soil samples from the B4 borehole at a depth of 1-2 m (No. 799/04) observed in relation to the Dutch standard show that the content of nickel and total hydrocarbons (TPH) is above the lowest level (target value) the quality of the unpolluted soil is defined, but below the intervention level, while according to the Italian standard, the results of the soil sample analysis show that the content of all the analyzed parameters is below the limit value referring to the soil for industrial and commercial use.

According to the results of the physico-chemical analysis , the sample of soil from the borehole B15 from the depth of 1.5-2 m (No. 817/04) **does not comply** with the requirements of the Rulebook on the permitted amount of dangerous and harmful substances in the soil and methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of soil samples from the B15 borehole at a depth of 1.5-2 m (No. 817/04) observed in relation to the Dutch standard show that the content of PAHs and total hydrocarbons (TPH) is above the lowest level) which defines the quality of the unpolluted soil but below the intervention level, while according to the Italian standard, the results of soil sample analysis show that the content of TPH is above the limit value for soil for industrial and commercial use.

According to the results of the physico-chemical analysis, the soil sample from the B15 borehole at a depth of 2-3 m (No. 818/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

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The results of the physico-chemical analysis of the soil sample from the B15 borehole at a depth of 2-3 m (No. 818/04) observed in relation to the Dutch standard show that the content of total hydrocarbons (TPH) is above the lowest target (target value) the quality of the unpolluted soil but below the intervention level, while according to the Italian standard, the results of soil sample analysis show that the content of all the analyzed parameters is below the limit value referring to the soil for industrial and commercial use.

RESULTS OF ANALYSES

BOREHOLE	**11**	**12**	**13**	**28**	**Method**
Coordinates	**600972.93 4695288.13**	**600970.04 4695345.64**	**600954.94 4695387.64**	**600853.23 4695382.95**	

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Depth			1.0-2.0 m	2.0-3.0 m	2.0-3.0 m	2.0-3.0 m	
Protocol number			783/04	826/04	822/04	788/04	
Date of sampling			27.10.2017.	27.10.2017.	27.10.2017.	27.10.2017.	
No.	Parameter	Unit	Results	Results	Results	Results	
1.	Total Petroleum Hydrocarbon (TPH) (C10-C40)	mg/kg	817	21	49	2013	ISO 16703:2004
2.	Polycyclic Aromatic Hydrocarbons:						
	Naphtalene	mg/kg	0,28±0,08	<0,005	<0,005	0,75±0,21	EPA 8270*
	2-Methylnaphtalene	mg/kg	0,80±0,22	<0,005	0,008±0,002	2,1±0,6	EPA 8270*
	1-Methylnaphtalene	mg/kg	0,50±0,14	<0,005	0,005±0,001	1,3±0,4	EPA 8270*
	Acenaphtylene	mg/kg	<0,005	<0,005	<0,005	<0,005	EPA 8270*
	Acenaphtene	mg/kg	0,031±0,006	<0,005	0,013±0,002	0,063±0,011	EPA 8270*
	Fluorene	mg/kg	0,072±0,012	<0,005	0,008±0,001	0,16±0,03	EPA 8270*
	Phenanthrene	mg/kg	0,12±0,02	0,041±0,006	0,10±0,02	0,17±0,03	EPA 8270*
	Anthracene	mg/kg	0,014±0,002	0,007±0,001	0,019±0,002	0,015±0,002	EPA 8270*
	Fluoranthene	mg/kg	0,10±0,02	0,11±0,02	0,30±0,05	0,027±0,004	EPA 8270*
	Pyrene	mg/kg	0,15±0,02	0,095±0,015	0,26±0,04	0,15±0,02	EPA 8270*
	Benzo(a)anthracene	mg/kg	0,058±0,008	0,045±0,006	0,15±0,02	0,015±0,002	EPA 8270*
	Chrysene	mg/kg	0,088±0,014	0,092±0,014	0,26±0,04	0,030±0,005	EPA 8270*

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	Benzo(b)fluoranthene	**mg/kg**	**0,10±0,02**	**0,10±0,02**	**0,31±0,05**	**0,032±0,005**	**EPA 8270***
	Benzo(k)fluoranthene	**mg/kg**	**0,044±0,011**	**0,046±0,011**	**0,14±0,03**	**0,009±0,002**	**EPA 8270***
	Benzo(a)pyrene	**mg/kg**	**0,065±0,008**	**0,071±0,009**	**0,21±0,03**	**0,019±0,002**	**EPA 8270***
	Indeno(1,2,3-cd)pyrene	**mg/kg**	**0,090±0,014**	**0,085±0,013**	**0,28±0,04**	**0,024±0,004**	**EPA 8270***
	Dibenzo(a,h)anthracene	**mg/kg**	**0,015±0,004**	**0,015±0,004**	**0,043±0,010**	**0,009±0,002**	**EPA 8270***
	Benzo(g,h,i)perylene	**mg/kg**	**0,10±0,02**	**0,075±0,014**	**0,24±0,05**	**0,072±0,014**	**EPA 8270***
	ΣPAHs	**mg/kg**	**2,6±0,5**	**0,80±0,14**	**2,4±0,4**	**4,9±0,9**	**EPA 8270***

* - accredited method

OPINION

According to the results of the physico-chemical analysis, the sample of soil from the borehole B11 at a depth of 1-2 m (No. 783/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of soil sample from the B11 borehole at 1-2 m depth (No. 783/04) observed in relation to the Dutch standard show that the content of PAHs and total hydrocarbons (TPH) is above the lowest level (target value) which defines the quality of the unpolluted soil but below the intervention level, while according to the Italian standard, the results of soil sample analysis show that the content of TPH is above the limit value for soil for industrial and commercial use.

According to the results of the physico-chemical analysis , the sample of soil from the borehole B12 at a depth of 2-3 m (No. 826/04) **does not comply** with the requirements of the Rulebook on the permitted amount of dangerous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of soil samples from the B12 borehole at 2-3 m depth (No. 826/04) observed in relation to the Dutch standard show that the content of PAHs and total hydrocarbons (TPH) is below the lowest level value) which defines the quality of the unpolluted soil, while according to the Italian standard, the results of soil sample analysis show that the content of PAHs and TPHs is below the limit values for soil for industrial and commercial use.

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According to the results of the physico-chemical analysis , the soil sample from the B13 borehole at a depth of 2-3 m (No. 822/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of the soil sample from the B13 borehole at a depth of 2-3 m (No. 822/04) observed in relation to the Dutch standard show that the content of PAHs is above the lowest level (target value) defining the quality of the unpolluted but below the intervention level, while according to the Italian standard, the results of the soil sample analysis show that the content of PAHs and TPHs is below the limit values for soil for industrial and commercial use.

According to the results of the physico-chemical analysis , the sample of soil from the borehole B28 at a depth of 2-3 m (No. 788/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of soil samples from the B28 borehole at a depth of 2-3 m (No. 788/04) observed in relation to the Dutch standard show that the content of PAHs and total hydrocarbons (TPH) is above the lowest level) which defines the quality of the unpolluted soil but below the intervention level, while according to the Italian standard, the results of soil sample analysis show that the content of TPH is above the limit value for soil for industrial and commercial use.

RESULTS OF ANALYSES

BOREHOLE	**3**	**3**	**4**	**4**	**Method**
Coordinates	**601027.06 4695354.24**		**600796.02 4695456.12**		

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Depth			3.0-5.0 m	5.0-6.0 m	3.0-5.0 m	5.0-6.0 m	
Protocol number			808-809/04	810/04	801-802/04	803/04	
Date of sampling			27.10.2017.	27.10.2017.	27.10.2017.	27.10.2017.	
No.	Parameter	Unit	Results	Results	Results	Results	
1.	Total Petroleum Hydrocarbon (TPH) (C10-C40)	mg/kg	1757	1069	2213	3295	ISO 16703:2004
2.	Polycyclic Aromatic Hydrocarbons:						
	Naphtalene	mg/kg	0,51±0,14	0,16±0,05	0,89±0,25	1,6±0,4	EPA 8270*
	2-Methylnaphtalene	mg/kg	2,0±0,5	0,76±0,21	2,9±0,8	4,1±1,1	EPA 8270*
	1-Methylnaphtalene	mg/kg	1,3±0,3	0,49±0,14	1,8±0,5	2,5±0,7	EPA 8270*
	Acenaphtylene	mg/kg	<0,005	<0,005	<0,005	<0,005	EPA 8270*
	Acenaphtene	mg/kg	0,093±0,017	0,039±0,007	0,10±0,02	0,10±0,02	EPA 8270*
	Fluorene	mg/kg	0,043±0,007	0,10±0,02	0,23±0,04	0,29±0,05	EPA 8270*
	Phenanthrene	mg/kg	0,21±0,03	0,11±0,02	0,24±0,04	0,026±0,004	EPA 8270*
	Anthracene	mg/kg	0,018±0,002	0,010±0,001	0,021±0,003	0,31±0,04	EPA 8270*
	Fluoranthene	mg/kg	0,034±0,005	0,026±0,004	0,016±0,002	0,006±0,001	EPA 8270*
	Pyrene	mg/kg	0,18±0,03	0,094±0,015	0,20±0,03	0,23±0,04	EPA 8270*
	Benzo(a)anthracene	mg/kg	0,023±0,003	0,013±0,002	0,026±0,003	0,009±0,001	EPA 8270*
	Chrysene	mg/kg	0,040±0,006	0,025±0,004	0,025±0,004	0,009±0,001	EPA 8270*

	Benzo(b)fluoranthene	**mg/kg**	**0,039±0,006**	**0,024±0,004**	**0,019±0,003**	**0,012±0,002**	**EPA 8270***
	Benzo(k)fluoranthene	**mg/kg**	**0,012±0,003**	**0,008±0,002**	**0,006±0,001**	**0,003±0,001**	**EPA 8270***
	Benzo(a)pyrene	**mg/kg**	**0,025±0,003**	**0,015±0,002**	**0,010±0,001**	**0,004±0,001**	**EPA 8270***
	Indeno(1,2,3-cd)pyrene	**mg/kg**	**0,027±0,004**	**0,018±0,003**	**0,012±0,002**	**0,006±0,001**	**EPA 8270***
	Dibenzo(a,h)anthracene	**mg/kg**	**0,005±0,001**	**0,005±0,001**	**<0,005**	**<0,005**	**EPA 8270***
	Benzo(g,h,i)perylene	**mg/kg**	**0,033±0,006**	**0,028±0,005**	**0,014±0,003**	**0,008±0,002**	**EPA 8270***
	ΣPAHs	**mg/kg**	**4,5±0,8**	**1,9±0,3**	**6,5±1,1**	**9,2±1,6**	**EPA 8270***

* - accredited method

OPINION

According to the results of the physico-chemical analysis, the sample of soil from the borehole B3 at a depth of 3-5 m (No. 808-809 / 04/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and methods for its examination ("Sl No. 18/97) due to the increased content of polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of the soil sample from the B3 borehole at a depth of 3-5 m (No. 808-809 / 04/04) observed in relation to the Dutch standard show that the content of PAHs and total hydrocarbons (TPH) is above the lowest of the target value, which defines the quality of the unpolluted soil, but below the intervention level, while according to the Italian standard, the results of soil sample analysis show that the content of TPH is above the limit value for soil for industrial and commercial use.

According to the results of the physico-chemical analysis, the sample of soil from the borehole B3 at a depth of 5-6 m (No. of Protocol No. 810/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of soil samples from the borehole B3 at a depth of 5-6 m (No. 810/04) observed in relation to the Dutch standard show that the content of PAHs and total hydrocarbons (TPH) is above the lowest level (target value) which defines the quality of the unpolluted soil but below the intervention level, while according to the Italian standard, the results of soil sample analysis show that the content of TPH is above the limit value for soil for industrial and commercial use.

REPORT No. 00-1654/1

According to the results of the physico-chemical analysis, the sample of soil from the B4 borehole at a depth of 3-5 m (No. 801-802 / 04/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and methods for its examination ("Sl No. 18/97) due to the increased content of polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of the soil sample from the B4 borehole at a depth of 3-5 m (No. 801-802 / 04/04) observed in relation to the Dutch standard show that the content of PAHs and total hydrocarbons (TPH) is above the lowest of the target value, which defines the quality of the unpolluted soil, but below the intervention level, while according to the Italian standard, the results of soil sample analysis show that the content of TPH is above the limit value for soil for industrial and commercial use.

According to the results of the physico-chemical analysis, the soil sample from the B4 borehole at a depth of 5-6 m (No. 803/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of the soil sample from the B4 borehole at a depth of 5-6 m (No. 803/04) observed in relation to the Dutch standard show that the content of PAHs and total hydrocarbons (TPH) is above the lowest level) which defines the quality of the unpolluted soil but below the intervention level, while according to the Italian standard, the results of soil sample analysis show that the content of TPH is above the limit value for soil for industrial and commercial use.

SUMMARY

According to the results of the physico-chemical analysis , the soil sample from the B23 borehole from 0-0.5 m depth (No. 636/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of chromium, nickel, fluorine and polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of the soil sample from the B23 borehole at a depth of 0-0.5 m (No. 636/04) observed in relation to the Dutch standard show that the content of nickel, cobalt, PAHs and total hydrocarbons (TPH) is above the lowest level (target value), which defines the quality of the unpolluted soil but below the intervention level. According to the Italian standard, the results of soil sample analysis show that the content of all the analyzed parameters is below the limit value for the soil for industrial and commercial use.

According to the results of the physico-chemical analysis, soil sample from the borehole B23 from the depth of 0.5-1 m (No. 636/04/1) **does not comply** with the requirements of the Rulebook on the permitted amount of dangerous and harmful substances in the soil and the methods for its examination ("Official Gazette of RS" RCG ", No. 18/97) due to the increased content of polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of soil samples from the B23 borehole at a depth of 0.5-1 m (No. 636/04/1) observed in relation to the Dutch standard show that the content of PAHs and total hydrocarbons (TPH) is above the lowest level (target value) which defines the quality of unpolluted soil but below the intervention level, while according to the Italian standard, the results of soil sample analysis show that the content of all the analyzed parameters is below the limit value for soil for industrial and commercial use.

According to the results of the physico-chemical analysis, the soil sample from the borehole B23 at a depth of 1-2 m (No. 637/04) is **in compliance** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and methods for its examination ("Official Gazette of the Republic of Montenegro" No. 18/97).

The results of the physico-chemical analysis of soil samples from the B23 borehole at a depth of 1-2 m (No. 637/04) observed in relation of the Dutch standard show that the content of all analyzed parameters is below of the lowest value (target value) which defines quality of unpolluted soil. According to the Italian standard, the results of the soil sample analysis show that the content of all the analyzed parameters is below the limit value pertaining to the soil for industrial and commercial use.

According to the results of the physico-chemical analysis , soil samplefrom the borehole B22 from 0-0.5 m depth (No. 639/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of chromium, nickel, fluorine and polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of the soil sample from the B22 borehole at a depth of 0-0.5 m (No. 639/04) observed in relation to the Dutch standard show that the content of barium, nickel, cobalt and PAHs is above the lowest level (target value) which defines the quality of unpolluted soil but below the intervention level. According to the Italian standard, the results of the soil sample analysis show that the content of all the analyzed parameters is below the limit value referring to the soil for industrial and commercial use.

According to the results of the physico-chemical analysis , the soil sample from the B21 borehole from 0-0.5 m depth (No. 642/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of chromium, nickel, fluorine and polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of soil samples from the B21 borehole depth 0-0.5 m (No. 642/04) observed in relation to the Dutch standard show that the content of nickel, cobalt and PAHs is above the lowest level (target value) which defines the quality of unpolluted soil but below the intervention level, while according to the Italian standard, the results of the soil sample analysis show that the content of all the analyzed parameters is below the limit value referring to the soil for industrial and commercial use.

According to the results of the physico-chemical analysis , the soil sample from the B10 borehole from 0-0.7 m depth (No. 645/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of chromium, nickel, fluorine and polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of the soil sample from borehole B10 at depth 0-0.7 m (No. 645/04) observed in relation to Dutch standards show that the content of barium, nickel, cobalt and PAHs is above the lowest level (target value) which defines the quality of unpolluted soil but below the intervention level, while according to the Italian standard results of soil sample analyses shows that the content of all analyzed parameters are below the limit values related to land for industrial and commercial use.

According to the results of the physico-chemical analysis , the soil sample from the B20 borehole from 0-0.4 m depth (No. 649/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of chromium, nickel, fluorine and polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of soil samples from the B20 borehole at a depth of 0-0.4 m (No. 649/04) observed in relation to the Dutch standard show that the content of barium, nickel, cobalt and PAHs is above the lowest level (target value) which defines the quality of unpolluted soil but below the intervention level. According to the Italian standard, the results of the soil sample analysis show that the content of all the analyzed parameters is below the limit value referring to the soil for industrial and commercial use.

According to the results of the physico-chemical analysis, the soil sample from the B19 borehole from 0-0.7 m depth (No. 653/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of chromium, nickel, fluorine and polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of soil samples from the B19 borehole at a depth of 0-0.7 m (No. 653/04) observed in relation to the Dutch standard show that the content of nickel, cobalt and PAHs is above the lowest level (target value) which defines quality of the unpolluted soil, but below the intervention level, while according to the Italian standard, the results of the soil sample analysis show that the content of all the analyzed parameters is below the limit value referring to the soil for industrial and commercial use.

According to the results of the physico-chemical analysis, the soil sample from the B18 borehole from 0-0.5 m depth (No. 657/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of chromium, nickel, fluorine and polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of soil samples from the B18 borehole at a depth of 0-0.5 m (No. 657/04) observed in relation to the Dutch standard show that the content of barium, nickel and cobalt is above the lowest level (target value) which defines the quality of unpolluted soil but below the intervention level, while according to the Italian standard, the results of the soil sample analysis show that the content of all the analyzed parameters is below the limit value referring to the soil for industrial and commercial use.

According to the results of physico-chemical analysis , soil samples from the B35 borehole from 0-0.6 m depth (No. 661/04) do not comply with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of chromium, nickel, fluorine and polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of the soil sample from the B35 borehole at a depth of 0-0.6 m (No. 661/04) observed in relation to the Dutch standard show that the content of barium, nickel, cobalt and PAHs above the lowest level (target value) which defines the quality of unpolluted soil but below the intervention level, while according to the Italian standard, the results of the soil sample analysis show that the content of all the analyzed parameters is below the limit value referring to the soil for industrial and commercial use.

According to the results of physico-chemical analysis , soil samples from the B36 borehole from 0-0.5 m depth (No. 665/04) do not comply with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of chromium, nickel, fluorine and polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of the soil sample from the B36 borehole at a depth of 0-0.5 m (No. 665/04) observed in relation to the Dutch standard show that the content is that the content of barium, nickel, cobalt and PAHs above the lowest level (target value) which defines the quality of unpolluted soil but below the intervention level, while according to the Italian standard, the results of the soil sample analysis show that the content of all the analyzed parameters is below the limit value referring to the soil for industrial and commercial use.

According to the results of the physico-chemical analysis , the soil sample from the B17 borehole from 0-0.5 m depth (No. 669/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of chromium, nickel, fluorine and polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of the soil sample from the B17 borehole at a depth of 0-0.5 m (No. 669/04) observed in relation to the Dutch standard show that the content of barium, nickel, selenium and cobalt is above the lowest level (target value) which defines the quality of unpolluted soil, but below the intervention level, while according to the Italian standard, the results of the soil sample analysis show that the content of all the analyzed parameters is below the limit value referring to the soil for industrial and commercial use.

According to the results of the physico-chemical analysis , the soil sample from the B6 borehole from 0-0.4 m depth (No. 673/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of chromium, nickel, fluorine and polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of the soil sample from the B6 borehole at a depth of 0-0.4 m (No. 673/04) observed in relation to the Dutch standard show that the content of nickel, cobalt and PAHs is above the lowest level (target value) which defines the quality of unpolluted soil, but below the intervention level, while according to the Italian standard, the results of the soil sample analysis show that the content of all the analyzed parameters is below the limit value referring to the soil for industrial and commercial use.

According to the results of the physico-chemical analysis, the soil sample from the B5 borehole from 0-0.7 m depth (No. 677/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of chromium, nickel, fluorine and polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of the soil sample from the B5 borehole at a depth of 0-0.7 m (No. 677/04) observed in relation to the Dutch standard show that the content of barium, nickel, cobalt and PAHs is above the lowest level (target value) which defines the quality of unpolluted soil but below the intervention level, while according to the Italian standard, the results of the soil sample analysis show that the content of all the analyzed parameters is below the limit value referring to the soil for industrial and commercial use.

According to the results of the physico-chemical analysis, the soil sample from the B7 borehole from 0-0.7 m depth (No. 681/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of chromium, nickel, fluorine and polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of soil samples from the B7 borehole from 0-0.7 m depth (No. 681/04) observed in relation to the Dutch standard show that the content of barium, nickel, cobalt and PAHs above the lowest level (target value) which defines the quality of unpolluted soil but below the intervention level, while according to the Italian standard, the results of the soil sample analysis show that the content of all the analyzed parameters is below the limit value referring to the soil for industrial and commercial use.

According to the results of the physico-chemical analysis , the sample of soil from the B8 borehole from 0-1 m depth (No. 685/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of chromium, nickel, fluorine and polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of soil samples from the B8 borehole at 0-1 m depth (No. 685/04) observed in relation to the Dutch standard show that the content of barium, copper, nickel, selenium, cobalt and PAHs is above the lowest of the target value, which defines the quality of the unpolluted soil but below the intervention level. According to the Italian standard, the results of soil sample analysis show that the content of all the analyzed parameters is below the limit value for the soil for industrial and commercial use.

According to the results of the physico-chemical analysis , the soil sample from the B9 borehole from 0-0.3 m depth (No. 688/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of chromium, nickel, fluorine and polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of soil samples from the B9 borehole at 0-0.3 m depth (No. 688/04) observed in relation to the Dutch standard show that the content of barium, nickel, selenium, cobalt and PAHs is above the lowest level target value) which defines the quality of unpolluted soil but below the intervention level. According to the Italian standard, the results of soil sample analysis show that the content of all the analyzed parameters is below the limit value referring to the soil for industrial and commercial use.

According to the results of the physico-chemical analysis , the sample of soil from the borehole B38 from 0-1 m depth (No. 703/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of chromium, nickel, fluorine and polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of the soil sample from the B38 borehole at 0-1 m depth (No. 703/04) observed in relation to the Dutch standard show that the content of barium, copper, mercury, nickel, cobalt and PAHs above the lowest of the target value, which defines the quality of the unpolluted soil but below the intervention level. According to the Italian standard, the results of soil sample analysis show that the content of all the analyzed parameters is below the limit value for the soil for industrial and commercial use.

According to the results of the physico-chemical analysis , the soil sample from the B30 borehole from 0-1 m depth (No. 706/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of chromium, nickel, fluorine and polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of the soil sample from the B30 borehole at 0-1 m depth (No. 706/04) observed in relation to the Dutch standard show that the content of barium, copper, nickel, cobalt and PAHs is above the lowest level target value) which defines the quality of unpolluted soil but below the intervention level, while according to the Italian standard, the results of soil sample analysis show that the content of all the analyzed parameters is below the limit value referring to the soil for industrial and commercial use.

According to the results of the physico-chemical analysis, the sample of soil from the borehole B31 from 0-0.4 m depth (No. 709/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of chromium, nickel, fluorine and polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of the soil sample from the B31 borehole from 0-0.4 m depth (No. 709/04) observed in relation to the Dutch standard show that the content of nickel, cobalt and PAHs is above the lowest level (target value) the quality of the unpolluted soil is defined, but below the intervention level. According to the Italian standard, the results of the soil sample analysis show that the content of all the analyzed parameters is below the limit value referring to the soil for industrial and commercial use.

According to the results of the physico-chemical analysis , the soil sample from the B32 borehole from 0-0.6 m depth (No. 713/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of chromium, nickel, fluorine and polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of the soil sample from the B32 borehole at a depth of 0-0.6 m (No. 713/04) observed in relation to the Dutch standard show that the content of nickel, cobalt and PAHs is above the lowest level (target value) which defines the quality of unpolluted soil, but below the intervention level. According to the Italian standard, the results of the soil sample analysis show that the content of all the analyzed parameters is below the limit value referring to the soil for industrial and commercial use.

According to the results of the physico-chemical analysis, the soil sample from the B34 borehole from 0-0.4 m depth (No. 717/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of chromium, nickel, fluorine and polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of soil samples from the B34 borehole at a depth of 0-0.4 m (No. 717/04) observed in relation to the Dutch standard show that the content of nickel, cobalt and PAHs is above the lowest level (target value) which defines the quality of unpolluted soil, but below the intervention level, while according to the Italian standard, the results of the soil sample analysis show that the content of all the analyzed parameters is below the limit value referring to the soil for industrial and commercial use.

According to the results of the physico-chemical analysis, the soil sample from the B1 borehole from 0-0.2 m depth (No. 721/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of chromium, nickel and fluorine in relation to the prescribed value.

The results of the physico-chemical analysis of soil samples from the B1 borehole from 0-0.2 m depth (No. 721/04) observed in relation to the Dutch standard show that the content of nickel and cobalt is above the lowest level (target value) which defines the quality of unpolluted soil but below the intervention level, while according to the Italian standard, the results of the soil sample analysis show that the content of all analyzed parameters is below the limit value for the soil for industrial and commercial use.

According to the results of the physico-chemical analysis, soil samplefrom the borehole B33 from 0-0.6 m depth (No. 728/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of chromium, nickel, fluorine and polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of the soil sample from the B33 borehole at 0-0.6 m depth (No. 728/04) observed in relation to the Dutch standard show that the content of barium, copper, nickel and cobalt is above the lowest limit (target value) which defines the quality of unpolluted soil, but below the intervention level, while according to the Italian standard, the results of the soil sample analysis show that the content of all the analyzed parameters is below the limit value referring to the soil for industrial and commercial use.

According to the results of the physico-chemical analysis, the soil sample from the Borehole B2 from the depth 0-0.4 m (No. 732/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of chromium, nickel, fluorine and polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of soil samples from the Borehole B2 from depth 0-0.4 m (No. 732/04) observed in relation to the Dutch standard show that the content of barium, copper, nickel, cobalt and PAHs is above the lowest level (target value) which defines the quality of unpolluted soil but below the intervention level, while according to the Italian standard, the results of soil sample analysis show that the content of all the analyzed parameters is below the limit value for soil for industrial and commercial use.

According to the results of the physico-chemical analysis, the soil sample from the B39 borehole from 0-0.5 m depth (No. 739/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of chromium, nickel, fluorine and polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of soil samples from the B39 borehole at 0-0.5 m depth (No. 739/04) observed in relation to the Dutch standard show that the content of barium, nickel, cobalt and PAHs above the lowest level (target value) which defines the quality of unpolluted soil but below the intervention level, while according to the Italian standard, the results of the soil sample analysis show that the content of all the analyzed parameters is below the limit value referring to the soil for industrial and commercial use.

According to the results of the physico-chemical analysis, the soil sample from the B37 borehole from 0-0.9 m depth (No. 743/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of chromium, nickel, fluorine and polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of the soil sample from the B37 borehole at a depth of 0-0.9 m (No. 743/04) observed in relation to the Dutch standard show that the content of barium, copper, nickel, cobalt and PAHs is above the lowest level (target value) which defines the quality of the unpolluted soil but below the intervention level, while according to the Italian standard, the results of the soil sample analysis show that the content of the fluorine is above the limit value for soil for industrial and commercial use.

According to the results of the physico-chemical analysis, soil samplefrom the borehole B37 from the depth of 0.9-1 m (No. 744/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to increased fluorine content in relation to the prescribed value.

The results of the physico-chemical analysis of the soil sample from the B37 borehole at a depth of 0.9-1 m (No. 744/04) observed in relation to the Dutch standard show that the content of all analyzed parameters is below the lowest value (target value) which defines the quality of unpolluted soil. According to the Italian standard, the results of the soil sample analysis show that the content of all the analyzed parameters is below the limit value pertaining to the soil for industrial and commercial use.

According to the results of the physico-chemical analysis, the soil sample from the B24 borehole from 0-0.5 m depth (No. 747/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of chromium, nickel, fluorine and polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of the soil sample from the B24 borehole at a depth of 0-0.5 m (No. 747/04) observed in relation to the Dutch standard show that the content of barium, copper, nickel, cobalt and PAHs is above the lowest level (target value) which defines the quality of the unpolluted soil but below the intervention level, while according to the Italian standard, the results of the soil sample analysis show that the content of the fluorine is above the limit value for soil for industrial and commercial use.

According to the results of the physico-chemical analysis , the soil sample from the B24 borehole from 0.5-1 m depth (No. 748/04) **does not comply** to the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of fluorine and polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of the soil sample from the B24 borehole at a depth of 0.5-1 m (No. 748/04) observed in relation to the Dutch standard show that the content of all analyzed parameters is below the lowest level (target value) which defines the quality of the unpolluted soil. According to the Italian standard, the results of the soil sample analysis show that the content of all the analyzed parameters is below the limit value pertaining to the soil for industrial and commercial use.

According to the results of the physico-chemical analysis , the sample of soil from the borehole B27 from 0-0.4 m depth (No. 769/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of chromium, nickel, fluorine and polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of the soil sample from the B27 borehole at a depth of 0-0.4 m (No. 769/04) observed in relation to the Dutch standard show that the content of barium, nickel, selenium, cobalt and PAHs is above the lowest level target value) which defines the quality of unpolluted soil but below the intervention level, while according to the Italian standard, the results of soil sample analysis show that the content of all the analyzed parameters is below the limit value referring to the soil for industrial and commercial use.

According to the results of the physico-chemical analysis , soil samples from the B26 borehole from 0-0.5 m depth (No. 773/04) do not comply with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of chromium, nickel, fluorine and polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of soil samples from the B26 borehole at a depth of 0-0.5 m (No. 773/04) observed in relation to the Dutch standard show that the content of barium, copper, nickel, selenium, zinc, cobalt, PAHs and total hydrocarbons (TPH) above the lowest level (target value) that defines the quality of unpolluted soil but below the intervention level, while according to the Italian standard, the results of soil sample analysis show that the content of all analyzed parameters is below the limit value related to the soil for industrial and commercial use.

According to the results of the physico-chemical analysis, the soil sample from the B25 borehole from 0-0.5 m depth (No. 777/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of fluorine and polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of the soil sample from the B25 borehole at a depth of 0-0.5 m (No. 777/04) observed in relation to the Dutch standard show that the content of barium, copper, nickel, cobalt and PAHs is above the lowest level (target value) which defines the quality of the unpolluted soil but below the intervention level, while according to the Italian standard, the results of the soil sample analysis show that the content of the fluorine is above the limit value for soil for industrial and commercial use.

According to the results of the physico-chemical analysis , the sample of soil from the borehole B25 at a depth of 0.5-1 m (No.. 778/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of soil samples from the B25 borehole at a depth of 0.5-1 m (No. 778/04) observed in relation to the Dutch standard show that the content of PAHs and total hydrocarbons (TPH) is above the lowest level(target value) which defines the quality of unpolluted soil but below the intervention level, while according to the Italian standard, the results of the soil sample analysis show that the content of all the analyzed parameters is below the limit value referring to the soil for industrial and commercial use.

According to the results of the physico-chemical analysis , the soil sample from the B11 borehole from 0-0.6 m depth (No. 781/04) **does not comply** with the requirements of the Rulebook on the permitted amount of dangerous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of chromium, nickel, fluorine and polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of the soil sample from the B11 borehole from 0-0.6 m depth (No. 781/04) observed in relation to the Dutch standard show that the content of barium, copper, nickel, selenium, cobalt and PAHs is above the lowest level (target value), which defines the quality of the unpolluted soil but below the intervention level, while according to the Italian standard, the results of soil sample analysis show that the content of all the analyzed parameters is below the limit value for the soil for industrial and commercial use.

According to the results of the physico-chemical analysis, soil samplefrom the borehole B28 from the depth 0-0.4 m (No. 785/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of chromium, nickel, fluorine and polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of soil samples from the B28 borehole at 0-0.4 m depth (No. 785/04) observed in relation to the Dutch standard show that the content of nickel, cobalt and PAHs is above the lowest level (target value) which defines the quality of the unpolluted soil, but below the intervention level, while according to the Italian standard, the results of the soil sample analysis show that the content of all the analyzed parameters is below the limit value referring to the soil for industrial and commercial use.

According to the results of the physico-chemical analysis , the soil sample from the B29 borehole from 0-0.4 m depth (No. 789/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of chromium, nickel and fluorine in relation to the prescribed value.

The results of the physico-chemical analysis of soil samples from the B29 borehole at 0-0.4 m depth (No. 789/04) observed in relation to the Dutch standard show that the content of nickel and cobalt is above the lowest level (target value), which defines the quality of the unpolluted but below the intervention level, while according to the Italian standard, the results of the soil sample analysis show that the content of all analyzed parameters is below the limit value for the soil for industrial and commercial use.

According to the results of the physico-chemical analysis, the sample of soil from the borehole B16 from 0-0.4 m depth (No. 793/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of chromium, nickel and fluorine in relation to the prescribed value.

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The results of the physico-chemical analysis of the soil sample from the B16 borehole at a depth of 0-0.4 m (No. 793/04) observed in relation to the Dutch standard show that the content of barium, copper, nickel, selenium and cobalt is above the lowest level) which defines the quality of unpolluted soil but below the intervention level, while according to the Italian standard, the results of the soil sample analysis show that the content of all the analyzed parameters is below the limit value referring to the soil for industrial and commercial use.

According to the results of the physico-chemical analysis , the soil sample from the B4 borehole from 0-0.4 m depth (No. 797/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of chromium, nickel, fluorine and polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of soil samples from the B4 borehole at 0-0.4 m depth (No. 797/04) observed in relation to the Dutch standard show that the content of barium, copper, nickel, cobalt, PAHs and total hydrocarbons (TPH) above the lowest level (target value) that defines the quality of the unpolluted soil but below the intervention level, while according to the Italian standard, the results of the soil sample analysis show that the content of all the analyzed parameters is below the limit value referring to the soil for industrial and commercial use.

According to the results of the physico-chemical analysis, the soil sample from the B3 borehole from 0-0.5 m depth (No. 804/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of chromium, nickel, fluorine and polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of soil samples from the B3 borehole from 0-0.5 m depth (No. 804/04) observed in relation to the Dutch standard show that the content of nickel, selenium, zinc, cobalt and total hydrocarbons (TPH) above the lowest level (target value,) which defines the quality of the unpolluted soil but below the intervention level, while the PAH content is above the intervention level. According to the Italian standard, the results of soil sample analysis show that the content of PAHs is above the soil-use limit for industrial and commercial use.

According to the results of the physico-chemical analysis, the sample of soil from the borehole B14 from 0-0.5 m depth (No. 811/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of chromium, nickel, fluorine and polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of soil samples from the B14 borehole at a depth of 0-0.5 m (No. 811/04) observed in relation to the Dutch standard show that the content of barium, copper, mercury, nickel, selenium, cobalt and PAHs above the lowest level (target value) which defines the quality of the unpolluted soil but below the intervention level, while according to the Italian standard, the results of soil sample analysis show that the content of all the analyzed parameters is below the limit value for the soil for industrial and commercial use.

According to the results of the physico-chemical analysis , the sample of soil from the borehole B15 from 0-1 m depth (No. 815/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of chromium, nickel, fluorine and polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of the soil sample from the B15 borehole at a depth of 0-1 m (No. 815/04) observed in relation to the Dutch standard show that the content of barium, copper, nickel, selenium, cobalt, PAHs and total hydrocarbons (TPH) is above the lowest level (target value) that defines the quality of the unpolluted soil but below the intervention level, while according to the Italian standard, the results of the soil sample analysis show that the content of all the analyzed parameters is below the limit values for soil for industrial and commercial use .

According to the results of the physico-chemical analysis , the soil sample from the B13 borehole from 0-0.4 m depth (No. 819/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of chromium, nickel, fluorine and polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of the soil sample from the B13 borehole at 0-0.4 m depth (No. 819/04) observed in relation to the Dutch standard show that the content of barium, copper, nickel, selenium, cobalt and PAHs is above the lowest of the target value, which defines the quality of the unpolluted soil, but below the intervention level, while according to the Italian standard, the results of soil sample analysis show that the content of all the analyzed parameters is below the limit value referring to the soil for industrial and commercial use.

According to the results of the physico-chemical analysis, the sample of soil from the borehole B12 from 0-0.4 m depth (No. 823/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of chromium, nickel, fluorine and polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of soil samples from the B12 borehole at a depth of 0-0.4 m (No. 823/04) observed in relation to the Dutch standard show that the content of nickel, cobalt and total hydrocarbons (TPH) above the lowest level) defining the quality of unpolluted soil but below the intervention level, while the content of PAHs is above the intervention level. According to the Italian standard, the results of the soil sample analysis show that the content of all the analyzed parameters is below the limit value pertaining to the soil for industrial and commercial use.

According to the results of the physico-chemical analysis, the soil sample from the B40 borehole from 0-0.4 m depth (No. 827/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of chromium, nickel, fluorine and polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of the soil sample from the B40 borehole at 0-0.4 m depth (No. 827/04) observed in relation to the Dutch standard show that the content of barium, nickel, cobalt and PAHs above the lowest level (target value) which defines the quality of unpolluted soil but below the intervention level, while according to the Italian standard, the results of the soil sample analysis show that the content of all the analyzed parameters is below the limit value referring to the soil for industrial and commercial use.

According to the results of the physico-chemical analysis, the sample of soil from the borehole B41 from 0-0.5 m depth (No. 831/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of chromium, nickel, fluorine and polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of soil samples from the B41 borehole at 0-0.5 m depth (No. 831/04) observed in relation to the Dutch standard show that the content of barium, copper, nickel, selenium, cobalt and PAHs above the lowest of the target value, which defines the quality of the unpolluted soil but below the intervention level, while according to the Italian standard, the results of soil sample analysis show that the content of all the analyzed parameters is below the limit value for the soil for industrial and commercial use.

According to the results of the physico-chemical analysis, the sample of soil from the borehole B12 at a depth of 0.4-1 m (No. 824/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of soil samples from the B12 borehole at a depth of 0.4-1 m (No. 824/04) observed in relation to the Dutch standard show that the content of all analyzed parameters is below the lowest value (target value) unprocessed soil, while according to the Italian standard, the results of soil sample analysis show that the content of all analyzed parameters is below the limit values for soil for industrial and commercial use.

According to the results of the physico-chemical analysis, the soil sample from the B3 borehole from 0.5-1 m depth (No. 805/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of soil samples from the B3 borehole at a depth of 0.5-1 m (No. 805/04) observed in relation to the Dutch standard show that the content of PAHs is above the lowest level (target value) defining the quality of the unpolluted but below the intervention level, while according to the Italian standard, the results of the soil sample analysis show that the content of all the analyzed parameters is below the limit value referring to the soil for industrial and commercial use.

According to the results of the physico-chemical analysis, soil samplefrom the borehole B13 at a depth of 0.4-1 m (No. 820/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of the soil sample from the B13 borehole at a depth of 0.4-1 m (No. 820/04) observed in relation to the Dutch standard show that the content of all analyzed parameters is below the lowest value (target value) unprocessed soil, while according to the Italian standard, the results of soil sample analysis show that the content of all analyzed parameters is below the limit values for soil for industrial and commercial use.

According to the results of the physico-chemical analysis , the sample of soil from the borehole B25 at a depth of 1-2 m (No. 779/04) **does not comply** with the requirements of the Rulebook on the permitted amount of dangerous and harmful substances in the soil and methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of soil samples from the B25 borehole at a depth of 1-2 m (No. 779/04) observed in relation to the Dutch standard show that the content of living and total hydrocarbons (TPH) is above the lowest target (s) the quality of the unpolluted soil is defined, but below the intervention level, while according to the Italian standard, the results of the soil sample analysis show that the content of all the analyzed parameters is below the limit value referring to the soil for industrial and commercial use.

According to the results of the physico-chemical analysis, the soil sample from the B4 borehole at a depth of 0.5-1 m (No. 798/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of chromium, nickel, fluorine and polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of the soil sample from the B4 borehole at a depth of 0.5-1 m (No. 798/04) observed in relation to the Dutch standard show that the content of chromium, copper, mercury, nickel, selenium, cobalt and total hydrocarbons TPH) above the lowest level (target value) that defines the quality of the unpolluted soil but below the intervention level, while according to the Italian standard, the results of the soil sample analysis show that the content of all the analyzed parameters is below the limit value referring to the soil for industrial and commercial use.

According to the results of the physico-chemical analysis , soil samplefrom the borehole B15 from the depth of 1-1.5 m (No. of Protocol No. 816/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of chromium, nickel and polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of the soil sample from the B15 borehole at a depth of 1-1.5 m (No. 816/04) observed in relation to the Dutch standard show that the content of nickel, cobalt, PAHs and total hydrocarbons (TPH) above the lowest of the target value, which defines the quality of the unpolluted soil, but below the intervention level, while according to the Italian standard, the results of soil sample analysis show that the content of TPH is above the limit value for soil for industrial and commercial use.

According to the results of the physico-chemical analysis , soil samplefrom the borehole B25 at a depth of 2-3 m (No. 780/04) **does not comply** with the requirements of the Rulebook on permitted amount of hazardous and harmful substances in soil and methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of the soil sample from the B25 borehole at a depth of 2-3 m (No. 780/04) observed in relation to the Dutch standard show that the content of PAHs and total hydrocarbons (TPH) is above the lowest level) which defines the quality of the unpolluted soil but below the intervention level, while according to the Italian standard, the results of soil sample analysis show that the content of TPH is above the limit value for soil for industrial and commercial use.

According to the results of the physico-chemical analysis, the sample of soil from the borehole B4 at a depth of 1-2 m (No. 799/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of soil samples from the B4 borehole at a depth of 1-2 m (No. 799/04) observed in relation to the Dutch standard show that the content of nickel and total hydrocarbons (TPH) is above the lowest level (target value) the quality of the unpolluted soil is defined, but below the intervention level, while according to the Italian standard, the results of the soil sample analysis show that the content of all the analyzed parameters is below the limit value referring to the soil for industrial and commercial use.

According to the results of the physico-chemical analysis , the sample of soil from the borehole B15 from the depth of 1.5-2 m (No. 817/04) **does not comply** with the requirements of the Rulebook on the permitted amount of dangerous and harmful substances in the soil and methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of soil samples from the B15 borehole at a depth of 1.5-2 m (No. 817/04) observed in relation to the Dutch standard show that the content of PAHs and total hydrocarbons (TPH) is above the lowest level) which defines the quality of the unpolluted soil but below the intervention level, while according to the Italian standard, the results of soil sample analysis show that the content of TPH is above the limit value for soil for industrial and commercial use.

According to the results of the physico-chemical analysis, the soil sample from the B15 borehole at a depth of 2-3 m (No. 818/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of the soil sample from the B15 borehole at a depth of 2-3 m (No. 818/04) observed in relation to the Dutch standard show that the content of total hydrocarbons (TPH) is above the lowest target (target value) the quality of the unpolluted soil but below the intervention level, while according to the Italian standard, the results of soil sample analysis show that the content of all the analyzed parameters is below the limit value referring to the soil for industrial and commercial use.

According to the results of the physico-chemical analysis, the sample of soil from the borehole B11 at a depth of 1-2 m (No. 783/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of soil sample from the B11 borehole at 1-2 m depth (No. 783/04) observed in relation to the Dutch standard show that the content of PAHs and total hydrocarbons (TPH) is above the lowest level (target value) which defines the quality of the unpolluted soil but below the intervention level, while according to the Italian standard, the results of soil sample analysis show that the content of TPH is above the limit value for soil for industrial and commercial use.

According to the results of the physico-chemical analysis , the sample of soil from the borehole B12 at a depth of 2-3 m (No. 826/04) **does not comply** with the requirements of the Rulebook on the permitted amount of dangerous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of soil samples from the B12 borehole at 2-3 m depth (No. 826/04) observed in relation to the Dutch standard show that the content of PAHs and total hydrocarbons (TPH) is below the lowest level value) which defines the quality of the unpolluted soil, while according to the Italian standard, the results of soil sample analysis show that the content of PAHs and TPHs is below the limit values for soil for industrial and commercial use.

According to the results of the physico-chemical analysis , the soil sample from the B13 borehole at a depth of 2-3 m (No. 822/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of the soil sample from the B13 borehole at a depth of 2-3 m (No. 822/04) observed in relation to the Dutch standard show that the content of PAHs is above the lowest level (target value) defining the quality of the unpolluted but below the intervention level, while according to the Italian standard, the results of the soil sample analysis show that the content of PAHs and TPHs is below the limit values for soil for industrial and commercial use.

According to the results of the physico-chemical analysis , the sample of soil from the borehole B28 at a depth of 2-3 m (No. 788/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of soil samples from the B28 borehole at a depth of 2-3 m (No. 788/04) observed in relation to the Dutch standard show that the content of PAHs and total hydrocarbons (TPH) is above the lowest level) which defines the quality of the unpolluted soil but below the intervention level, while according to the Italian standard, the results of soil sample analysis show that the content of TPH is above the limit value for soil for industrial and commercial use.

According to the results of the physico-chemical analysis, the sample of soil from the borehole B3 at a depth of 3-5 m (No. 808-809 / 04/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and methods for its examination ("Sl No. 18/97) due to the increased content of polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of the soil sample from the B3 borehole at a depth of 3-5 m (No. 808-809 / 04/04) observed in relation to the Dutch standard show that the content of PAHs and total hydrocarbons (TPH) is above the lowest of the target value, which defines the quality of the unpolluted soil, but below the intervention level, while according to the Italian standard, the results of soil sample analysis show that the content of TPH is above the limit value for soil for industrial and commercial use.

According to the results of the physico-chemical analysis, the sample of soil from the borehole B3 at a depth of 5-6 m (No. of Protocol No. 810/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of soil samples from the borehole B3 at a depth of 5-6 m (No. 810/04) observed in relation to the Dutch standard show that the content of PAHs and total hydrocarbons (TPH) is above the lowest level (target value) which defines the quality of the unpolluted soil but below the intervention level, while according to the Italian standard, the results of soil sample analysis show that the content of TPH is above the limit value for soil for industrial and commercial use.

According to the results of the physico-chemical analysis, the sample of soil from the B4 borehole at a depth of 3-5 m (No. 801-802 / 04/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and methods for its examination ("Sl No. 18/97) due to the increased content of polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

The results of the physico-chemical analysis of the soil sample from the B4 borehole at a depth of 3-5 m (No. 801-802 / 04/04) observed in relation to the Dutch standard show that the content of PAHs and total hydrocarbons (TPH) is above the lowest of the target value, which defines the quality of the unpolluted soil, but below the intervention level, while according to the Italian standard, the results of soil sample analysis show that the content of TPH is above the limit value for soil for industrial and commercial use.

According to the results of the physico-chemical analysis, the soil sample from the B4 borehole at a depth of 5-6 m (No. 803/04) **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of polycyclic aromatic hydrocarbons (PAHs) in relation to the prescribed value.

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The results of the physico-chemical analysis of the soil sample from the B4 borehole at a depth of 5-6 m (No. 803/04) observed in relation to the Dutch standard show that the content of PAHs and total hydrocarbons (TPH) is above the lowest level) which defines the quality of the unpolluted soil but below the intervention level, while according to the Italian standard, the results of soil sample analysis show that the content of TPH is above the limit value for soil for industrial and commercial use.

Conclusion

The location under examination is located west of the KAP production facilities (Electrolysis and Anotec) and the impact of these facilities is evident throughout the site as to content of fluoride (the influence of Electrolysis) and as to content of PAH (Anotec).

The impact of deposited waste / mineral oils as well as the combustion process has resulted in an additional increased content of PAHs at certain micro (individual) locations and significant mineral oil content. For example, in the surroundings of the borehole 23, on the surface of about 40m2, rest of burned wood waste are evident; this has affected the additionally increased content of PAH.

In the largest number of wells as representative of specific surface area (except for borehole 4), the PAH content decreases with increasing depth.

However, the TPH content increases with depths due to different densities, porosity, structure, permeability of the soil: clay is replaced by sand and gravel.

When it comes to TPH, the content in some soil / gravel samples (borehole) is several times higher than the maximum allowed concentration of 750mg / kg as the maximum allowed level in the Italian legislation.

The graphical review of the PAH and TPH contents in the borehole (B3, B4, B11, B14, B15, B25 and B28) is given in depths in Figures 1- 12. The content of PAH is above the Italian standard of 100mg / kg for industrial soil only on the surface layer of the borehole B3, while the content of the TPH is different in depths in the other above-mentioned boreholes.

BOREHOLE B3

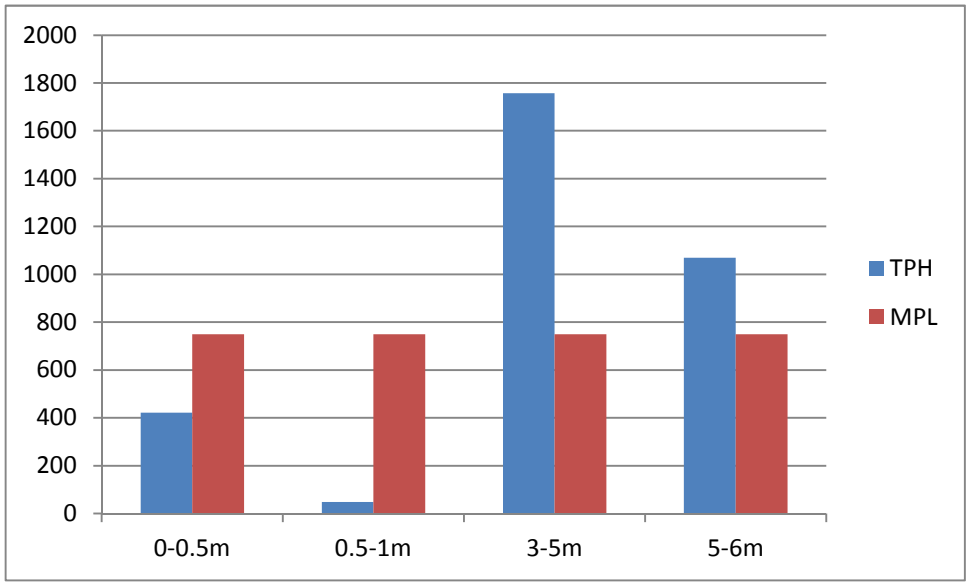


Figure 1: Overview of TPH contents in well B3 at depths

It is evident that TPH content goes to deeper layers, for example 3-5 m as well as 5-6 m is above the maximum allowed by the Italian standard (750 mg / kg) for the industrial zone.

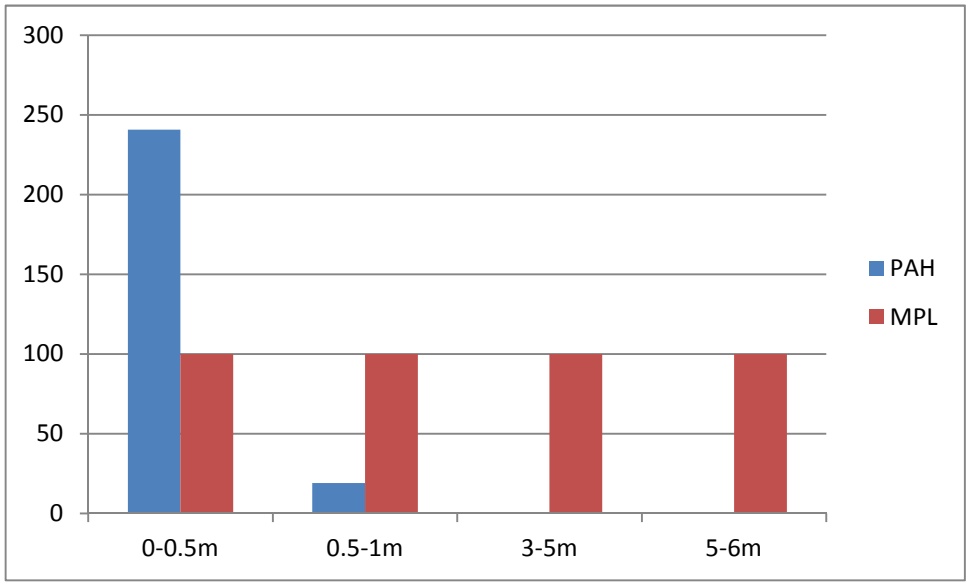


Figure 2: Overview of PAH content in borehole B3 by depths

The PAH content is above the maximum permitted by the Italian standard (100mg / kg) in the surface layer.

BOREHOLE B4

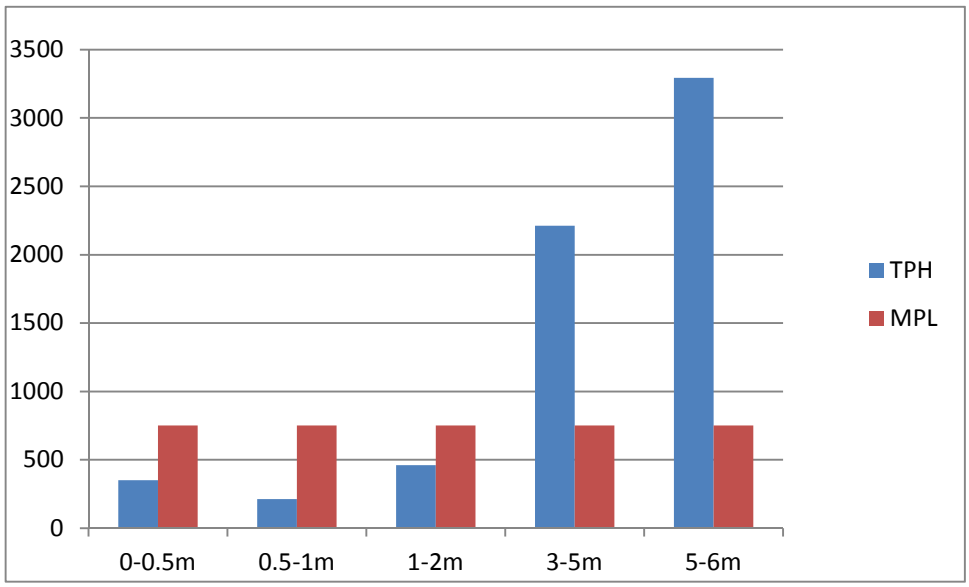


Figure 3: Overview of TPH content in borehole B4 by depths

The content of TPH going to deeper layers, for example, 3-5 m as well as 5-6m is above the maximum allowed by the Italian standard (750mg / kg) for the industrial zone and it increases with depths.

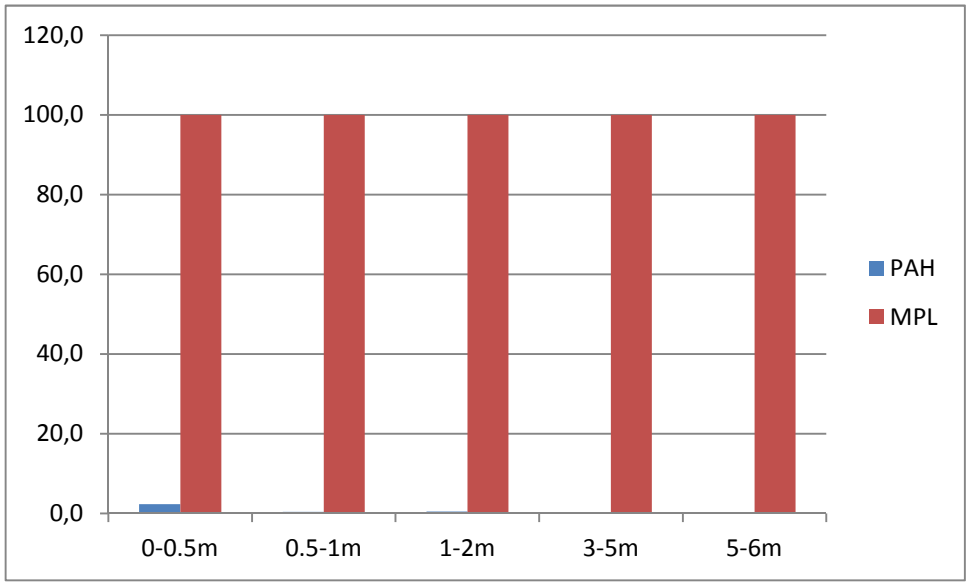


Figure 4: Overview of PAH content in borehole B4 by depths

The PAH content is below the maximum permitted by the Italian standard (100mg / kg).

BOREHOLE B11

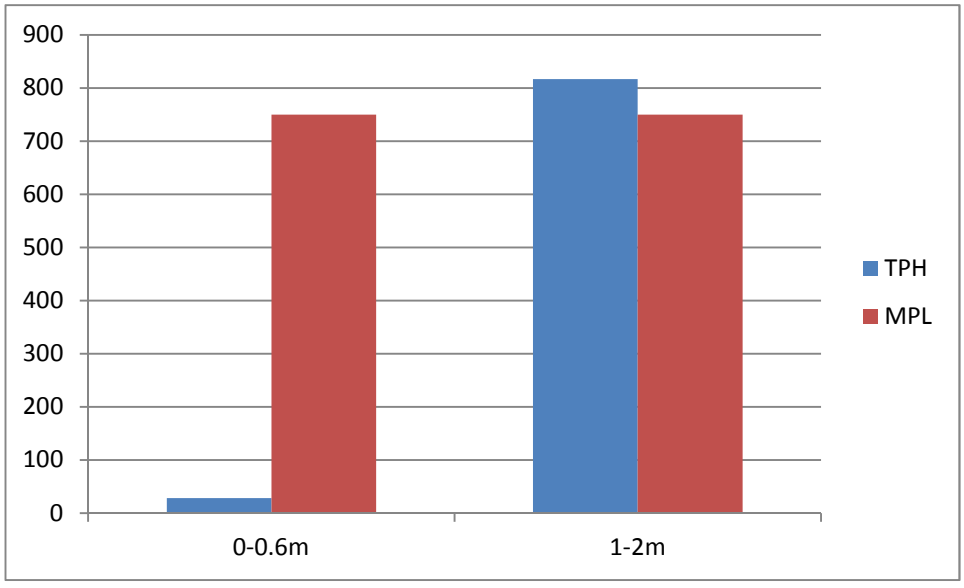


Figure 5: Overview of TPH content in borehole B11 by depths

The TPH content is above the maximum permitted by the Italian standard (750 mg / kg) for the industrial zone at a depth of 1-2m.

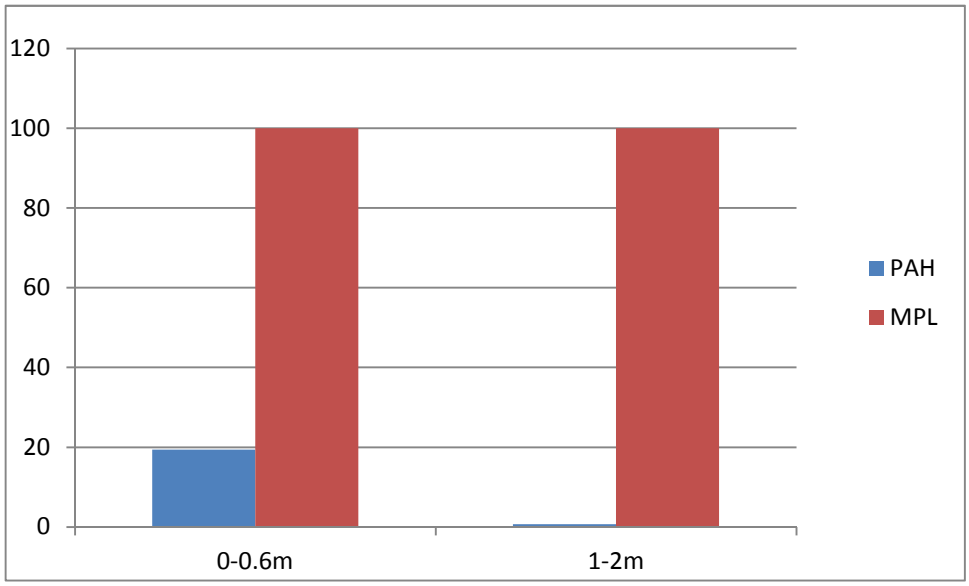


Figure 6: Overview of PAH content in borehole B11 by depths

The PAH content is below the maximum permitted by the Italian standard (100mg / kg).

BOREHOLE B15

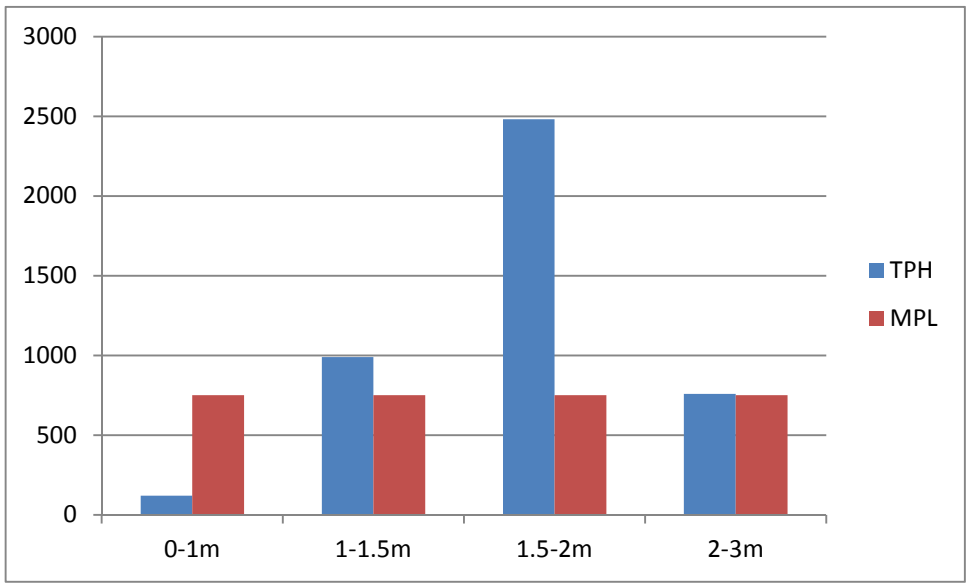


Figure 7: Overview of TPH content in borehole B15 by depths

The TPH content is at a depth of 1.5-2 above the maximum permissible, while at the depth of 2-3 m it is at the maximum permissible level according to the Italian standard (750 mg / kg) for the industrial zone.

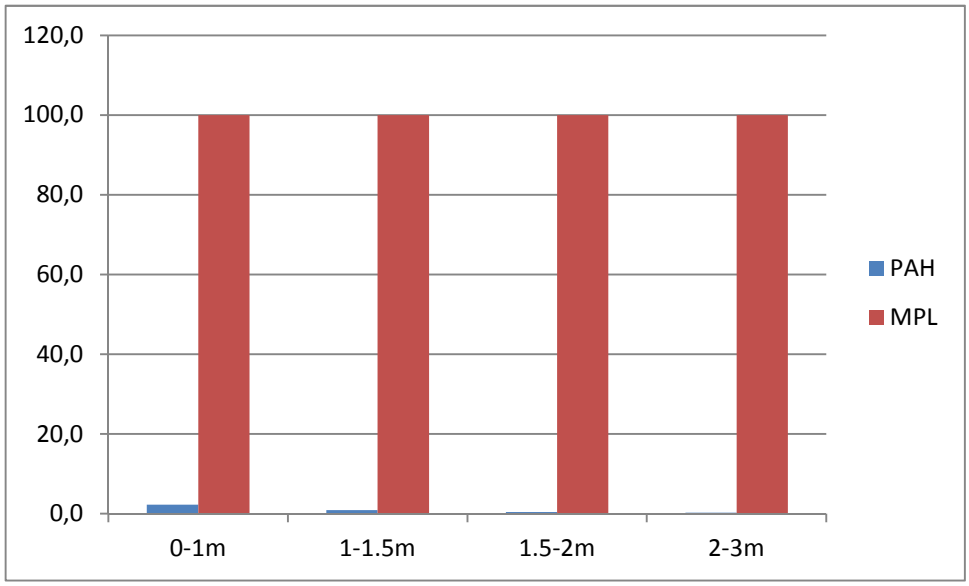


Figure 8: Overview of PAH content in borehole B15 by depths

The PAH content is below the maximum permitted by the Italian standard (100mg / kg).

BOREHOLE B25

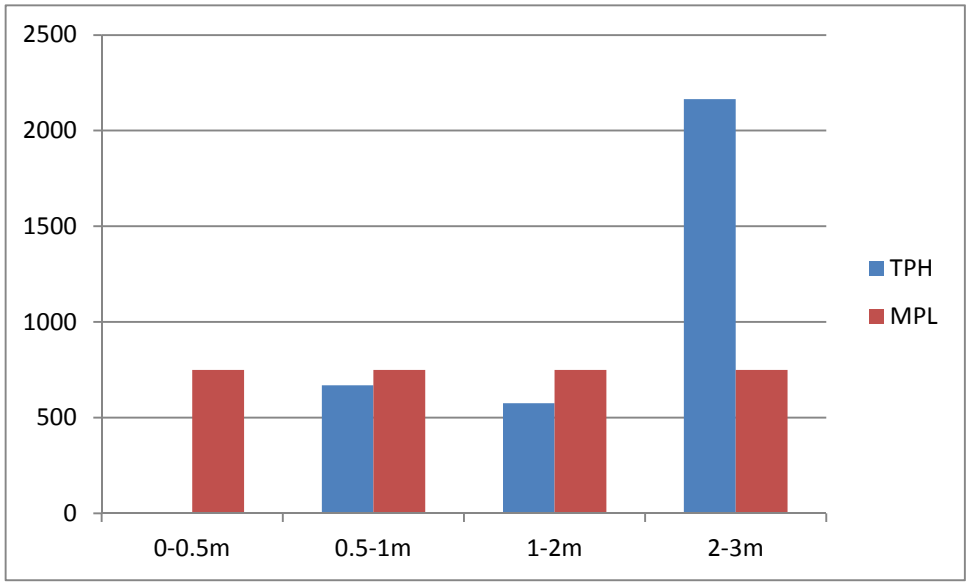


Figure 9: Overview of TPH content in borehole B25 by depths

The TPH content at a depth of 2-3m is above the maximum permitted by the Italian standard (750 mg / kg) for the industrial zone

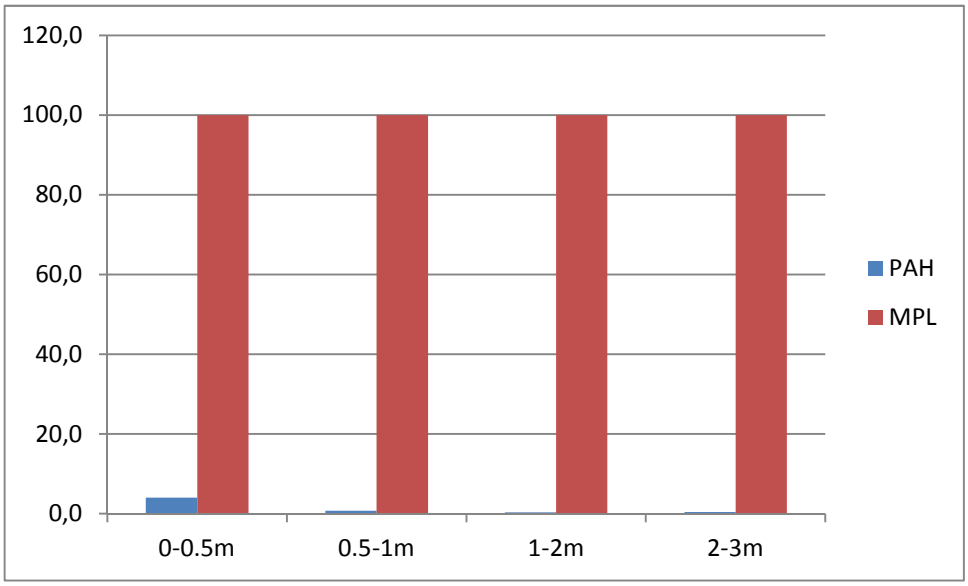


Figure 10: Overview of PAH content in borehole B25 by depths

The PAH content is below the maximum permitted by the Italian standard (100mg / kg).

BOREHOLE B28

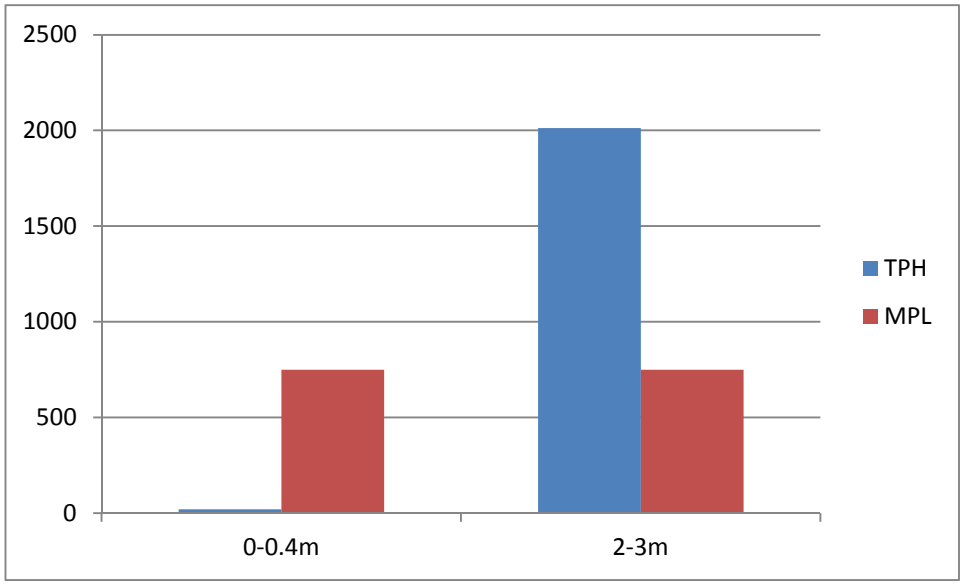


Figure 11: Overview of TPH content in borehole B28 by depths

The TPH content at the depth of 2 - 3m is above the maximum permitted by the Italian standard (750 mg / kg) for the industrial zone.

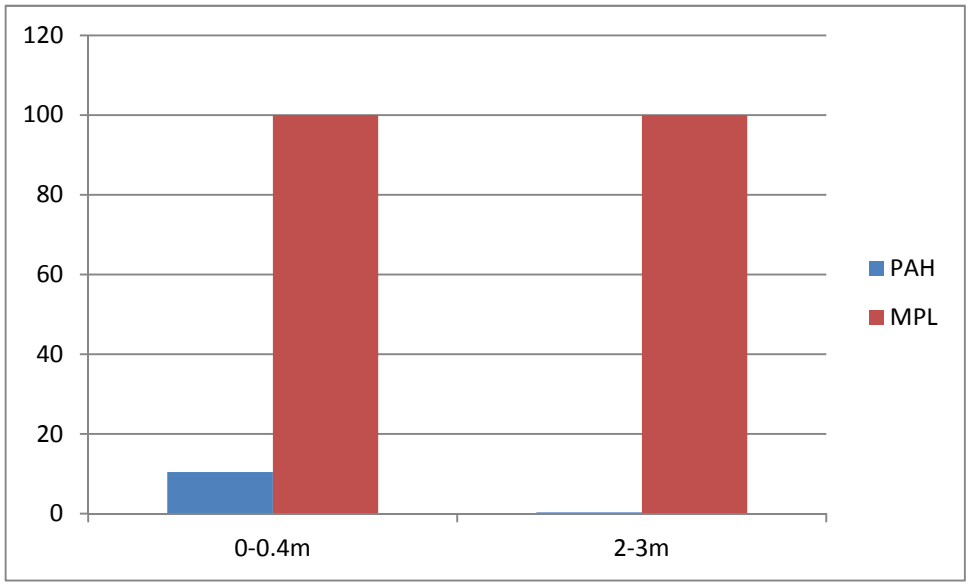


Figure 12: Overview of PAH content in borehole B28 by depths

The PAH content is below the maximum permitted by the Italian standard (100mg / kg).

The TPH content does not exceed the intervention level of the Dutch standard of 5000 mg / kg in any of the boreholes but is significantly above the "target" level (50 mg / kg) in which case further research is recommended.

Since 1998, CETI has implemented the Program for the Testing of Hazardous and Hazardous Substances in the Land of Montenegro. The aim of the program is to determine the content of hazardous and harmful substances in the land as a segment of the environment (near the landfill, subway stations, roads, industrial zones, airports, as well as in inhabited places with special emphasis on playgrounds and parks) to take measures of its protection, and improvements. The results of soil sample analysis in Montenegro show increased chromium and nickel content in almost all soil samples. By sequential analysis it was found that the content of chromium and nickel (above MDK 50 mg / kg) is of natural and not of anthropogenic origin.

ANNEX 1: PHOTO DOCUMENTATION



BOREHOLE B1



BOREHOLE B2



BOREHOLE B3



BOREHOLE B4



BOREHOLE B5



BOREHOLE B6



BOREHOLE B7



BOREHOLE B8



BOREHOLE B9



BOREHOLE B10



BOREHOLE B11



BOREHOLE B12



BOREHOLE B13



BOREHOLE B14



BOREHOLE B15



BOREHOLE B16



BOREHOLE B17



BOREHOLE B18



BOREHOLE B19



BOREHOLE B20



BOREHOLE B21



BOREHOLE B22



BOREHOLE B23



BOREHOLE B24



BOREHOLE B25



BOREHOLE B26



BOREHOLE B27



BOREHOLE B28



BOREHOLE B29



BOREHOLE B30



BOREHOLE B31



BOREHOLE B32



BOREHOLE B33



BOREHOLE B34



BOREHOLE B35



BOREHOLE B36



BOREHOLE B37



BOREHOLE B38



BOREHOLE B39



BOREHOLE B40



BOREHOLE B41





DRILLING EQUIPMENT



DRILLING EQUIPMENT

ANNEX 2: MAP OF BOREHOLES



Br	Y	X
1	600650.44	4695174.29
2	600782.30	4695069.65
3	601027.06	4695354.24
4	600796.02	4695456.12
5	600696.62	4695256.06
6	600690.79	4695174.65
7	600726.55	4695138.61
8	600737.29	4695130.66
9	600793.27	4695108.35
10	600836.63	4695128.42
11	600972.93	4695288.13
12	600970.04	4695345.64
13	600954.94	4695387.64
14	600942.85	4695392.69
15	600863.46	4695421.87
16	600778.25	4695426.31
17	600738.39	4695208.77
18	600762.97	4695182.80
19	600772.46	4695175.49
20	600811.41	4695158.49
21	600835.83	4695161.62
22	600901.31	4695212.22
23	600915.23	4695228.87
24	600947.24	4695282.21
25	600929.94	4695316.84
26	600914.51	4695335.95
27	600903.26	4695345.34
28	600853.23	4695382.95
29	600812.14	4695377.36
30	600757.38	4695360.25
31	600745.71	4695340.86
32	600734.09	4695272.92
33	600774.94	4695278.51
34	600788.60	4695238.82
35	600811.32	4695222.48
36	600861.95	4695211.99
37	600901.70	4695259.33
38	600878.28	4695307.44
39	600865.30	4695345.24
40	600817.11	4695329.66
41	600845.11	4695265.85

Maps with locations of boreholes

HISTORICAL DATA

A vailable historical data are related to soil and groundwater testing, near of the Podgorica Aluminum Plant (KAP) carried out under regular monitoring programs at the request of KAP.

Soil samples are sampled from the west side of the KAP (Electrolysis and Anotec), in the same direction as the subject location but away from the same 100m to 500m.

The soil samples were taken from the depth of 0-30 cm and the scope of the realized tests was in accordance with the requirements of the Rulebook on permitted amounts of hazardous and harmful substances in soil and methods for its testing ("List of RCGs", No. 18/97).

As Rulebook does not meet the MDK for the total hydrocarbon content (TPH), this means that this group of compounds was not subject to testing.

The results of the soil samples analysis (sampled 500 and 1000 m far from the KAP in the direction of the west in 2012. and 2016.) show that it does not correspond to the requirements of the Rolebook on permitted amounts of hazardous and harmful substances in soil and methods for its testing ("Fig. list RCG ", No. 18/97) due to increased content of chromium, nickel, fluoride and polycyclic aromatic hydrocarbons.

Observed in relation to the Dutch standards, these results show that the content of nickel, cobalt and PAHs above the target value defines the quality of the unpolluted soil but below the intervention level.

Compared to the Italian standards, results of the soil analysis shows that the content of all analyzed parameters are below the limit values relating to the soil for industrial and commercial use.

The available data for the quality of groundwater relate to piezometer P7 located at the site which is the subject of this study. The tests were performed in accordance with the provisions of the "Regulation for classification and categorization of surface and ground water (" Off.Gazz. MNE ", No. 02/07).

Water quality from this location varies depending on the year of sampling. Thus in 2011 (one sampling) the quality corresponded to the requirements for A1 class, while in 2016 (two sampling) and 2017 (one sampling) the quality of this water was outside of all classes prescribed by the Regulation.

Parameters that exceed the limits for all water classes are: turbidity, manganese, orthophosphates, ammonium ion, cyanides and suspended solids (2016) and ammonium ion (2017).

REPORT No. 00-1654/1

RESULTS OF ANALYSES-SOIL

	LOCATION		500 m west of Electrolysis	1000 m west of Electrolysis		Method
	Protocol number		13/04	14/04		
	Date of sampling		30.01.2011.	30.01.2011.		
N_0	Parameter	Unit			MPL	
	Depth	cm	0-30	0-30		
1	pH		6.10±0.10	6.32±0.10		SW846 Method 9045*
2	Cadmium	mg/kg	0.71±0.07	0.56±0.06	2	AOAC 990.08*
3	Lead	mg/kg	17.16±1.61	18.38±1.72	50	AOAC 990.08*
4	Mercury	mg/kg	0.039±0.006	0.064±0.010	1.5	AMA-114*
5	Arsenic	mg/kg	19.54±2.33	27.86±3.32	20	AOAC 990.08*
6	Chromium	mg/kg	17.21	38.52	50	AOAC 990.08
7	Nickel	mg/kg	74.89±6.15	101.67±8.35	50	AOAC 990.08*
8	Fluorine	mg/kg	792.0	1003.0	300	AF-ISM
9	Copper	mg/kg	21.27±3.83	36.89±5.26	100	AOAC 990.08*
10	Zinc	mg/kg	53.41±3.89	66.90±4.87	300	AOAC 990.08*
11	Boron	mg/kg	3.87	4.47	5	EPA 3051A, EPA 6010C
12	Cobalt	mg/kg	6.88±0.67	17.00±1.65	50	AOAC 990.08*

13	Molybdenum	mg/kg	<0.05	0.79	10	EPA 3051A, EPA 6010-C
14	Manganese	mg/kg	834.62±135.04	1227.09±198.54		AOAC 990.08*
15	Polycyclic aromatic hydrocarbons (PAH):					
	Naphtalene	mg/kg	0.049±0.014	0.030±0.008		EPA 8270 C*
	Acenaphtylene	mg/kg	<0.001	<0.001		EPA 8270 C*
	Acenaphtene	mg/kg	0.273±0.048	0.026±0.0046		EPA 8270 C*
	Fluorineene	mg/kg	0.126±0.0205	0.017±0.0027		EPA 8270 C*
	Phenanthrene	mg/kg	2.244±0.340	0.185±0.028		EPA 8270 C*
	Anthracene	mg/kg	0.387±0.047	0.033±0.004		EPA 8270 C*
	Fluorineanthene	mg/kg	6.666±1.018	0.435±0.066		EPA 8270 C*
	Pyrene	mg/kg	5.990±0.937	0.370±0.058		EPA 8270 C*
	Benzo(a)anthracene	mg/kg	4.025±0.541	0.270±0.036		EPA 8270 C*
	Chrysene	mg/kg	5.592±0.867	0.401±0.062		EPA 8270 C*
	Benzo(b)Fluorineanthene	mg/kg	7.645±1.158	0.558±0.085		EPA 8270 C*
	Benzo(k)Fluorineanthene	mg/kg	2.422±0.593	0.174±0.043		EPA 8270 C*
	Benzo(a)pyrene	mg/kg	4.736±0.610	0.304±0.039		EPA 8270 C*
	Indeno(1,2,3-cd) pyrene	mg/kg	3.690±0.579	0.240±0.038		EPA 8270 C*

	Dibenzo(a,h) anthracene	mg/kg	0.913±0.215	0.061±0.014		EPA 8270 C*
	Benzo(g,h,i)perylene	mg/kg	3.705±0.705	0.247±0.047		EPA 8270 C*
	ΣPAHs	mg/kg	48.46±8.41	3.35±0.58	0.6	EPA 8270 C*
16	PCBs congeners:	mg/kg				
	PCB 18	mg/kg	<0.0005	<0.0005	0.004	EPA 8270 C*
	PCB 31	mg/kg	<0.0005	<0.0005	0.004	EPA 8270 C*
	PCB 28	mg/kg	<0.0005	<0.0005	0.004	EPA 8270 C*
	PCB 52	mg/kg	0.0022±0.00027	0.0007±0.000086	0.004	EPA 8270 C*
	PCB 44	mg/kg	0.00070±0.00008	<0.0005	0.004	EPA 8270 C*
	PCB 101	mg/kg	0.00060±0.00007	<0.0005	0.004	EPA 8270 C*
	PCB 149	mg/kg	<0.0005	<0.0005	0.004	EPA 8270 C*
	PCB 118	mg/kg	<0.0005	<0.0005	0.004	EPA 8270 C*
	PCB 153	mg/kg	0.00070±0.00007	<0.0005	0.004	EPA 8270 C*
	PCB 138	mg/kg	<0.0005	<0.0005	0.004	EPA 8270 C*
	PCB 180	mg/kg	0.00050±0.00008	<0.0005	0.004	EPA 8270 C*
	PCB 194	mg/kg	<0.0005	<0.0005	0.004	EPA 8270 C*
17	Organotin compounds	mg/kg			0.005	ISO 23161
	Monobutyl-tin	mg/kg	<0.005	<0.005		ISO 23161
	Dibutyl-tin	mg/kg	<0.005	<0.005		ISO 23161

	Monophenyl- tin	mg/kg	<0.005	<0.005		ISO 23161
	Tributyl-tin	mg/kg	<0.005	<0.005		ISO 23161
	Diphenyl-tin	mg/kg	<0.005	<0.005		ISO 23161
	Triphenyl-tin	mg/kg	<0.005	<0.005		ISO 23161

* - accredited method

OPINION

According to the results of the physico-chemical analysis , the soil sample from th site 500 m west of Electrolysis (Pr No. 13/04) does not comply with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of nickel content, fluorine and polycyclic aromatic hydrocarbons in relation to the prescribed value..
According to the results of the physico-chemical analysis , the soil sample from th site 1000 m west of Electrolysis (Pr No. 14/04)) does not comply with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of Arsenic, Nickel, Fluorinated and Polycyclic Aromatic Carbon Dioxides in relation to the prescribed value. .

REPORT No. 00-1654/1

RESULTS OF ANALYSES-SOIL

	LOCATION		500 m west of Electrolysis	1000 m west of Electrolysis		Method	
	Protocol number		216/04	217/04			
	Date of sampling		30.05.2011.	30.05.2011.			
N_0	Parameter	Unit			MPL		
1	pH		7.25±0.12	6.12±0.10		SW846 Method 9045*	
2	Cadmium	mg/kg	1.01±0.10	0.67±0.07	2	AOAC 990.08*	
3	Lead	mg/kg	21.51±2.02	22.32±2.09	50	AOAC 990.08*	
4	Mercury	mg/kg	0.077±0.013	0.066±0.011	1.5	AMA-114*	
5	Arsenic	mg/kg	23.87±2.84	23.45±2.79	20	AOAC 990.08*	
6	Chromium	mg/kg	48.45	35.27	50	AOAC 990.08	
7	Nickel	mg/kg	163.58±13.43	146.34±12.01	50	AOAC 990.08*	
8	Fluorine	mg/kg	950.0	1193.0	300	AF-ISM	

9	Copper	mg/kg	45.06±6.43	36.50±5.21	100	AOAC 990.08*	
10	Zinc	mg/kg	90.26±6.57	82.21±5.98	300	AOAC 990.08*	
11	Boron	mg/kg	<1.25	<1.25	5	EPA 3051A	
12	Cobalt	mg/kg	22.89±2.23	26.23±2.55	50	AOAC 990.08*	
13	Molybdenum	mg/kg	<0.125	<0.125	10	EPA 3051A	
14	Manganese	mg/kg	2379.22±384.96	1986.67±321.44		AOAC 990.08*	
15	Polycyclic aromatic hydrocarbons (PAH):						
	Naphtalene	mg/kg	0.0220±0.0061	0.0400±0.0111		EPA 8270 C*	
	Acenaphtylene	mg/kg	< 0.005	< 0.005		EPA 8270 C*	
	Acenaphtene	mg/kg	0.0620±0.011	0.0920±0.0164		EPA 8270 C*	
	Fluorineene	mg/kg	0.0450±0.0073	0.0880±0.0143		EPA 8270 C*	
	Phenanthrene	mg/kg	0.3960±0.0599	0.5100±0.0772		EPA 8270 C*	

	Anthracene	mg/kg	0.0710±0.0086	0.1100±0.0134		EPA 8270 C*	
	Fluorineanthene	mg/kg	0.9940±0.1518	1.2280±0.1875		EPA 8270 C*	
	Pyrene	mg/kg	0.8440±0.1321	1.0310±0.1614		EPA 8270 C*	
	Benzo(a)anthracene	mg/kg	0.5210±0.0701	0.6210±0.0835		EPA 8270 C*	
	Chrysene	mg/kg	0.6860±0.1064	0.9050±0.1404		EPA 8270 C*	
	Benzo(b)Fluorineanthene	mg/kg	2.0500±0.3106	1.2800±0.1939		EPA 8270 C*	
	Benzo(k)Fluorineanthene	mg/kg	0.6400±0.1567	0.474±0.116		EPA 8270 C*	
	Benzo(a)pyrene	mg/kg	1.1200±0.1441	0.7730±0.0995		EPA 8270 C*	
	Indeno(1.2.3-cd)pyrene	mg/kg	1.0570±0.1657	0.6930±0.1087		EPA 8270 C*	
	Dibenzo(a.h)anthracene	mg/kg	0.2310±0.0543	0.1870±0.044		EPA 8270 C*	
	Benzo(g.h.i)perylene	mg/kg	0.9750±0.1854	0.6300±0.1198		EPA 8270 C*	
	ΣPAHs	mg/kg	9.7140±1.6854	8.6620±1.5029	0.6	EPA 8270 C*	

16	PCBs congeners:	mg/kg					
	PCB 18	mg/kg	0.0110±0.0013	0.0090±0.0011	0.004	EPA 8270 C*	
	PCB 31	mg/kg	0.0080±0.0009	0.0060±0.0007	0.004	EPA 8270 C*	
	PCB 28	mg/kg	0.0110±0.0013	0.0090±0.0011	0.004	EPA 8270 C*	
	PCB 52	mg/kg	0.0050±0.0006	0.0050±0.0006	0.004	EPA 8270 C*	
	PCB 44	mg/kg	0.0020±0.0002	0.0020±0.0002	0.004	EPA 8270 C*	
	PCB 101	mg/kg	<0.002	<0.002	0.004	EPA 8270 C*	
	PCB 149	mg/kg	<0.002	<0.002	0.004	EPA 8270 C*	
	PCB 118	mg/kg	<0.002	<0.002	0.004	EPA 8270 C*	
	PCB 153	mg/kg	<0.002	<0.002	0.004	EPA 8270 C*	
	PCB 138	mg/kg	<0.002	<0.002	0.004	EPA 8270 C*	
	PCB 180	mg/kg	<0.002	<0.002	0.004	EPA 8270 C*	
	PCB 194	mg/kg	<0.002	<0.002	0.004	EPA 8270	

						C*	
17	Triazini	mg/kg			0.01		
	Atrazin	mg/kg	<0.005	<0.005		DIN ISO 11264	
	Simazin	mg/kg	<0.005	<0.005		DIN ISO 11264	
18	Carbamates	mg/kg			0.5		
	Aldicarb	mg/kg	<0.1	<0.1		EPA 8318A	
	Aldicarb-sulfone	mg/kg	<0.1	<0.1		EPA 8318A	
	Aldicarb-sulfoxide	mg/kg	<0.1	<0.1		EPA 8318A	
	Carbofuran	mg/kg	<0.1	<0.1		EPA 8318A	
	Carbofuran-3-hydroxy	mg/kg	<0.1	<0.1		EPA 8318A	
	1-Naphtyl-N-methylcarbamate	mg/kg	<0.1	<0.1		EPA 8318A	
	Mercaptodimethur	mg/kg	<0.1	<0.1		EPA 8318A	
	Methomyl	mg/kg	<0.1	<0.1		EPA 8318A	
	Oxamyl	mg/kg	<0.1	<0.1		EPA	

						8318A	
	Propoxur	mg/kg	<0.1	<0.1		EPA 8318A	
19	Dithiocarbamates	mg/kg			1.0		
	Mancozeb	mg/kg	<0.5	<0.5		FPD	
	Maneb	mg/kg	<0.5	<0.5		FPD	
	Metiram	mg/kg	<0.5	<0.5		FPD	
	Ziram	mg/kg	<0.5	<0.5		FPD	
	Zineb	mg/kg	<0.5	<0.5		FPD	
	Thiram	mg/kg	<0.5	<0.5		FPD	
	Ferbam	mg/kg	<0.5	<0.5		FPD	
20	Chlorphenoxy	mg/kg			1.0		
	2.4-D	mg/kg	<0.5	<0.5		EPA Method 1658	
	2.4-DB	mg/kg	<0.5	<0.5		EPA Method 1658	
	2.4-DP	mg/kg	<0.5	<0.5		EPA Method 1658	
	2.4.5-TP	mg/kg	<0.5	<0.5		EPA Method	

						1658	
	2.4.5-T	mg/kg	<0.5	<0.5		EPA Method 1658	
21	Phenol herbicides	mg/kg			0.3		
	DNOC	mg/kg	<0.1	<0.1		EPA Method81 51A	
	DINOSEB	mg/kg	<0.1	<0.1		EPA Method81 51A	
22	Organochlorine pesticide	mg/kg				0.01	
	DDT	mg/kg	<0.005	<0.005		EPA 8270 C*	
	DDD	mg/kg	<0.005	<0.005		EPA 8270 C*	
	DDE	mg/kg	<0.005	<0.005		EPA 8270 C*	
23	Organotin compounds	mg/kg			0.005	ISO 23161*	
	Monobutyl-tin	mg/kg	<0.005	<0.005		ISO 23161*	
	Dibutyl- tin	mg/kg	<0.005	<0.005		ISO 23161*	
	Monophenyl- tin	mg/kg	<0.005	<0.005		ISO	

						23161*	
	Tributyl-tin	mg/kg	<0.005	<0.005		ISO 23161*	
	Diphenyl-tin	mg/kg	<0.005	<0.005		ISO 23161*	
	Triphenyl-tin	mg/kg	<0.005	<0.005		ISO 23161*	

* - accredited method

OPINION

According to the results of the physico-chemical analysis , the soil sample from the site 500 m west of Electrolysis (no. pr. 216/04) does not comply with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of Arsenic, Nickel, Fluorineid, Polycyclic Aromatic Carbons and PCB Congeners (PCB 18 , PCB 31, PCB 28, PCB 52) in relation to the prescribed value..

According to the results of the physico-chemical analysis , the soil sample from the site 1000 m west of Electrolysis (no. pr. 217/04) does not comply with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of Arsenic, Nickel, Fluorineid, Polycyclic Aromatic Carbons and PCB Congeners (PCB 18 , PCB 31, PCB 28, PCB 52) in relation to the prescribed value..

RESULTS OF ANALYSES-SOIL

	LOCATION		KAP-west 500m	KAP-west 1000m		Method
	Protocol number		313/04	314/04		
	Date of sampling		28.11.2012.	28.11.2012.		
N_0	Parameter	Unit			MPL	
	Depth		0-20cm	0-20cm		
1	pH		6.65 ± 0.11	6.40 ± 0.10		SW846 Method 9045*
2	Cadmium	mg/kg	< 0.08	< 0.08	2	AOAC 990.08*
3	Lead	mg/kg	18.25 ± 0.71	12.04 ± 1.13	50	AOAC 990.08*
4	Mercury	mg/kg	0.0894 ± 0.0146	0.065 ± 0.011	1.5	AMA-112*
5	Arsenic	mg/kg	6.20 ± 0.74	3.87 ± 0.46	20	AOAC 990.08*
6	Chromium	mg/kg	44.07	61.14	50	AOAC 990.08
7	Nickel	mg/kg	114.65 ± 9.41	173.96 ± 14.28	50	AOAC 990.08*
8	Fluorine	mg/kg	768.86	659.84	300	AF-ISM
9	Copper	mg/kg	26.72 ± 3.81	30.82 ± 4.39	100	AOAC 990.08*

10	Zinc	mg/kg	57.76 ± 4.20	46.91 ± 3.41	300	AOAC 990.08*
11	Boron	mg/kg	0.16	0.142	5	EPA 3051A, EPA 6010C
12	Cobalt	mg/kg	14.35 ± 1.40	17.08 ± 1.66	50	AOAC 990.08*
13	Molybdenum	mg/kg	1.46	0.97	10	EPA 3051A, EPA 6010-C
14	Polycyclic aromatic hydrocarbons (PAH):					
	Naphtalene	mg/kg	0.075±0.0208	0.044±0.0122		EPA 8270 C*
	Acenaphtylene	mg/kg	0.005±0.0008	0.005±0.0008		EPA 8270 C*
	Acenaphtene	mg/kg	0.022±0.0039	0.005±0.0009		EPA 8270 C*
	Fluorineene	mg/kg	0.023±0.0037	0.011±0.0018		EPA 8270 C*
	Phenanthrene	mg/kg	0.201±0.0304	0.070±0.0106		EPA 8270 C*
	Anthracene	mg/kg	0.015±0.0018	0.008±0.0010		EPA 8270 C*
	Fluorineanthene	mg/kg	0.331±0.0505	0.109±0.0166		EPA 8270 C*
	Pyrene	mg/kg	0.291±0.0455	0.093±0.0146		EPA 8270 C*
	Benzo(a)anthracene	mg/kg	0.187±0.0252	0.057±0.0077		EPA 8270 C*
	Chrysene	mg/kg	0.254±0.0394	0.081±0.0126		EPA 8270 C*
	Benzo(b)Fluorineanthene	mg/kg	0.409±0.0620	0.126±0.0191		EPA 8270 C*
	Benzo(k)Fluorineanthene	mg/kg	0.280±0.0685	0.218±0.0534		EPA 8270 C*
	Benzo(a)pyrene	mg/kg	0.434±0.0559	0.220±0.0283		EPA 8270 C*

	Indeno(1,2,3-cd)pyrene	mg/kg	0.499±0.0782	0.382±0.0599		EPA 8270 C*
	Dibenzo(a,h)anthracene	mg/kg	0.085±0.0200	0.062±0.0146		EPA 8270 C*
	Benzo(g,h,i)perylene	mg/kg	0.407±0.0774	0.297±0.0565		EPA 8270 C*
	ΣPAHs	mg/kg	3.518±0.610	1.788±0.310	0.6	EPA 8270 C*
15	PCBs congeners:	mg/kg				
	PCB 18	mg/kg	<0.002	<0.002	0.004	EPA 8270 C*
	PCB 31	mg/kg	<0.002	<0.002	0.004	EPA 8270 C*
	PCB 28	mg/kg	<0.002	<0.002	0.004	EPA 8270 C*
	PCB 52	mg/kg	<0.002	<0.002	0.004	EPA 8270 C*
	PCB 44	mg/kg	<0.002	<0.002	0.004	EPA 8270 C*
	PCB 101	mg/kg	<0.002	<0.002	0.004	EPA 8270 C*
	PCB 149	mg/kg	<0.002	<0.002	0.004	EPA 8270 C*
	PCB 118	mg/kg	<0.002	<0.002	0.004	EPA 8270 C*
	PCB 153	mg/kg	<0.002	<0.002	0.004	EPA 8270 C*
	PCB 138	mg/kg	<0.002	<0.002	0.004	EPA 8270 C*
	PCB 180	mg/kg	<0.002	<0.002	0.004	EPA 8270 C*
	PCB 194	mg/kg	<0.002	<0.002	0.004	EPA 8270 C*
16	Triazini	mg/kg			0.01	
	Atrazin	mg/kg	< 0.005	< 0.005		DIN ISO 11264

	Simazin	mg/kg	< 0.005	< 0.005		DIN ISO 11264
17	Carbamates	mg/kg			0.5	
	Aldicarb	mg/kg	< 0.1	< 0.1		EPA 8318A
	Aldicarb-sulfone	mg/kg	< 0.1	< 0.1		EPA 8318A
	Aldicarb-sulfoxide	mg/kg	< 0.1	< 0.1		EPA 8318A
	Carbofuran	mg/kg	< 0.1	< 0.1		EPA 8318A
	Carbofuran-3-hydroxy	mg/kg	< 0.1	< 0.1		EPA 8318A
	1-Naphtyl-N-methylcarbamate	mg/kg	< 0.1	< 0.1		EPA 8318A
	Mercaptodimethur	mg/kg	< 0.1	< 0.1		EPA 8318A
	Methomyl	mg/kg	< 0.1	< 0.1		EPA 8318A
	Oxamyl	mg/kg	< 0.1	< 0.1		EPA 8318A
	Propoxur	mg/kg	< 0.1	< 0.1		EPA 8318A
18	Dithiocarbamates	mg/kg			1.0	
	Mancozeb	mg/kg	< 0.5	< 0.5		FPD
	Maneb	mg/kg	< 0.5	< 0.5		FPD
	Metiram	mg/kg	< 0.5	< 0.5		FPD
	Ziram	mg/kg	< 0.5	< 0.5		FPD
	Zineb	mg/kg	< 0.5	< 0.5		FPD
	Thiram	mg/kg	< 0.5	< 0.5		FPD

	Ferbam	mg/kg	< 0.5	< 0.5		FPD
19	Chlorphenoxy	mg/kg			1.0	
	2.4-D	mg/kg	< 0.5	< 0.5		EPA Method 1658
	2.4-DB	mg/kg	< 0.5	< 0.5		EPA Method 1658
	2.4-DP	mg/kg	< 0.5	< 0.5		EPA Method 1658
	2.4.5-TP	mg/kg	< 0.5	< 0.5		EPA Method 1658
	2.4.5-T	mg/kg	< 0.5	< 0.5		EPA Method 1658
20	Phenol herbicides	mg/kg			0.3	
	DNOC	mg/kg	< 0.1	< 0.1		EPA Method8151A
	DINOSEB	mg/kg	< 0.1	< 0.1		EPA Method8151A
21	Organotin compounds	mg/kg			0.005	ISO 23161
	Monobutyl-tin	mg/kg	<0.004	<0.004		ISO 23161
	Dibutyl- tin	mg/kg	<0.004	<0.004		ISO 23161
	Monophenyl- tin	mg/kg	<0.004	<0.004		ISO 23161
	Tributyl-tin	mg/kg	<0.004	<0.004		ISO 23161
	Diphenyl-tin	mg/kg	<0.004	<0.004		ISO 23161
	Triphenyl-tin	mg/kg	<0.004	<0.004		ISO 23161

* - accredited method

REPORT No. 00-1654/1

OPINION

According to the results of the physical-chemical analysis, the soil sample sampled 500 m west of Electrolysis, (Pr No CETI 313/04) does not comply with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of nickel, fluorine and polycyclic aromatic hydrocarbons in relation to the prescribed value.

According to the results of the physical-chemical analysis, the soil sample sampled 500 m west of Electrolysis, (Pr No CETI 314/04) does not comply with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of Chromium a, nickel, Fluorine and polycyclic aromatic hydrocarbons in relation to the prescribed value.

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REPORT No. 00-1654/1

RESULTS OF ANALYSES-SOIL

LOCATION			500 metara west of Electrolysis	1000 metara west of Electrolysis	MPL	Method
Protocol number			967/04	968/04		
Date of sampling			23.11.2016.	23.11.2016.		
N_0	Parameter	Unit	Results of analyses			
1	pH		7,52±0,27	7,53±0,31		EPA SW-846 M9045d*
2	Cadmium	mg/kg	0,61±0,04	0,54±0,04	2	EPA 3051A*
3	Lead	mg/kg	29±2	23±2	50	EPA 3051A*
4	Mercury	mg/kg	0,10±0,02	0,12±0,02	1,5	AMA-112*
5	Arsenic	mg/kg	13±1	9±1	20	EPA 3051A*
6	Chromium	mg/kg	78±6	71±6	50	EPA 3051A*
7	Nickel	mg/kg	127±12	108±10	50	EPA 3051A*
8	Fluorine	mg/kg	1020	653	300	AF-ISM
9	Copper	mg/kg	59±3	46±3	100	EPA 3051A*
10	Zinc	mg/kg	90±3	64±2	300	EPA 3051A*
11	Boron	mg/kg	7,6±0,8	4,0±0,4	5	EPA 3051A*
12	Cobalt	mg/kg	18±3	13±2	50	EPA 3051A*
13	Molybdenum	mg/kg	1,0±0,1	0,45±0,06	10	EPA 3051A*

14	**Polycyclic aromatic hydrocarbons (PAH):**					
	Naphtalene	**mg/kg**	**0,070±0,019**	**0,024±0,007**		**EPA 8270 C***
	2-Methylnaphtalene	**mg/kg**	**0,040±0,011**	**0,015±0,004**		**EPA 8270 C***
	1-Methylnaphtalene	**mg/kg**	**0,037±0,010**	**0,014±0,004**		**EPA 8270 C***
	Acenaphtylene	**mg/kg**	**0,009±0,001**	**0,007±0,001**		**EPA 8270 C***
	Acenaphtene	**mg/kg**	**0,246±0,044**	**0,048±0,009**		**EPA 8270 C***
	Fluorineene	**mg/kg**	**0,125±0,020**	**0,030±0,005**		**EPA 8270 C***
	Phenanthrene	**mg/kg**	**1,70±0,26**	**0,396±0,060**		**EPA 8270 C***
	Anthracene	**mg/kg**	**0,384±0,047**	**0,061±0,007**		**EPA 8270 C***
	Fluorineanthene	**mg/kg**	**5,23±0,78**	**1,14±0,17**		**EPA 8270 C***
	Pyrene	**mg/kg**	**4,24±0,66**	**0,991±0,155**		**EPA 8270 C***
	Benzo(a)anthracene	**mg/kg**	**2,48±0,33**	**0,590±0,079**		**EPA 8270 C***
	Chrysene	**mg/kg**	**3,00±0,47**	**0,620±0,096**		**EPA 8270 C***
	Benzo(b)Fluorineanthene	**mg/kg**	**5,39±0,82**	**1,10±0,17**		**EPA 8270 C***
	Benzo(k)Fluorineanthene	**mg/kg**	**1,63±0,40**	**0,362±0,089**		**EPA 8270 C***
	Benzo(a)pyrene	**mg/kg**	**2,99±0,38**	**0,557±0,072**		**EPA 8270 C***
	Indeno(1,2,3-cd)pyrene	**mg/kg**	**2,47±0,39**	**0,504±0,079**		**EPA 8270 C***

	Dibenzo(a,h)anthracene	mg/kg	0,550±0,129	0,101±0,024		EPA 8270 C*
	Benzo(g,h,i)perylene	mg/kg	2,29±0,44	0,458±0,087		EPA 8270 C*
	ΣPAHs	mg/kg	32,9±5,7	7,02±1,22	0,6	EPA 8270 C*
15	Kongeneri PCB-a:					
	PCB 18	mg/kg	<0,002	<0,002	0,004	EPA 8270 C*
	PCB 31	mg/kg	<0,002	<0,002	0,004	EPA 8270 C*
	PCB 28	mg/kg	<0,002	<0,002	0,004	EPA 8270 C*
	PCB 52	mg/kg	<0,002	<0,002	0,004	EPA 8270 C*
	PCB 44	mg/kg	<0,002	<0,002	0,004	EPA 8270 C*
	PCB 101	mg/kg	<0,002	<0,002	0,004	EPA 8270 C*
	PCB 149	mg/kg	<0,002	<0,002	0,004	EPA 8270 C*
	PCB 118	mg/kg	<0,002	<0,002	0,004	EPA 8270 C*
	PCB 153	mg/kg	<0,002	<0,002	0,004	EPA 8270 C*
	PCB 138	mg/kg	<0,002	<0,002	0,004	EPA 8270 C*
	PCB 180	mg/kg	<0,002	<0,002	0,004	EPA 8270 C*
	PCB 194	mg/kg	<0,002	<0,002	0,004	EPA 8270 C*
16	Triazini	mg/kg			0,01	
	Atrazin	mg/kg	<0,005	<0,005		DIN ISO 11264
	Simazin	mg/kg	<0,005	<0,005		DIN ISO 11264

17	Carbamates	mg/kg			0,5	
	Aldicarb	mg/kg	<0,05	<0,05		EPA 8318A
	Aldicarb-sulfone	mg/kg	<0,05	<0,05		EPA 8318A
	Aldicarb-sulfoxide	mg/kg	<0,05	<0,05		EPA 8318A
	Carbofuran	mg/kg	<0,05	<0,05		EPA 8318A
	Carbofuran-3-hydroxy	mg/kg	<0,05	<0,05		EPA 8318A
	1-Naphtyl-N-methylcarbamate	mg/kg	<0,05	<0,05		EPA 8318A
	Mercaptodimethur	mg/kg	<0,05	<0,05		EPA 8318A
	Methomyl	mg/kg	<0,05	<0,05		EPA 8318A
	Oxamyl	mg/kg	<0,05	<0,05		EPA 8318A
	Propoxur	mg/kg	<0,05	<0,05		EPA 8318A
18	Dithiocarbamates	mg/kg			1,0	
	Mancozeb	mg/kg	<0,5	<0,5		GC-FPD
	Maneb	mg/kg	<0,5	<0,5		GC-FPD
	Metiram	mg/kg	<0,5	<0,5		GC-FPD
	Ziram	mg/kg	<0,5	<0,5		GC-FPD
	Zineb	mg/kg	<0,5	<0,5		GC-FPD
	Thiram	mg/kg	<0,5	<0,5		GC-FPD
	Ferbam	mg/kg	<0,5	<0,5		GC-FPD

19	Chlorphenoxy	mg/kg			1,0	
	2.4-D	mg/kg	<0,4	<0,4		EPA Method 1658
	2.4-DB	mg/kg	<0,4	<0,4		EPA Method 1658
	2.4-DP	mg/kg	<0,4	<0,4		EPA Method 1658
	2.4.5-TP	mg/kg	<0,4	<0,4		EPA Method 1658
	2.4.5-T	mg/kg	<0,4	<0,4		EPA Method 1658
20	Phenol herbicides	mg/kg			0,3	
	DNOC	mg/kg	<0,1	<0,1		EPA Method8151A
	DINOSEB	mg/kg	<0,1	<0,1		EPA Method8151A
21	Organochlorine pesticide	mg/kg			0,01	
	DDT	mg/kg	<0,004	<0,004		EPA 8270 C*
	DDD	mg/kg	<0,004	<0,004		EPA 8270 C*
	DDE	mg/kg	<0,004	<0,004		EPA 8270 C*
22	Organotin compounds	mg/kg			0,005	
	Monobutyltin	mg/kg	< 0,004	< 0,004		ISO 23161:2009*
	Dibutyltin	mg/kg	< 0,004	< 0,004		ISO 23161:2009*
	Tributyltin	mg/kg	< 0,004	< 0,004		ISO 23161:2009*
	Monooctyltin	mg/kg	< 0,004	< 0,004		ISO 23161:2009*
	Tetrabutyltin	mg/kg	< 0,004	< 0,004		ISO 23161:2009*

	Dioctyltin	**mg/kg**	**< 0,004**	**< 0,004**		**ISO 23161:2009***
	Triphenyltin	**mg/kg**	**< 0,004**	**< 0,004**		**ISO 23161:2009***
	Tricyclohexyltin	**mg/kg**	**< 0,004**	**< 0,004**		**ISO 23161:2009***

* - accredited method

OPINION

According to the results of the physico-chemical analysis , the soil sample from the site 500 m west of Electrolysis, (Pr No 967/04), **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of Chromium, nickel, fluorine, boron and polycyclic aromatic hydrocarbons in relation to the prescribed value.

According to the results of the physico-chemical analysis , the soil sample from the site 1000 m west of Electrolysis(Pr No 968/04), **does not comply** with the requirements of the Rulebook on the permitted amount of hazardous and harmful substances in the soil and the methods for its examination ("Official Gazette of the Republic of Montenegro" , No. 18/97) due to the increased content of Chromium, nickel, Fluorine and polycyclic aromatic hydrocarbons in relation to the prescribed value..

REPORT No. 00-1654/1

RESULTS OF ANALYSES-GROUNDWATER

Parameter	Unit	Results of analyses	MPL A	MPL A1	MPL A2	MPL A3	Method
Protocol number		35/04					
Date of sampling		02.02.2011.					
Location		P7					
Air temperature	^{0}C	4.0					SMVP.111*
Water temperature	^{0}C	15.2	8-12	9-12	30	30	SMVP.111*
Turbidity	NTU	0.106±0.006	1	5	5	10	SMVP.118*
Conductivity (site/lab)	μS/cm	328/326.0±1.8	300	400	600	1000	SMVP.143*
Suspended matter	mg/l	5.80	0	10	20	50	SMVP.133
pH (ter/lab)		7.29/7.11±0.26	6.8-8.3	6.8-8.5	6.5-8.5	5.5-9	JUS HZ1.111*
Color after ordinary filtration	mg/l Pt skale	5	5	5	10	20	SMVP.120
Ratio Ca/Mg	mol	6.07	2-3	2-3	2-4	2-6	SMEW3500CaD* SMEW.2340
Fluoride	mg/l	0.058±0.007	0.05	1	1.5	1.7	SMVP.326*
Nitrate	mg/l	6.27±0.85	10	20	25	50	SMEW4500NO3B*
Nitrite	mg/l	<0.003	<G.D.	0.003	0.005	0.02	SMEW4500NO2B*

Dissolved iron	**mg/l**	**0.026±0.006**	**0.05**	**0.1**	**0.3**	**1**	**SMEW.3500FeB***
Manganese	**mg/l**	**0.0060±0.0018**	**<G.D.**	**0.005**	**0.01**	**0.05**	**SMEW.3500MnB***
Copper	**mg/l**	**0.0150±0.0018**	**0.005**	**0.02**	**0.05**	**1**	**SMEW.3500CuB***
Zinc	**mg/l**	**0.029±0.003**	**0.01**	**0.05**	**1**	**5**	**SMEW.3500ZnB***
Boron	**mg/l**	**<0.05**	**0.5**	**1.0**	**1.0**	**1.0**	**EPA 200.7**
Beryllium	**mg/l**	**<0.0005**	**0.001**	**0.001**	**0.005**	**0.05**	**EPA 200.7**
Cobalt	**mg/l**	**<0.001**	**0.001**	**0.001**	**0.01**	**0.05**	**SMEW.3500CoB***
Nickel	**mg/l**	**<0.001**	**0.002**	**0.002**	**0.05**	**0.1**	**SMEW.3500NiB***
Vanadium	**mg/l**	**<0.001**	**0.001**	**0.010**	**0.020**	**0.100**	**EPA 200.7**
Arsenic	**mg/l**	**<0.001**	**0.001**	**0.01**	**0.05**	**0.05**	**SCB.3***
Cadmium	**mg/l**	**<0.0005**	**0.000**	**0.001**	**0.005**	**0.005**	**SCB.2***
Total Chromium	**mg/l**	**<0.001**	**0.000**	**0.000**	**0.05**	**0.05**	**SMEW.3500CrB***
Lead	**mg/l**	**<0.001**	**0.001**	**0.01**	**0.05**	**0.05**	**SCB.4***
Selen	**mg/l**	**<0.001**	**0.001**	**0.001**	**0.01**	**0.01**	**SCB.6***
Mercury	**mg/l**	**0.00060±0.00006**	**<G.D.**	**<G.D.**	**0.0005**	**0.001**	**AMA-111***
Barium	**mg/l**	**0.041±0.004**	**0.1**	**0.1**	**0.7**	**1**	**SCB.1***
Cyanide	**mg/l**	**<0.001**	**<G.D.**	**0.001**	**0.005**	**0.005**	**SMEW 4500CN-E***
Sulphate	**mg/l**	**5.60**	**20**	**20**	**50**	**200**	**SMEW4500SO4F**
Chloride	**mg/l**	**3.39**	**10**	**20**	**40**	**200**	**ISO 9297:1997**

Surfactants that react with methyl blue	**mg/l**	**<0.001**	**0.001**	**0.001**	**0.02**	**0.5**	
Ortophosphate	**mg/l PO_4**	**<0.01**	**0.01**	**0.02**	**0.05**	**0.1**	**SMEW. 4500PD***
Phenol	**mg/l**	**<0.0005**	**0.0005**	**0.001**	**0.005**	**0.01**	**SMVP.299***
Polycyclic aromatic hydrocarbons	**mg/l**	**< 0.000005**	**<G.D.**	**0.0002**	**0.0002**	**0.001**	**SMEW.6440C* EPA 8270 C***
Naphtalene	**mg/l**	**< 0.000005**					**SMEW.6440C***
Acenaphtylene	**mg/l**	**< 0.000005**					**SMEW.6440C***
Acenaphtene	**mg/l**	**< 0.000005**					**SMEW.6440C***
Fluorineene	**mg/l**	**< 0.000005**					**SMEW.6440C***
Phenanthrene	**mg/l**	**< 0.000005**					**SMEW.6440C***
Anthracene	**mg/l**	**< 0.000005**					**SMEW.6440C***
Fluorineanthene	**mg/l**	**< 0.000005**					**SMEW.6440C***
Pyrene	**mg/l**	**< 0.000005**					**SMEW.6440C***
Benzo(a)anthracene	**mg/l**	**< 0.000005**					**SMEW.6440C***
Chrysene	**mg/l**	**< 0.000005**					**SMEW.6440C***
Benzo(b)Fluorineanthene	**mg/l**	**< 0.000005**					**SMEW.6440C***
Benzo(k)Fluorineanthene	**mg/l**	**< 0.000005**					**SMEW.6440C***
Benzo(a)pyrene	**mg/l**	**< 0.000005**					**SMEW.6440C***
Indeno(1,2,3-cd) pyrene	**mg/l**	**< 0.000005**					**SMEW.6440C***

Dibenzo(a,h) anthracene	mg/l	< 0.000005					SMEW.6440C*
Benzo(g,h,i) perylene	mg/l	< 0.000005					SMEW.6440C*
Total pesticides	mg/l		<G.D	<G.D	0.001	0.0025	SMEW.6630* EPA 8141 A*
Acephate	mg/l	<0.0005					EPA 8141 A*
Acetamiprid	mg/l	<0.0005					EPA 8141 A*
Aldicarb	mg/l	<0.0005					EPA 8141 A*
Amitraz	mg/l	<0.0005					EPA 8141 A*
Azinphos-methyl	mg/l	<0.0005					EPA 8141 A*
Azoxystrobin	mg/l	<0.0005					EPA 8141 A*
Benomyl + carbendazim (expressed as carbendazim)	mg/l	<0.0005					EPA 8141 A*
Bifenthrin	mg/l	<0.0005					EPA 8141 A*
Bromopropylate	mg/l	<0.0005					EPA 8141 A*
Bupirimate	mg/l	<0.0005					EPA 8141 A*
Buprofezin	mg/l	<0.0005					EPA 8141 A*
Captan	mg/l	<0.0005					EPA 8141 A*
Folpet	mg/l	<0.0005					EPA 8141 A*
Carbaryl	mg/l	<0.0005					EPA 8141 A*
Clofentezin	mg/l	<0.0005					EPA 8141 A*

Chlorothalonil	**mg/l**	**<0.0005**					**EPA 8141 A***
Chlorpropham	**mg/l**	**<0.0005**					**EPA 8141 A***
Chlorpyriphos	**mg/l**	**<0.0005**					**EPA 8141 A***
Chlorpyriphos-methyl	**mg/l**	**<0.0005**					**EPA 8141 A***
Cypermethrin	**mg/l**	**<0.0005**					**EPA 8141 A***
Cyprodinil	**mg/l**	**<0.0005**					**EPA 8141 A***
Deltamethrin	**mg/l**	**<0.0005**					**EPA 8141 A***
Diazinon	**mg/l**	**<0.0005**					**EPA 8141 A***
Dichlofluanid	**mg/l**	**<0.0005**					**EPA 8141 A***
Dichlorvos	**mg/l**	**<0.0005**					**EPA 8141 A***
Dimethoate + Omethoate (sum expressed as dimethoate)	**mg/l**	**<0.0005**					**EPA 8141 A***
Dinocap	**mg/l**	**<0.0005**					**EPA 8141 A***
Diphenylamine	**mg/l**	**<0.0005**					**EPA 8141 A***
Fenitrothion	**mg/l**	**<0.0005**					**EPA 8141 A***
Glyphosate	**mg/l**	**<0.0005**					**EPA 8141 A***
Hexaconazole	**mg/l**	**<0.0005**					**EPA 8141 A***
Lambda-cyhalothrin	**mg/l**	**<0.0005**					**EPA 8141 A***
Malathion	**mg/l**	**<0.0005**					**EPA 8141 A***

Maneb group	**mg/l**	**<0.0005**					**EPA 8141 A***
Methamidophos	**mg/l**	**<0.0005**					**EPA 8141 A***
Methidathion	**mg/l**	**<0.0005**					**EPA 8141 A***
Methiocarb	**mg/l**	**<0.0005**					**EPA 8141 A***
Methomyl/Thiodicarb (sum expressed as methomyl)	**mg/l**	**<0.0005**					**EPA 8141 A***
Oxydemeton-methyl	**mg/l**	**<0.0005**					**EPA 8141 A***
Parathion	**mg/l**	**<0.0005**					**EPA 8141 A***
Phosalone	**mg/l**	**<0.0005**					**EPA 8141 A***
Pirimicarb	**mg/l**	**<0.0005**					**EPA 8141 A***
Pirimiphos-methyl	**mg/l**	**<0.0005**					**EPA 8141 A***
Profenofos	**mg/l**	**<0.0005**					**EPA 8141 A***
Vinclozolin	**mg/l**	**<0.0005**					**EPA 8141 A***
Carbofuran	**mg/l**	**<0.0005**					**EPA 8141 A***
Cyfluthrin (including beta-)	**mg/l**	**<0.0005**					**EPA 8141 A***
Ethion ne	**mg/l**	**<0.0005**					**EPA 8141 A***
Fenoxycarb ne	**mg/l**	**<0.0005**					**EPA 8141 A***
Monocrotophos	**mg/l**	**<0.0005**					**EPA 8141 A***
Parathion-Methyl	**mg/l**	**<0.0005**					**EPA 8141 A***
Phosmet	**mg/l**	**<0.0005**					**EPA 8141 A***

Tetradifon	**mg/l**	**<0.0005**					**EPA 8141 A***
Triazophos	**mg/l**	**<0.0005**					**EPA 8141 A***
Abamectin (sum)	**mg/l**	**<0.0005**					**EPA 8141 A***
Acrinathrin	**mg/l**	**<0.0005**					**EPA 8141 A***
Fenthion (sum)	**mg/l**	**<0.0005**					**EPA 8141 A***
Fenvalerate/Esfenvalerate (sum)	**mg/l**	**<0.0005**					**EPA 8141 A***
Pendimethalin	**mg/l**	**<0.0005**					**EPA 8141 A***
Phenthoate	**mg/l**	**<0.0005**					**EPA 8141 A***
Trifluralin	**mg/l**	**<0.0005**					**EPA 8141 A***
Aldrin	**mg/l**	**<0.0005**					**EPA 8141 A***
Azinphos-ethyl	**mg/l**	**<0.0005**					**EPA 8141 A***
Chlordane-cis	**mg/l**	**<0.0005**					**EPA 8141 A***
Chlordane-trans	**mg/l**	**<0.0005**					**EPA 8141 A***
Chlorobenzilate	**mg/l**	**<0.0005**					**EPA 8141 A***
Cyfluthrin (sum of isomers)	**mg/l**	**<0.0005**					**EPA 8141 A***
DDD-p,p'	**mg/l**	**<0.0005**					**EPA 8141 A***
DDE-p,p'	**mg/l**	**<0.0005**					**EPA 8141 A***
DDT-o,p'	**mg/l**	**<0.0005**					**EPA 8141 A***
DDT-p,p'	**mg/l**	**<0.0005**					**EPA 8141 A***

Dieldrin	**mg/l**	**<0.0005**					**EPA 8141 A***
Endosulfan-alpha	**mg/l**	**<0.0005**					**EPA 8141 A***
Endosulfan-beta	**mg/l**	**<0.0005**					**EPA 8141 A***
Endosulfan sulphate	**mg/l**	**<0.0005**					**EPA 8141 A***
Fenthion	**mg/l**	**<0.0005**					**EPA 8141 A***
Fenvalerat/Esfenvalerat	**mg/l**	**<0.0005**					**EPA 8141 A***
HCB	**mg/l**	**<0.0005**					**EPA 8141 A***
HCH-alpha	**mg/l**	**<0.0005**					**EPA 8141 A***
HCH-beta	**mg/l**	**<0.0005**					**EPA 8141 A***
HCH-gamma (lindane)	**mg/l**	**<0.0005**					**EPA 8141 A***
Heptachlor	**mg/l**	**<0.0005**					**EPA 8141 A***
Heptachlor epoxide (cis)	**mg/l**	**<0.0005**					**EPA 8141 A***
Methacrifos	**mg/l**	**<0.0005**					**EPA 8141 A***
4,4'-Methoxychlor	**mg/l**	**<0.0005**					**EPA 8141 A***
Permethrin (sum of isomers)	**mg/l**	**<0.0005**					**EPA 8141 A***
Pirimiphos-methyl	**mg/l**	**<0.0005**					**EPA 8141 A***
Pyrazophos	**mg/l**	**<0.0005**					**EPA 8141 A***
Quintozene	**mg/l**	**<0.0005**					**EPA 8141 A***
Resmethrin (sum of	**mg/l**	**<0.0005**					**EPA 8141 A***

isomers)							
Triazophos	**mg/l**	**<0.0005**					**EPA 8141 A***
COD	**mg/l O_2**	**1.98±0.12**	**1**	**2**	**4**	**8**	**JUS/ISO 6060***
Oksidabilnost	**mg $KMnO_4$/l**	**1.93**	**5**	**5**	**8**	**8**	**SMVP.134**
Dissolved oxygen	**mg/l O_2**	**9.60**					**SMVP.150**
BOD_5	**mg/l O_2**	**2.44**	**2**	**3**	**4**	**7**	**JUS ISO 5815**
Ammonium	**mg/l**	**0.022±0.003**	**0.00**	**0.02**	**0.05**	**1**	**SMVP.179***
PCB congeners	**mg/l**	**< 0.000001**					**SMEW.6431C***
Mineral oil	**mg/l**	**< 0.0005**	**<G.D**	**0.01**	**0.05**	**0.5**	**SMVP.430***

* - accredited method

MIŠLJENJE

Prema Resultsima fizičko-hemijske analize, uzorak podzemne vode uzorkovan na lokaciji **A.D. Kombinat aluminijuma Podgorica**, (Protocol number CETI 35/04), **ODGOVARA** A3 klasiUredbe o klasifikaciji i kategorizaciji površinskih i podzemnih voda („Sl. list CG“, br. 02/07).

REPORT No. 00-1654/1
RESULTS OF ANALYSES--GROUNDWATER

Protocol number		809/04					
Date of sampling		30.09.2016.					
Location		A.D. Aluminum Plant Podgorica– Piezometer P7					
Parameter	Unit	Results of analyses	MPL A	MPL A1	MPL A2	MPL A3	Method
Air temperature	^{0}C	25					SMVP.111*
Water temperature	^{0}C	18	8-12	9-12	30	30	SMVP.111*
Turbidity	NTU	15±1	1	5	5	10	SMVP.118*
Elektroprovodljivost	μS/cm	322±2	300	400	600	1000	MEST EN 27888:2009 *
Suspended matter	mg/l	40	0	10	20	50	SMVP.133
pH		7,7/7,9±0,3	6,8-8,3	6,8-8,5	6,5-8,5	5,5-9	MEST EN ISO 10523:2013*
Color after ordinary filtration	mg/l Pt skale	5	5	5	10	20	SMVP.120
Ratio Ca/Mg	mol	5,6	2-3	2-3	2-4	2-6	EPA200.7*
Odor		bez					HA-OL
Fluoride	mg/l	0,09±0,01	0,05	1	1,5	1,7	SMVP.326*
Nitrate	mg/l	3,2±0,4	10	20	25	50	SMEW4500NO3B*
Nitrite	mg/l	0,018±0,001	<G.D.	0,003	0,005	0,02	SMEW4500NO2B*
Dissolved iron	mg/l	0,11±0,01	0,05	0,1	0,3	1	MEST EN ISO 17294-2:2013*

Manganese	**mg/l**	**0,080±0,005**	**<G.D.**	**0,005**	**0,01**	**0,05**	**MEST EN ISO 17294-2:2013***
Copper	**mg/l**	**0,050±0,003**	**0,005**	**0,02**	**0,05**	**1**	**MEST EN ISO 17294-2:2013***
Zinc	**mg/l**	**0,17±0,01**	**0,01**	**0,05**	**1**	**5**	**MEST EN ISO 17294-2:2013***
Boron	**mg/l**	**<0,005**	**0,5**	**1,0**	**1,0**	**1,0**	**EPA 200.7***
Beryllium	**mg/l**	**<0,0001**	**0,001**	**0,001**	**0,005**	**0,05**	**MEST EN ISO 17294-2:2013***
Cobalt	**mg/l**	**<0,0001**	**0,001**	**0,001**	**0,01**	**0,05**	**MEST EN ISO 17294-2:2013***
Nickel	**mg/l**	**<0,0002**	**0,002**	**0,002**	**0,05**	**0,1**	**MEST EN ISO 17294-2:2013***
Vanadium	**mg/l**	**<0,0001**	**0,001**	**0,010**	**0,020**	**0,100**	**MEST EN ISO 17294-2:2013***
Arsenic	**mg/l**	**<0,0002**	**0,001**	**0,01**	**0,05**	**0,05**	**MEST EN ISO 17294-2:2013***
Cadmium	**mg/l**	**<0,0001**	**0,000**	**0,001**	**0,005**	**0,005**	**MEST EN ISO 17294-2:2013***
Total Chromium	**mg/l**	**<0,0001**	**0,000**	**0,000**	**0,05**	**0,05**	**MEST EN ISO 17294-2:2013***
Lead	**mg/l**	**0,0090±0,0005**	**0,001**	**0,01**	**0,05**	**0,05**	**MEST EN ISO 17294-2:2013***
Selen	**mg/l**	**<0,0001**	**0,001**	**0,001**	**0,01**	**0,01**	**MEST EN ISO 17294-2:2013***
Mercury	**mg/l**	**<0,0001**	**<G.D.**	**<G.D.**	**0,0005**	**0,001**	**AMA-111***
Barium	**mg/l**	**0,030±0,003**	**0,1**	**0,1**	**0,7**	**1**	**MEST EN ISO 17294-2:2013***
Cyanide	**mg/l**	**<0,001**	**<G.D.**	**0,001**	**0,005**	**0,005**	**SMEW 4500CN-E***
Sulphate	**mg/l**	**6**	**20**	**20**	**50**	**200**	**SMEW4500SO4F**
Chloride	**mg/l**	**4**	**10**	**20**	**40**	**200**	**ISO 9297:1997**
Surfactants that react with methyl blue	**mg/l**	**<0,001**	**0,001**	**0,001**	**0,02**	**0,5**	**SMVP.295**

Ortophosphate	**mg/l PO_4**	**2,26±0,38**	**0,01**	**0,02**	**0,05**	**0,1**	**SMEW. 4500PD***
Phenol	**mg/l**	**<0,0005**	**0,0005**	**0,001**	**0,005**	**0,01**	**SMVP.299***
COD	**mg/l O_2**	**5,3±0,3**	**1**	**2**	**4**	**8**	**MEST ISO 6060:2011***
Oksidabilnost	**mg $KMnO_4$/l**	**3,4**	**5**	**5**	**8**	**8**	**SMVP.134**
Dissolved oxygen	**mg/l O_2**	**5,9**					**SMVP.150**
BOD_5	**mg/l O_2**	**0,7**	**2**	**3**	**4**	**7**	**ISO 5815:2003**
Ammonium	**mg/l**	**2,14±0,31**	**0,00**	**0,02**	**0,05**	**1**	**SMVP.179***
Substances are extracted with chloroform	**mg/l**	**<0,001**	**<GD**	**0,01**	**0,2**	**0,5**	**D 1178**
Polycyclic aromatic hydrocarbons	**mg/l**	**0,00006±0,00001**	**<G.D.**	**0,0002**	**0,0002**	**0,001**	**SMEW.6440C***
Naphtalene	**mg/l**	**<0,00001**					**SMEW.6440C***
2-Methylnaphtalene	**mg/l**	**<0,00001**					**SMEW.6440C***
1-Methylnaphtalene	**mg/l**	**<0,00001**					**SMEW.6440C***
Acenaphtylene	**mg/l**	**<0,00001**					**SMEW.6440C***
Acenaphtene	**mg/l**	**<0,00001**					**SMEW.6440C***
Fluorineene	**mg/l**	**<0,00001**					**SMEW.6440C***
Phenanthrene	**mg/l**	**<0,00001**					**SMEW.6440C***
Anthracene	**mg/l**	**<0,00001**					**SMEW.6440C***
Fluorineanthene	**mg/l**	**0,00002±0,000003**					**SMEW.6440C***

Pyrene	mg/l	0,00002±0,000004					SMEW.6440C*
Benzo(a)anthracene	mg/l	<0,00001					SMEW.6440C*
Chrysene	mg/l	<0,00001					SMEW.6440C*
Benzo(b)Fluorineanthene	mg/l	0,00002±0,000003					SMEW.6440C*
Benzo(k)Fluorineanthene	mg/l	<0,00001					SMEW.6440C*
Benzo(a)pyrene	mg/l	<0,00001					SMEW.6440C*
Indeno(1,2,3-cd)pyrene	mg/l	<0,00001					SMEW.6440C*
Dibenzo(a,h)anthracene	mg/l	<0,00001					SMEW.6440C*
Benzo(g,h,i)perylene	mg/l	<0,00001					SMEW.6440C*
Mineral oil	mg/l	0,09	<G.D	0,01	0,05	0,5	DIN EN ISO 9377-2:2001*
Total pesticides:	mg/l	<0,0003	<G.D	<G.D	0,001	0,0025	EPA.8141A* EPA 8080 A*
Azinphos-ethyl (F)	mg/l	<0,00005					EPA.8141A*
Azinphos-methyl (F)	mg/l	<0,00005					EPA.8141A*
Chlorfenvinphos (F)	mg/l	<0,00005					EPA.8141A*
Chlorpyrifos (F)	mg/l	<0,00005					EPA.8141A*
Chlorpyrifos-methyl (F)	mg/l	<0,00005					EPA.8141A*
Diazinon (F)	mg/l	<0,00005					EPA.8141A*
Dichlorvos	mg/l	<0,00005					EPA.8141A*
Dimethoate	mg/l	<0,00005					EPA.8141A*

Ethion	**mg/l**	**<0,00005**					**EPA.8141A***
Fenitrothion	**mg/l**	**<0,00005**					**EPA.8141A***
Fenthion (F)	**mg/l**	**<0,00005**					**EPA.8141A***
Malathion	**mg/l**	**<0,00005**					**EPA.8141A***
Methacrifos	**mg/l**	**<0,00005**					**EPA.8141A***
Methidathion	**mg/l**	**<0,00005**					**EPA.8141A***
Parathion-methyl	**mg/l**	**<0,00005**					**EPA.8141A***
Parathion (F)	**mg/l**	**<0,00005**					**EPA.8141A***
Phosalone	**mg/l**	**<0,00005**					**EPA.8141A***
Phosmet (R)	**mg/l**	**<0,00005**					**EPA.8141A***
Pirimiphos-methyl (F)	**mg/l**	**<0,00005**					**EPA.8141A***
Profenofos (F)	**mg/l**	**<0,00005**					**EPA.8141A***
Pyrazophos (F)	**mg/l**	**<0,00005**					**EPA.8141A***
Triazophos (F)	**mg/l**	**<0,00005**					**EPA.8141A***
Aldrin (F)	**mg/l**	**<0,00003**					**EPA 8080 A***
Chlordane-cis (F) (R)	**mg/l**	**<0,00003**					**EPA 8080 A***
Chlordane-trans (F) (R)	**mg/l**	**<0,00003**					**EPA 8080 A***
Chlorothalonil (R)	**mg/l**	**<0,00003**					**EPA 8080 A***
p,p´-DDD (F)	**mg/l**	**<0,00003**					**EPA 8080 A***

p,p´-DDE (F)	mg/l	<0,00003					EPA 8080 A*
p,p´-DDT (F)	mg/l	<0,00003					EPA 8080 A*
Dieldrin (F)	mg/l	<0,00003					EPA 8080 A*
Endosulfan-sulphate (F)	mg/l	<0,00003					EPA 8080 A*
Endosulfan-alpha (F)	mg/l	<0,00003					EPA 8080 A*
Endosulfan-beta (F)	mg/l	<0,00003					EPA 8080 A*
Endrin (F)	mg/l	<0,00003					EPA 8080 A*
Endrin aldehyde	mg/l	<0,00003					EPA 8080 A*
Endrin ketone	mg/l	<0,00003					EPA 8080 A*
HCH-delta isomer	mg/l	<0,00003					EPA 8080 A*
HCH-alpha isomer	mg/l	<0,00003					EPA 8080 A*
HCH-beta isomer	mg/l	<0,00003					EPA 8080 A*
HCH-gamma (lindane) (F)	mg/l	<0,00003					EPA 8080 A*
Heptachlor (F)	mg/l	<0,00003					EPA 8080 A*
Heptachlor epoxide (F)	mg/l	<0,00003					EPA 8080 A*
Hexachlorobenzene (F)	mg/l	<0,00003					EPA 8080 A*
Methoxychlor (F)	mg/l	<0,00003					EPA 8080 A*
Tetradifon	mg/l	<0,00003					EPA 8080 A*
Azoxystrobin	mg/l	<0,00005					EPA 8141-mod.

Boscalid (F) (R)	**mg/l**	**<0,00005**					**EPA 8141-mod.**
Bromuconazole (F)	**mg/l**	**<0,00005**					**EPA 8141-mod.**
Chlordane-cis (F) (R)	**mg/l**	**<0,00005**					**EPA 8141-mod.**
Chlordane-trans (F) (R)	**mg/l**	**<0,00005**					**EPA 8141-mod.**
Chlorpropham (F) (R) (A)	**mg/l**	**<0,00005**					**EPA 8141-mod.**
Cypermethrin (F)	**mg/l**	**<0,00005**					**EPA 8141-mod.**
Cyproconazole (F)	**mg/l**	**<0,00005**					**EPA 8141-mod.**
Cyprodinil (F) (R)	**mg/l**	**<0,00005**					**EPA 8141-mod.**
Deltamethrin-cis (F)	**mg/l**	**<0,00005**					**EPA 8141-mod.**
Dichlorvos	**mg/l**	**<0,00005**					**EPA 8141-mod.**
Famoxadone	**mg/l**	**<0,00005**					**EPA 8141-mod.**
Fenazaquin	**mg/l**	**<0,00005**					**EPA 8141-mod.**
Fludioxonil (F) (R)	**mg/l**	**<0,00005**					**EPA 8141-mod.**
Fluquinconazole (F)	**mg/l**	**<0,00005**					**EPA 8141-mod.**
Imazalil	**mg/l**	**<0,00005**					**EPA 8141-mod.**
Lambda-Cyhalothrin (F) (R)	**mg/l**	**<0,00005**					**EPA 8141-mod.**
Metalaxyl	**mg/l**	**<0,00005**					**EPA 8141-mod.**
Penconazole (F)	**mg/l**	**<0,00005**					**EPA 8141-mod.**
Propiconazole	**mg/l**	**<0,00005**					**EPA 8141-mod.**

Pyrazophos (F)	**mg/l**	**<0,00005**					**EPA 8141-mod.**
Pyrimethanil (R)	**mg/l**	**<0,00005**					**EPA 8141-mod.**
Pyriproxyfen (F)	**mg/l**	**<0,00005**					**EPA 8141-mod.**
Quinoxyfen (F)	**mg/l**	**<0,00005**					**EPA 8141-mod.**
Tau-Fluvalinate (F)	**mg/l**	**<0,00005**					**EPA 8141-mod.**
Total organic carbon	**mg/l**	**1,4**	**1**	**1**	**2**	**2,5**	**EN 1484:1997**

* - accredited method

OPINION

According to the results of the physico-chemical analysis groundwater sampled at at location **A.D. Aluminum Plant Podgorica – u stečaju - Piezometer P7**, (Protocol number CETI 809/04),, **does not comply** with the any of the classes of the Trgulation of Classification and Categorization of Surface and Groundwater (Off Gazz MNE ", No. 02/07) due to increased manganese, ortophosphates and ammonia content.

REPORT No. 00-1654/1

RESULTS OF ANALYSES--GROUNDWATER

Protocol number		**961/04**					
Date of sampling		**23.11.2016.**					
Location		**A.D. Aluminum Plant Podgorica– Piezometer P7**					
Parameter	**Unit**	**Results of analyses**	**MPL A**	**MPL A1**	**MPL A2**	**MPL A3**	**Methoda**
Air temperature	**^{0}C**	**16**					**SMVP.111***
Water temperature	**^{0}C**	**18**	**8-12**	**9-12**	**30**	**30**	**SMVP.111***
Turbidity	**NTU**	**4,7±0,3**	**1**	**5**	**5**	**10**	**SMVP.118***
Conductivity	**µS/cm**	**303±2**	**300**	**400**	**600**	**1000**	**MEST EN 27888:2009 ***
Suspended matter	**mg/l**	**111**	**0**	**10**	**20**	**50**	**SMVP.133**
pH (ter/lab)		**7,7/7,4±0,3**	**6,8-8,3**	**6,8-8,5**	**6,5-8,5**	**5,5-9**	**MEST EN ISO 10523:2013***
Color after ordinary filtration	**mg/l Pt skale**	**15**	**5**	**5**	**10**	**20**	**SMVP.120**
Ratio Ca/Mg	**mol**	**5,8**	**2-3**	**2-3**	**2-4**	**2-6**	**EPA200.7***
Odor		**bez**					**HA-OL**
Fluoride	**mg/l**	**0,12±0,01**	**0,05**	**1**	**1,5**	**1,7**	**SMVP.326***
Nitrate	**mg/l**	**3,2±0,4**	**10**	**20**	**25**	**50**	**SMEW4500NO3B***

Nitrite	**mg/l**	**<0,003**	**<G.D.**	**0,003**	**0,005**	**0,02**	**SMEW4500NO2B***
Dissolved iron	**mg/l**	**0,097±0,006**	**0,05**	**0,1**	**0,3**	**1**	**MEST EN ISO 17294-2:2013***
Manganese	**mg/l**	**0,030±0,002**	**<G.D.**	**0,005**	**0,01**	**0,05**	**MEST EN ISO 17294-2:2013***
Copper	**mg/l**	**0,022±0,001**	**0,005**	**0,02**	**0,05**	**1**	**MEST EN ISO 17294-2:2013***
Zinc	**mg/l**	**0,050±0,003**	**0,01**	**0,05**	**1**	**5**	**MEST EN ISO 17294-2:2013***
Boron	**mg/l**	**<0,005**	**0,5**	**1,0**	**1,0**	**1,0**	**EPA 200.7***
Beryllium	**mg/l**	**<0,0001**	**0,001**	**0,001**	**0,005**	**0,05**	**MEST EN ISO 17294-2:2013***
Cobalt	**mg/l**	**<0,0001**	**0,001**	**0,001**	**0,01**	**0,05**	**MEST EN ISO 17294-2:2013***
Nickel	**mg/l**	**0,0014±0,0001**	**0,002**	**0,002**	**0,05**	**0,1**	**MEST EN ISO 17294-2:2013***
Vanadium	**mg/l**	**<0,0001**	**0,001**	**0,010**	**0,020**	**0,100**	**MEST EN ISO 17294-2:2013***
Arsenic	**mg/l**	**<0,0002**	**0,001**	**0,01**	**0,05**	**0,05**	**MEST EN ISO 17294-2:2013***
Cadmium	**mg/l**	**<0,0001**	**0,000**	**0,001**	**0,005**	**0,005**	**MEST EN ISO 17294-2:2013***
Total Chromium	**mg/l**	**0,020±0,001**	**0,000**	**0,000**	**0,05**	**0,05**	**MEST EN ISO 17294-2:2013***
Lead	**mg/l**	**0,0052±0,0003**	**0,001**	**0,01**	**0,05**	**0,05**	**MEST EN ISO 17294-2:2013***
Selen	**mg/l**	**<0,0005**	**0,001**	**0,001**	**0,01**	**0,01**	**MEST EN ISO 17294-2:2013***
Mercury	**mg/l**	**<0,0001**	**<G.D.**	**<G.D.**	**0,0005**	**0,001**	**AMA-111***
Barium	**mg/l**	**0,033±0,002**	**0,1**	**0,1**	**0,7**	**1**	**MEST EN ISO 17294-2:2013***
Cyanide	**mg/l**	**0,010±0,001**	**<G.D.**	**0,001**	**0,005**	**0,005**	**SMEW 4500CN-E***
Sulphate	**mg/l**	**3**	**20**	**20**	**50**	**200**	**SMEW4500SO4F**

Chloride	**mg/l**	**3**	**10**	**20**	**40**	**200**	**ISO 9297:1997**
Surfactants that react with methyl blue	**mg/l**	**<0,001**	**0,001**	**0,001**	**0,02**	**0,5**	**SMVP.295**
Ortophosphate	**mg/l PO_4**	**0,05±0,01**	**0,01**	**0,02**	**0,05**	**0,1**	**SMEW. 4500PD***
Phenol	**mg/l**	**<0,0005**	**0,0005**	**0,001**	**0,005**	**0,01**	**SMVP.299***
COD	**mg/l O_2**	**2,5±0,1**	**1**	**2**	**4**	**8**	**MEST ISO 6060:2011***
Oksidabilnost	**mg $KMnO_4$/l**	**1,4**	**5**	**5**	**8**	**8**	**SMVP.134**
Dissolved oxygen	**mg/l O_2**	**7,8**					**SMVP.150**
BOD_5	**mg/l O_2**	**0,7**	**2**	**3**	**4**	**7**	**ISO 5815:2003**
Ammonium	**mg/l**	**0,31±0,04**	**0,00**	**0,02**	**0,05**	**1**	**SMVP.179***
Substances extracted with chloroform	**mg/l**	**<0,001**	**<GD**	**0,01**	**0,2**	**0,5**	**D 1178**
Polycyclic aromatic hydrocarbons	**mg/l**	**<0,00001**	**<G.D.**	**0,0002**	**0,0002**	**0,001**	**SMEW.6440C***
Naphtalene	**mg/l**	**<0,00001**					**SMEW.6440C***
2-Methylnaphtalene	**mg/l**	**<0,00001**					**SMEW.6440C***
1-Methylnaphtalene	**mg/l**	**<0,00001**					**SMEW.6440C***
Acenaphtylene	**mg/l**	**<0,00001**					**SMEW.6440C***
Acenaphtene	**mg/l**	**<0,00001**					**SMEW.6440C***
Fluorineene	**mg/l**	**<0,00001**					**SMEW.6440C***
Phenanthrene	**mg/l**	**<0,00001**					**SMEW.6440C***

Anthracene	**mg/l**	**<0,00001**					**SMEW.6440C***
Fluorineanthene	**mg/l**	**<0,00001**					**SMEW.6440C***
Pyrene	**mg/l**	**<0,00001**					**SMEW.6440C***
Benzo(a)anthracene	**mg/l**	**<0,00001**					**SMEW.6440C***
Chrysene	**mg/l**	**<0,00001**					**SMEW.6440C***
Benzo(b)Fluorineanthene	**mg/l**	**<0,00001**					**SMEW.6440C***
Benzo(k)Fluorineanthene	**mg/l**	**<0,00001**					**SMEW.6440C***
Benzo(a)pyrene	**mg/l**	**<0,00001**					**SMEW.6440C***
Indeno(1,2,3-cd)pyrene	**mg/l**	**<0,00001**					**SMEW.6440C***
Dibenzo(a,h)anthracene	**mg/l**	**<0,00001**					**SMEW.6440C***
Benzo(g,h,i)perylene	**mg/l**	**<0,00001**					**SMEW.6440C***
Mineral oil	**mg/l**	**<0,01**	**<G.D**	**0,01**	**0,05**	**0,5**	**DIN EN ISO 9377-2:2001***
Total pesticides:	**mg/l**	**<0,0003**	**<G.D**	**<G.D**	**0,001**	**0,0025**	**EPA.8141A* EPA 8080 A***
Azinphos-ethyl (F)	**mg/l**	**<0,00005**					**EPA.8141A***
Azinphos-methyl (F)	**mg/l**	**<0,00005**					**EPA.8141A***
Chlorfenvinphos (F)	**mg/l**	**<0,00005**					**EPA.8141A***
Chlorpyrifos (F)	**mg/l**	**<0,00005**					**EPA.8141A***
Chlorpyrifos-methyl (F)	**mg/l**	**<0,00005**					**EPA.8141A***
Diazinon (F)	**mg/l**	**<0,00005**					**EPA.8141A***

Dichlorvos	**mg/l**	**<0,00005**					**EPA.8141A***
Dimethoate	**mg/l**	**<0,00005**					**EPA.8141A***
Ethion	**mg/l**	**<0,00005**					**EPA.8141A***
Fenitrothion	**mg/l**	**<0,00005**					**EPA.8141A***
Fenthion (F)	**mg/l**	**<0,00005**					**EPA.8141A***
Malathion	**mg/l**	**<0,00005**					**EPA.8141A***
Methacrifos	**mg/l**	**<0,00005**					**EPA.8141A***
Methidathion	**mg/l**	**<0,00005**					**EPA.8141A***
Parathion-methyl	**mg/l**	**<0,00005**					**EPA.8141A***
Parathion (F)	**mg/l**	**<0,00005**					**EPA.8141A***
Phosalone	**mg/l**	**<0,00005**					**EPA.8141A***
Phosmet (R)	**mg/l**	**<0,00005**					**EPA.8141A***
Pirimiphos-methyl (F)	**mg/l**	**<0,00005**					**EPA.8141A***
Profenofos (F)	**mg/l**	**<0,00005**					**EPA.8141A***
Pyrazophos (F)	**mg/l**	**<0,00005**					**EPA.8141A***
Triazophos (F)	**mg/l**	**<0,00005**					**EPA.8141A***
Aldrin (F)	**mg/l**	**<0,00003**					**EPA 8080 A***
Chlordane-cis (F) (R)	**mg/l**	**<0,00003**					**EPA 8080 A***
Chlordane-trans (F) (R)	**mg/l**	**<0,00003**					**EPA 8080 A***

Chlorothalonil (R)	**mg/l**	**<0,00003**					**EPA 8080 A***
p,p´-DDD (F)	**mg/l**	**<0,00003**					**EPA 8080 A***
p,p´-DDE (F)	**mg/l**	**<0,00003**					**EPA 8080 A***
p,p´-DDT (F)	**mg/l**	**<0,00003**					**EPA 8080 A***
Dieldrin (F)	**mg/l**	**<0,00003**					**EPA 8080 A***
Endosulfan-sulphate (F)	**mg/l**	**<0,00003**					**EPA 8080 A***
Endosulfan-alpha (F)	**mg/l**	**<0,00003**					**EPA 8080 A***
Endosulfan-beta (F)	**mg/l**	**<0,00003**					**EPA 8080 A***
Endrin (F)	**mg/l**	**<0,00003**					**EPA 8080 A***
Endrin aldehyde	**mg/l**	**<0,00003**					**EPA 8080 A***
Endrin ketone	**mg/l**	**<0,00003**					**EPA 8080 A***
HCH-delta isomer	**mg/l**	**<0,00003**					**EPA 8080 A***
HCH-alpha isomer	**mg/l**	**<0,00003**					**EPA 8080 A***
HCH-beta isomer	**mg/l**	**<0,00003**					**EPA 8080 A***
HCH-gamma (lindane) (F)	**mg/l**	**<0,00003**					**EPA 8080 A***
Heptachlor (F)	**mg/l**	**<0,00003**					**EPA 8080 A***
Heptachlor epoxide (F)	**mg/l**	**<0,00003**					**EPA 8080 A***
Hexachlorobenzene (F)	**mg/l**	**<0,00003**					**EPA 8080 A***
Methoxychlor (F)	**mg/l**	**<0,00003**					**EPA 8080 A***

Tetradifon	**mg/l**	**<0,00003**					**EPA 8080 A***
Azoxystrobin	**mg/l**	**<0,00005**					**EPA 8141-mod.**
Boscalid (F) (R)	**mg/l**	**<0,00005**					**EPA 8141-mod.**
Bromuconazole (F)	**mg/l**	**<0,00005**					**EPA 8141-mod.**
Chlordane-cis (F) (R)	**mg/l**	**<0,00005**					**EPA 8141-mod.**
Chlordane-trans (F) (R)	**mg/l**	**<0,00005**					**EPA 8141-mod.**
Chlorpropham (F) (R) (A)	**mg/l**	**<0,00005**					**EPA 8141-mod.**
Cypermethrin (F)	**mg/l**	**<0,00005**					**EPA 8141-mod.**
Cyproconazole (F)	**mg/l**	**<0,00005**					**EPA 8141-mod.**
Cyprodinil (F) (R)	**mg/l**	**<0,00005**					**EPA 8141-mod.**
Deltamethrin-cis (F)	**mg/l**	**<0,00005**					**EPA 8141-mod.**
Dichlorvos	**mg/l**	**<0,00005**					**EPA 8141-mod.**
Famoxadone	**mg/l**	**<0,00005**					**EPA 8141-mod.**
Fenazaquin	**mg/l**	**<0,00005**					**EPA 8141-mod.**
Fludioxonil (F) (R)	**mg/l**	**<0,00005**					**EPA 8141-mod.**
Fluquinconazole (F)	**mg/l**	**<0,00005**					**EPA 8141-mod.**
Imazalil	**mg/l**	**<0,00005**					**EPA 8141-mod.**
Lambda-Cyhalothrin (F) (R)	**mg/l**	**<0,00005**					**EPA 8141-mod.**
Metalaxyl	**mg/l**	**<0,00005**					**EPA 8141-mod.**

Penconazole (F)	**mg/l**	**<0,00005**					**EPA 8141-mod.**
Propiconazole	**mg/l**	**<0,00005**					**EPA 8141-mod.**
Pyrazophos (F)	**mg/l**	**<0,00005**					**EPA 8141-mod.**
Pyrimethanil (R)	**mg/l**	**<0,00005**					**EPA 8141-mod.**
Pyriproxyfen (F)	**mg/l**	**<0,00005**					**EPA 8141-mod.**
Quinoxyfen (F)	**mg/l**	**<0,00005**					**EPA 8141-mod.**
Tau-Fluvalinate (F)	**mg/l**	**<0,00005**					**EPA 8141-mod.**
Total organic carbon	**mg/l**	**0,47**	**1**	**1**	**2**	**2,5**	**EN 1484:1997**

* - accredited method

OPINION

According to the results of the physico-chemical analysis groundwater sampled at at location A.D. Aluminum Plant Podgorica - in bankruptcy - Piezometer P7, (Protocol number CETI 961/04), **does not comply** with the any of the classes of the Trgulation of Classification and Categorization of Surface and Groundwater (Off Gazz MNE ", No. 02/07) due to increased suspended metters and cianides content.

RESULTS OF ANALYSES--GROUNDWATER

Protocol number		568/04					
Date of sampling		19.09.2017.					
Location		Aluminum Plant Podgorica - Piezometer P7					
Parameter	Unit	Results of analyses	MPL A	MPL A1	MPL A2	MPL A3	Method
Air temperature	^{0}C	25					SMVP.111*
Water temperature	^{0}C	19	8-12	9-12	30	30	SMVP.111*
Turbidity	NTU	0,60±0,04	1	5	5	10	SMVP.118*
Conductivity	µS/cm	310±2	300	400	600	1000	MEST EN 27888:2009 *
Suspended matter	mg/l	48	0	10	20	50	SMVP.133
pH		7,4/7,6±0,3	6,8-8,3	6,8-8,5	6,5-8,5	5,5-9	MEST EN ISO 10523:2013*
Boja nakon obične filtracije	mg/l Pt skale	3	5	5	10	20	SMVP.120
Ratio Ca/Mg	mol	6	2-3	2-3	2-4	2-6	EPA200.7*
Odor		bez					HA-OL
Fluoride	mg/l	0,05±0,01	0,05	1	1,5	1,7	SMVP.326*

Nitrate	**mg/l**	**3,5±0,5**	**10**	**20**	**25**	**50**	**SMEW4500NO3B***
Nitrite	**mg/l**	**<0,001**	**<G.D.**	**0,003**	**0,005**	**0,02**	**SMEW4500NO2B***
Dissolved iron	**mg/l**	**<0,025**	**0,05**	**0,1**	**0,3**	**1**	**MEST EN ISO 17294-2:2013***
Manganese	**mg/l**	**<0,0002**	**<G.D.**	**0,005**	**0,01**	**0,05**	**MEST EN ISO 17294-2:2013***
Copper	**mg/l**	**<0,001**	**0,005**	**0,02**	**0,05**	**1**	**MEST EN ISO 17294-2:2013***
Zinc	**mg/l**	**0,0090±0,0005**	**0,01**	**0,05**	**1**	**5**	**MEST EN ISO 17294-2:2013***
Boron	**mg/l**	**<0,005**	**0,5**	**1,0**	**1,0**	**1,0**	**EPA 200.7***
Beryllium	**mg/l**	**<0,0001**	**0,001**	**0,001**	**0,005**	**0,05**	**MEST EN ISO 17294-2:2013***
Cobalt	**mg/l**	**<0,0001**	**0,001**	**0,001**	**0,01**	**0,05**	**MEST EN ISO 17294-2:2013***
Nickel	**mg/l**	**<0,0002**	**0,002**	**0,002**	**0,05**	**0,1**	**MEST EN ISO 17294-2:2013***
Vanadium	**mg/l**	**0,0011±0,0006**	**0,001**	**0,010**	**0,020**	**0,100**	**MEST EN ISO 17294-2:2013***
Arsenic	**mg/l**	**<0,0002**	**0,001**	**0,01**	**0,05**	**0,05**	**MEST EN ISO 17294-2:2013***
Cadmium	**mg/l**	**<0,0001**	**0,000**	**0,001**	**0,005**	**0,005**	**MEST EN ISO 17294-2:2013***
Total Chromium	**mg/l**	**<0,0001**	**0,000**	**0,000**	**0,05**	**0,05**	**MEST EN ISO 17294-2:2013***
Lead	**mg/l**	**<0,0002**	**0,001**	**0,01**	**0,05**	**0,05**	**MEST EN ISO 17294-2:2013***
Selen	**mg/l**	**<0,0005**	**0,001**	**0,001**	**0,01**	**0,01**	**MEST EN ISO 17294-2:2013***
Mercury	**mg/l**	**<0,0001**	**<G.D.**	**<G.D.**	**0,0005**	**0,001**	**AMA-111***
Barium	**mg/l**	**0,013±0,007**	**0,1**	**0,1**	**0,7**	**1**	**MEST EN ISO 17294-2:2013***
Cyanide	**mg/l**	**<0,001**	**<G.D.**	**0,001**	**0,005**	**0,005**	**SMEW 4500CN-E***

Sulphate	**mg/l**	**6**	**20**	**20**	**50**	**200**	**SMEW4500SO4F**
Chloride	**mg/l**	**5**	**10**	**20**	**40**	**200**	**ISO 9297:1997**
Surfactant react with methyl blu	**mg/l**	**0,13**	**0,001**	**0,001**	**0,02**	**0,5**	**SMVP.295**
Ortophosphate	**mg/l PO_4**	**<0,001**	**0,01**	**0,02**	**0,05**	**0,1**	**SMEW. 4500PD***
Phenol	**mg/l**	**0,030±0,003**	**0,0005**	**0,001**	**0,005**	**0,01**	**SMVP.299***
COD	**mg/l O_2**	**3,0±0,2**	**1**	**2**	**4**	**8**	**MEST ISO 6060:2011***
Oksidabilnost	**mg $KMnO_4$/l**	**2**	**5**	**5**	**8**	**8**	**SMVP.134**
Dissolved oxygen	**mg/l O_2**	**5,5**					**SMVP.150**
BOD_5	**mg/l O_2**	**1,0**	**2**	**3**	**4**	**7**	**ISO 5815:2003**
Ammonium	**mg/l**	**1,44±0,20**	**0,00**	**0,02**	**0,05**	**1**	**SMVP.179***
Substances extracted with chloroform	**mg/l**	**<0,001**	**<GD**	**0,01**	**0,2**	**0,5**	**D 1178**
Polycyclic aromatic hydrocarbons	**mg/l**	**0,000060±0,000010**	**<G.D.**	**0,0002**	**0,0002**	**0,001**	**SMEW.6440C***
Naphtalene	**mg/l**	**<0,00001**					**SMEW.6440C***
2-Methylnaphtalene	**mg/l**	**<0,00001**					**SMEW.6440C***
1-Methylnaphtalene	**mg/l**	**<0,00001**					**SMEW.6440C***
Acenaphtylene	**mg/l**	**<0,00001**					**SMEW.6440C***
Acenaphtene	**mg/l**	**<0,00001**					**SMEW.6440C***
Fluorineene	**mg/l**	**<0,00001**					**SMEW.6440C***

Phenanthrene	mg/l	<0,00001					SMEW.6440C*
Anthracene	mg/l	<0,00001					SMEW.6440C*
Fluorineanthene	mg/l	0,000010±0,000002					SMEW.6440C*
Pyrene	mg/l	0,000010±0,000002					SMEW.6440C*
Benzo(a)anthracene	mg/l	0,000010±0,000002					SMEW.6440C*
Chrysene	mg/l	0,000010±0,000001					SMEW.6440C*
Benzo(b)Fluorineanthene	mg/l	0,000010±0,000001					SMEW.6440C*
Benzo(k)Fluorineanthene	mg/l	<0,00001					SMEW.6440C*
Benzo(a)pyrene	mg/l	0,000010±0,000002					SMEW.6440C*
Indeno(1,2,3-cd)pyrene	mg/l	<0,00001					SMEW.6440C*
Dibenzo(a,h)anthracene	mg/l	<0,00001					SMEW.6440C*
Benzo(g,h,i)perylene	mg/l	<0,00001					SMEW.6440C*
Mineral oil	mg/l	<0,01	<G.D	0,01	0,05	0,5	DIN EN ISO 9377-2:2001*
Total pesticides:	mg/l	<0,0003	<G.D	<G.D	0,001	0,0025	EPA.8141A* EPA 8080 A*
Azinphos-ethyl (F)	mg/l	<0,00005					EPA.8141A*
Azinphos-methyl (F)	mg/l	<0,00005					EPA.8141A*
Chlorfenvinphos (F)	mg/l	<0,00005					EPA.8141A*
Chlorpyrifos (F)	mg/l	<0,00005					EPA.8141A*
Chlorpyrifos-methyl (F)	mg/l	<0,00005					EPA.8141A*

Diazinon (F)	**mg/l**	**<0,00005**					**EPA.8141A***
Dichlorvos	**mg/l**	**<0,00005**					**EPA.8141A***
Dimethoate	**mg/l**	**<0,00005**					**EPA.8141A***
Ethion	**mg/l**	**<0,00005**					**EPA.8141A***
Fenitrothion	**mg/l**	**<0,00005**					**EPA.8141A***
Fenthion (F)	**mg/l**	**<0,00005**					**EPA.8141A***
Malathion	**mg/l**	**<0,00005**					**EPA.8141A***
Methacrifos	**mg/l**	**<0,00005**					**EPA.8141A***
Methidathion	**mg/l**	**<0,00005**					**EPA.8141A***
Parathion-methyl	**mg/l**	**<0,00005**					**EPA.8141A***
Parathion (F)	**mg/l**	**<0,00005**					**EPA.8141A***
Phosalone	**mg/l**	**<0,00005**					**EPA.8141A***
Phosmet (R)	**mg/l**	**<0,00005**					**EPA.8141A***
Pirimiphos-methyl (F)	**mg/l**	**<0,00005**					**EPA.8141A***
Profenofos (F)	**mg/l**	**<0,00005**					**EPA.8141A***
Pyrazophos (F)	**mg/l**	**<0,00005**					**EPA.8141A***
Triazophos (F)	**mg/l**	**<0,00005**					**EPA.8141A***
Aldrin (F)	**mg/l**	**<0,00003**					**EPA 8080 A***
Chlordane-cis (F) (R)	**mg/l**	**<0,00003**					**EPA 8080 A***

Chlordane-trans (F) (R)	**mg/l**	**<0,00003**					**EPA 8080 A***
Chlorothalonil (R)	**mg/l**	**<0,00003**					**EPA 8080 A***
p,p´-DDD (F)	**mg/l**	**<0,00003**					**EPA 8080 A***
p,p´-DDE (F)	**mg/l**	**<0,00003**					**EPA 8080 A***
p,p´-DDT (F)	**mg/l**	**<0,00003**					**EPA 8080 A***
Dieldrin (F)	**mg/l**	**<0,00003**					**EPA 8080 A***
Endosulfan-sulphate (F)	**mg/l**	**<0,00003**					**EPA 8080 A***
Endosulfan-alpha (F)	**mg/l**	**<0,00003**					**EPA 8080 A***
Endosulfan-beta (F)	**mg/l**	**<0,00003**					**EPA 8080 A***
Endrin (F)	**mg/l**	**<0,00003**					**EPA 8080 A***
Endrin aldehyde	**mg/l**	**<0,00003**					**EPA 8080 A***
Endrin ketone	**mg/l**	**<0,00003**					**EPA 8080 A***
HCH-delta isomer	**mg/l**	**<0,00003**					**EPA 8080 A***
HCH-alpha isomer	**mg/l**	**<0,00003**					**EPA 8080 A***
HCH-beta isomer	**mg/l**	**<0,00003**					**EPA 8080 A***
HCH-gamma (lindane) (F)	**mg/l**	**<0,00003**					**EPA 8080 A***
Heptachlor (F)	**mg/l**	**<0,00003**					**EPA 8080 A***
Heptachlor epoxide (F)	**mg/l**	**<0,00003**					**EPA 8080 A***
Hexachlorobenzene (F)	**mg/l**	**<0,00003**					**EPA 8080 A***

Methoxychlor (F)	**mg/l**	**<0,00003**					**EPA 8080 A***
Tetradifon	**mg/l**	**<0,00003**					**EPA 8080 A***
Azoxystrobin	**mg/l**	**<0,00005**					**EPA 8141-mod.**
Boscalid (F) (R)	**mg/l**	**<0,00005**					**EPA 8141-mod.**
Bromuconazole (F)	**mg/l**	**<0,00005**					**EPA 8141-mod.**
Chlordane-cis (F) (R)	**mg/l**	**<0,00005**					**EPA 8141-mod.**
Chlordane-trans (F) (R)	**mg/l**	**<0,00005**					**EPA 8141-mod.**
Chlorpropham (F) (R) (A)	**mg/l**	**<0,00005**					**EPA 8141-mod.**
Cypermethrin (F)	**mg/l**	**<0,00005**					**EPA 8141-mod.**
Cyproconazole (F)	**mg/l**	**<0,00005**					**EPA 8141-mod.**
Cyprodinil (F) (R)	**mg/l**	**<0,00005**					**EPA 8141-mod.**
Deltamethrin-cis (F)	**mg/l**	**<0,00005**					**EPA 8141-mod.**
Dichlorvos	**mg/l**	**<0,00005**					**EPA 8141-mod.**
Famoxadone	**mg/l**	**<0,00005**					**EPA 8141-mod.**
Fenazaquin	**mg/l**	**<0,00005**					**EPA 8141-mod.**
Fludioxonil (F) (R)	**mg/l**	**<0,00005**					**EPA 8141-mod.**
Fluquinconazole (F)	**mg/l**	**<0,00005**					**EPA 8141-mod.**
Imazalil	**mg/l**	**<0,00005**					**EPA 8141-mod.**
Lambda-Cyhalothrin (F) (R)	**mg/l**	**<0,00005**					**EPA 8141-mod.**

Metalaxyl	**mg/l**	**<0,00005**					**EPA 8141-mod.**
Penconazole (F)	**mg/l**	**<0,00005**					**EPA 8141-mod.**
Propiconazole	**mg/l**	**<0,00005**					**EPA 8141-mod.**
Pyrazophos (F)	**mg/l**	**<0,00005**					**EPA 8141-mod.**
Pyrimethanil (R)	**mg/l**	**<0,00005**					**EPA 8141-mod.**
Pyriproxyfen (F)	**mg/l**	**<0,00005**					**EPA 8141-mod.**
Quinoxyfen (F)	**mg/l**	**<0,00005**					**EPA 8141-mod.**
Tau-Fluvalinate (F)	**mg/l**	**<0,00005**					**EPA 8141-mod.**
Total organic carbon	**mg/l**	**1,8**	**1**	**1**	**2**	**2,5**	**EN 1484:1997**

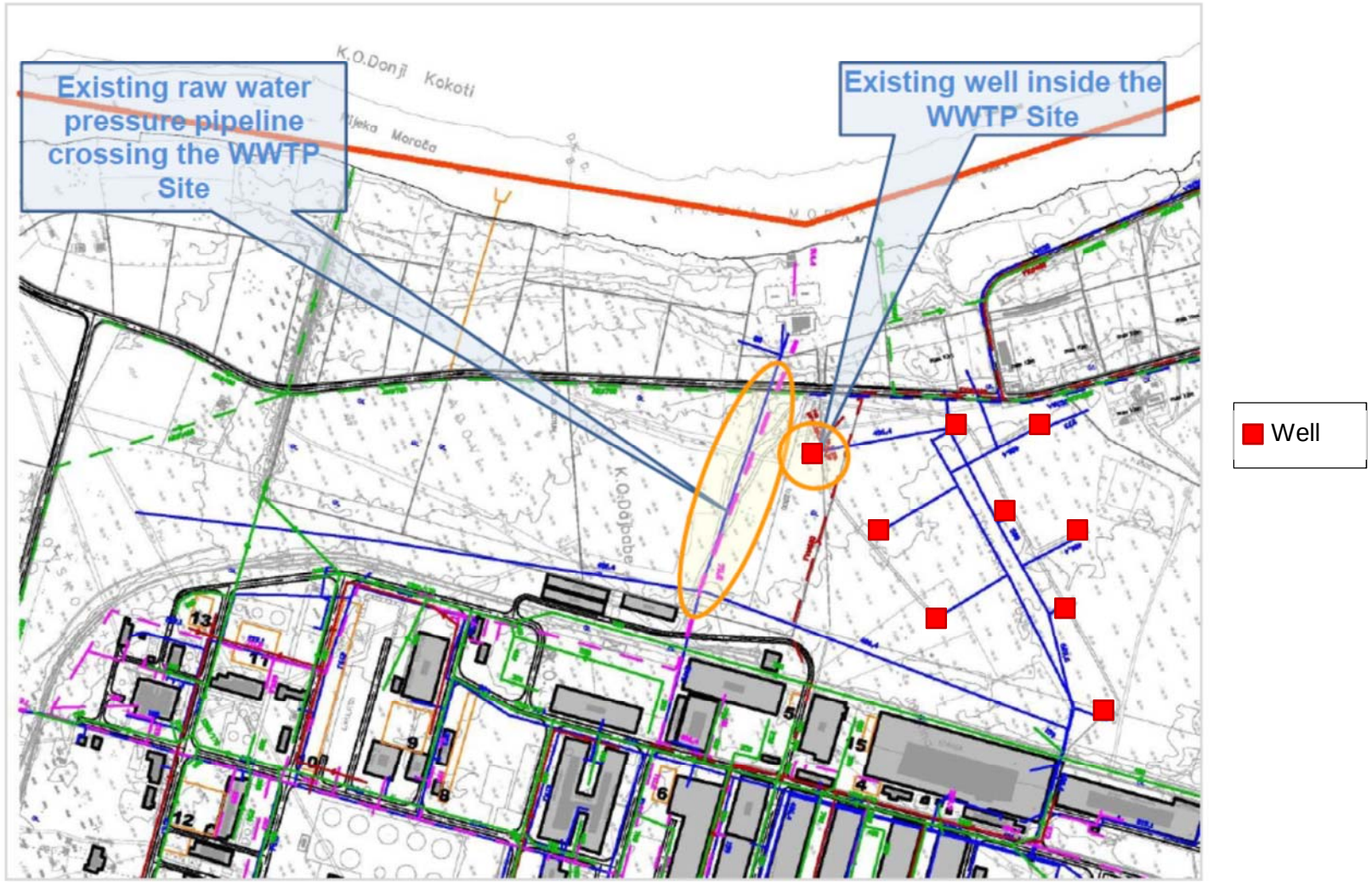
OPINION

According to the results of the physico-chemical analysis groundwater sampled at Uniprom doo Nikšić-Piezometer P7, (protocol CETI 568/04), **does not comply** with the any of the classes of the Trgulation of Classification and Categorization of Surface and Groundwater (Off Gazz MNE ", No. 02/07) due to increased ammonium ion content.

(viii) Other Documents

- **Construction Site Plan**
- **Urban-Technical Conditions (Urbanisticko-Tehnicki Uslovi)**
- **Environmental and Social Impact Assessment (ESIA)**
- **Environmental and Social Management Plan (ESMP)**
- **Geotechnical Survey Report**
- **Reports on Soil Contamination**
- **KAP Well Water Analyses Dat**

KAP Aluminium Factory wells




KAP wells
Legende
KAP wells
KAP well 1
KAP well 4
KAP well 5
KAP well 2
KAP well 6
KAP well 7
KAP well 3
KAP well 8
KAP well 9
Google Earth
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400 m
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UPOREDNI PREGLED REZULTATA ISPITIVANJA VODE ZA PIĆE ZA 2013.GODINU

Redni broj	Mjesto uzorkovanja	Parametar	Dozvoljena vrijednost	Jedinica mjere	Osnovna analiza				Periodična analiza	
					april	avgust 1	novembar	decembar 1	avgust 2	decembar 2
1	Bunar 1	Temperatura vode	25	°C	14,8	16.0	15.4	14.45	14.90	13.9
		Boja	20	mg/PtCo skale	3	0	0	3	0	0
		Ukus	-	-	bez	bez	bez	bez	bez	bez
		Miris	bez	-	bez	bez	bez	bez	bez	bez
		Mutnoća	5.0	NTU	0.072	0.074	0.127	0.101	0.12	0.128
		Ukupna tvrdoća	-	°dH					8.96	9.01
		Koncentracija vodonikovih jona	6.5-9.5	pH jedinica	7.57	6.93	7.63	6.77	7.27	7.55
		Elektroprovodljivost	2500	µS/cm/20^{0}C	339	319	291.5	320.5	308	313.5
		Hloridi	250	Cl mg/l	4.20	3.1	2.75	3.10	2.75	3.10
		Nitrati	50	NO_3 mg/l	7.0	4.67	4.11	5.54	5.19	5.50
		Nitriti	0.50	NO_2 mg/l	0.0115	<0.003	<0.003	<0.003	<0.003	<0.003
		Fluoridi	1500	F µg/l	<20	69.00	210	84.0	72.0	76.0
		HPK		mg/l O_2	0.39	<0.2	<0.2	<0.2		
		Utrošak KMnO4	5.0	Mg/l O_2					0.23	0.24
		Amonijak	0.50	NH_4 mg/l	0.06	0.026	0.037	0.025	0.023	0.037
		Suvi ostatak na 180°	-	mg/l	224	189	159	222	150	212
		Rezidue dezinfekc. sredstava	-	mg/l					<0.2	<0.2
		Gvožđe	200.0	Fe µg/l	<1	2.1	109.00	<1.0	2.0	<1.0
		Mangan	50.0	Mn µg/l	1.1	<1.0	1.70	<0.5	<1.0	<0.5
		Fenoli	-	µg/l					<0.0005	<0.5
		Trihalometani ukupni	100	µg/l		<0.001	<0.001	<0.001	<0.001	
		-hloroform		µg/l	<0.01	<0.001	<0.001	<0.001	<0.001	<0.001
		-bromoform		µg/l	<0.01	<0.001	<0.001	<0.001	<0.001	<0.001
		-dibromhlormetan		µg/l	<0.01	<0.001	<0.001	<0.001	<0.001	<0.001
		-bromdihlormetan		µg/l	<0.01	<0.001			<0.001	<0.001
		Mineralna ulja	20.0	µg/l					<0.01	<0.1
		Zasićenost kiseonikom	-	%					88.7	88.1

UPOREDNI PREGLED REZULTATA ISPITIVANJA VODE ZA PIĆE ZA 2013.GODINU

Redni broj	Mjesto uzorkovanja	Parametar	Dozvoljena vrijednost	Jedinica mjere	Osnovna analiza				Periodična analiza	
					april	avgust 1	novembar	decembar 1	avgust 2	decembar 2
1	Bunar 1	Escherichia coli(MPN)	0	broj/100 ml					0	0
		Ukupne kolimorfne bakterije(MPN)	0	broj/100 ml					0	0
		Enterococcus species	0	broj/100 ml					nisu nađene	nisu nađene
		Pseudomonas aeruginosa(MPN)	0	broj/100 ml					nije nađen	0
		Aerobne mezofilne bakterije na 37ºC	20	broj/1ml					0	0
		Aerobne mezofilne bakterije na 22ºC	100	broj/1ml					0	0
2	Bunar 2	Temperatura vode	25	°C	14.43	15.7	15	14.85	15.4	14.2
		Boja	20	mg/PtCo skale	4	2	1	1	0	0
		Ukus	-	-	bez	bez	bez	bez	bez	bez
		Miris	bez	-	bez	bez	bez	bez	bez	bez
		Mutnoća	5.0	NTU	0.09	0.171	0.252	0.054	0	0.095
		Ukupna tvrdoća	-	ºdH					9.85	9.27
		Koncentracija vodonikovih jona	6.5-9.5	pH jedinica	7.54	7.37	7.32	7.655	7.31	7.57
		Elektroprovodljivost	2500	µS/cm/20^{0}C	350	293	311.5	317.0	319	315.5
		Hloridi	250	Cl mg/l	4.56	3.1	3.44	3.10	3.44	3.10
		Nitrati	50	NO_3 mg/l	8.73	2.84	4.98	5.78	8.86	6.02
		Nitriti	0.50	NO_2 mg/l	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
		Fluoridi	1500	F µg/l	30.00	72.00	122	77	82	76.0
		HPK		mg/l O_2	0.39	<0.2	0.2	<0.2		
		Utrošak KMnO4	5.0	Mg/l O_2					0.08	0.16
		Amonijak	0.50	NH_4 mg/l	0.05	0.096	0.040	0.170	0.05	0.037
		Suvi ostatak na 180°	-	mg/l	216	178	185	214	166	147
		Rezidue dezinfekc. sredstava	-	mg/l					<0.2	<0.2
		Gvožđe	200.0	Fe µg/l	11.00	8.80	19.00	<1.00	8.0	<1.0
		Mangan	50.0	Mn µg/l	1.00	<1.0	<1.00	<0.5	<1.0	<0.5
		Fenoli	-	µg/l		<0.001			<0.0005	<0.5

UPOREDNI PREGLED REZULTATA ISPITIVANJA VODE ZA PIĆE ZA 2013.GODINU

Redni broj	Mjesto uzorkovanja	Parametar	Dozvoljena vrijednost	Jedinica mjere	Osnovna analiza				Periodična analiza	
					april	avgust 1	novembar	decembar 1	avgust 2	decembar 2
2	Bunar 2	Trihalometani ukupni	100	µg/l	<0.001	<0.001			<0.001	
		-hloroform		µg/l	<0.001	<0.001			<0.001	<0.001
		-bromoform		µg/l	<0.001	<0.001			<0.001	<0.001
		-dibromhlormetan		µg/l	<0.001	<0.001			<0.001	<0.001
		-bromdihlormetan		µg/l					<0.001	<0.001
		Mineralna ulja	20.0	µg/l					<0.01	<0.1
		Zasićenost kiseonikom	-	%					82.4	73.6
		Escherichia coli(MPN)	0	broj/100 ml					0	0
		Ukupne kolimorfne bakterije(MPN)	0	broj/100 ml					0	0
		Enterococcus species	0	broj/100 ml					nisu nađene	nisu nađene
		Pseudomonas aeruginosa(MPN)	0	broj/100 ml					nije nađen	0
		Aerobne mezofilne bakterije na 37ºC	20	broj/1ml					0	0
		Aerobne mezofilne bakterije na 22ºC	100	broj/1ml					1	0
3	Bunar 3	Temperatura vode	25	°C	14.6	16.3	15.30	15.9	15.14	14.3
		Boja	20	mg/PtCo skale	4	0	1	1	0/0	1
		Ukus	-	-	bez	bez	bez	bez	bez	bez
		Miris	bez	-	bez	bez	bez	bez	bez	bez
		Mutnoća	5.0	NTU	0.286	0.1055	0.181	0.061	0.29	0.36
		Ukupna tvrdoća	-	ºdH					10.60	10.33
		Koncentracija vodonikovih jona	6.5-9.5	pH jedinica	7.35	7.20	7.12	7.69	7.31	7.55
		Elektroprovodljivost	2500	µS/cm/20^{0}C	379	370	355.5	367.0	338.5	350.5
		Hloridi	250	Cl mg/l	5.61	5.16	4.13	4.82	4.82	4.82
		Nitrati	50	NO_3 mg/l	9.4	6.89	6.41	7.06	8.16	7.82
		Nitriti	0.50	NO_2 mg/l	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
		Fluoridi	1500	F µg/l	120.0	85.00	126	101	102.0	91.0
		HPK		mg/l O_2	3.12	<0.2	<0.2	<0.2		

UPOREDNI PREGLED REZULTATA ISPITIVANJA VODE ZA PIĆE ZA 2013.GODINU

Redni broj	Mjesto uzorkovanja	Parametar	Dozvoljena vrijednost	Jedinica mjere	Osnovna analiza				Periodična analiza	
					april	avgust 1	novembar	decembar 1	avgust 2	decembar 2
3	Bunar 3	Utrošak KMnO4	5.0	Mg/l O_2					0.31	0.24
		Amonijak	0.50	NH_4 mg/l	0.090	0.014	0.038	0.0067	0.046	0.050
		Suvi ostatak na 180°	-	mg/l	264	241	212	224	192	195
		Rezidue dezinfekc. sredstava	-	mg/l					<0.2	<0.2
		Gvožđe	200.0	Fe µg/l	4.00	1.40	<1.00	<1.00	2.0	<1.0
		Mangan	50.0	Mn µg/l	0.990	<1.0	2.00	<0.5	1.0	<0.5
		Fenoli	-	µg/l					<0.0005	<0.5
		Trihalometani ukupni	100	µg/l		<0.001	<0.001	<0.001	<0.001	
		-hloroform		µg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
		-bromoform		µg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
		-dibromhlormetan		µg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
		-bromdihlormetan		µg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
		Mineralna ulja	20.0	µg/l					<0.01	<0.1
		Zasićenost kiseonikom	-	%					79.9	75.0
		Escherichia coli(MPN)	0	broj/100 ml					0	0
		Ukupne kolimorfne bakterije(MPN)	0	broj/100 ml					0	0
		Enterococcus species	0	broj/100 ml					nisu nađene	nisu nađene
		Pseudomonas aeruginosa(MPN)	0	broj/100 ml					nije nađen	0
		Aerobne mezofilne bakterije na 37ºC	20	broj/1ml					1	0
		Aerobne mezofilne bakterije na 22ºC	100	broj/1ml					0	0
4	Bunar 6	Temperatura vode	25	°C	15.2	16.25	15.5	15.05	15.01	15.5
		Boja	20	mg/PtCo skale	3	0	1	2	0	0
		Ukus	-	-	bez	bez	bez	bez	bez	bez
		Miris	bez	-	bez	bez	bez	bez	bez	bez
		Mutnoća	5.0	NTU	0.230	0.161	<0.1	0.208	0.434	0.06
		Ukupna tvrdoća	-	ºdH					7.99	-

UPOREDNI PREGLED REZULTATA ISPITIVANJA VODE ZA PIĆE ZA 2013.GODINU

Redni broj	Mjesto uzorkovanja	Parametar	Dozvoljena vrijednost	Jedinica mjere	Osnovna analiza				Periodična analiza	
					april	avgust 1	novembar	decembar 1	avgust 2	decembar 2
4	Bunar 6	Koncentracija vodonikovih jona	6.5-9.5	pH jedinica	7.54	7.31	7.39	7.81	7.36	7.66
		Elektroprovodljivost	2500	µS/cm/20^{0}C	338.5	278.0	291.5	309.0	283	299.5
		Hloridi	250	Cl mg/l	4.2	2.41	3.10	3.10	2.41	3.10
		Nitrati	50	NO_3 mg/l	8.46	2.59	4.04	5.52	2.72	5.28
		Nitriti	0.50	NO_2 mg/l	0.053	<0.003	<0.003	<0.003	<0.003	<0.003
		Fluoridi	1500	F µg/l	<20.0	74.00	134	88.0	79.0	83.0
		HPK		mg/l O_2	2.73	<0.2	<0.2	<0.2		
		Utrošak KMnO4	5.0	Mg/l O_2					0.61	0.39
		Amonijak	0.50	NH_4 mg/l	0.066	0.0043	0.037	0.063	0.061	0.031
		Suvi ostatak na 180°	-	mg/l	252	163	158	258	124	196
		Rezidue dezinfekc. sredstava	-	mg/l					<0.2	<0.2
		Gvožđe	200.0	Fe µg/l	18.00	1.50	51.00	<1.0	3.0	<0.1
		Mangan	50.0	Mn µg/l	1.1	<1.0	1.60	1.30	<1.0	<0.5
		Fenoli	-	µg/l					<.0005	<0.5
		Trihalometani ukupni	100	µg/l		<0.001	<0.001	<0.001	<0.001	
		-hloroform		µg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
		-bromoform		µg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
		-dibromhlormetan		µg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
		-bromdihlormetan		µg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
		Mineralna ulja	20.0	µg/l					<0.01	<0.1
		Zasićenost kiseonikom	-	%					75.7	79.7
		Escherichia coli(MPN)	0	broj/100 ml					0	0
		Ukupne kolimorfne bakterije(MPN)	0	broj/100 ml					6	0
		Enterococcus species	0	broj/100 ml					**Nađene su**	Nisu nađene
		Pseudomonas aeruginosa(MPN)	0	broj/100 ml					Nije nađen	0
		Aerobne mezofilne bakterije na 37ºC	20	broj/1ml					1	1

UPOREDNI PREGLED REZULTATA ISPITIVANJA VODE ZA PIĆE ZA 2013.GODINU

Redni broj	Mjesto uzorkovanja	Parametar	Dozvoljena vrijednost	Jedinica mjere	Osnovna analiza				Periodična analiza	
					april	avgust 1	novembar	decembar 1	avgust 2	decembar 2
4	Bunar 6	Aerobne mezofilne bakterije na 22ºC	100	broj/1ml					**15**	0
5	Bunar 7	Temperatura vode	25	°C		16	15.3	15.1	15.32	14.2
		Boja	20	mg/PtCo skale		0	2	1	0	1
		Ukus	-	-		bez	bez	bez	bez	bez
		Miris	bez	-		bez	bez	bez	bez	bez
		Mutnoća	5.0	NTU		0.352	0.415	0.10	0.27	0.103
		Ukupna tvrdoća	-	ºdH					9.32	9.29
		Koncentracija vodonikovih jona	6.5-9.5	pH jedinica		7.355	7.42	7.75	7.12	7.6
		Elektroprovodljivost	2500	µS/cm/20^{0}C		281.50	296	320	310.5	313
		Hloridi	250	Cl mg/l		2.41	2.75	3.44	3.10	3.10
		Nitrati	50	NO_3 mg/l		1.87	4.14	6.01	5.59	6.35
		Nitriti	0.50	NO_2 mg/l		<0.003	<0.003	<0.003	<0.003	<0.003
		Fluoridi	1500	F µg/l		71.00	122	89.0	80.0	82.0
		HPK		mg/l O_2			<0.2	<0.2	<0.2	
		Utrošak KMnO4	5.0	Mg/l O_2					0.61	0.39
		Amonijak	0.50	NH_4 mg/l		0.036	0.082	0.031	0.086	0.040
		Suvi ostatak na 180°	-	mg/l		156.0	160	200	160	165
		Rezidue dezinfekc. sredstava	-	mg/l					<0.2	<0.2
		Gvožđe	200.0	Fe µg/l		3.50	64.00	<1.0	41.0	<1.0
		Mangan	50.0	Mn µg/l		2.10	2.60	<0.5	1.60	<0.5
		Fenoli	-	µg/l					<0.0005	<0.5
		Trihalometani ukupni	100	µg/l		<0.001	<0.001	<0.001	<0.001	
		-hloroform		µg/l		<0.001	<0.001	<0.001	<0.001	<0.001
		-bromoform		µg/l		<0.001	<0.001	<0.001	<0.001	<0.001
		-dibromhlormetan		µg/l		<0.001	<0.001	<0.001	<0.001	<0.001
		-bromdihlormetan		µg/l		<0.001	<0.001	<0.001	<0.001	<0.001
		Mineralna ulja	20.0	µg/l					<0.01	<0.1

UPOREDNI PREGLED REZULTATA ISPITIVANJA VODE ZA PIĆE ZA 2013.GODINU

Redni broj	Mjesto uzorkovanja	Parametar	Dozvoljena vrijednost	Jedinica mjere	Osnovna analiza				Periodična analiza	
					april	avgust 1	novembar	decembar 1	avgust 2	decembar 2
5	Bunar 7	Zasićenost kiseonikom	-	%					78.8	64.6
		Escherichia coli(MPN)	0	broj/100 ml					0	0
		Ukupne kolimorfne bakterije(MPN)	0	broj/100 ml					0	0
		Enterococcus species	0	broj/100 ml					nisu nađene	nisu nađene
		Pseudomonas aeruginosa(MPN)	0	broj/100 ml					nije nađen	0
		Aerobne mezofilne bakterije na 37ºC	20	broj/1ml					0	0
		Aerobne mezofilne bakterije na 22ºC	100	broj/1ml					2	0
6	Bunar 8	Temperatura vode	25	°C	15.7	14.8	15.53	15.45	14.10	16.2
		Boja	20	mg/PtCo skale	1	0	1	0	0	1
		Ukus	-	-	bez	bez	bez	bez	bez	bez
		Miris	bez	-	bez	bez	bez	bez	bez	bez
		Mutnoća	5.0	NTU	0.134	<0.1	<0.1	0.08	0.118	0.089
		Ukupna tvrdoća	-	ºdH					8.12	8.85
		Koncentracija vodonikovih jona	6.5-9.5	pH jedinica	7.65	7.16	7.42	7.76	7.23	7.65
		Elektroprovodljivost	2500	µS/cm/20^{0}C	333	274.5	284	298	295.2	294
		Hloridi	250	Cl mg/l	3.5	2.41	2.75	2.75	2.41	2.41
		Nitrati	50	NO_3 mg/l	7.96	1.54	3.77	4.22	2.55	4.49
		Nitriti	0.50	NO_2 mg/l	0.066	<0.003	<0.003	<0.003	<0.003	<0.003
		Fluoridi	1500	F µg/l	<20	68.00	162	103	64.0	88.0
		HPK		mg/l O_2	0.78	0.58	<0.2	<0.2		
		Utrošak KMnO4	5.0	Mg/l O_2					0.38	0.24
		Amonijak	0.50	NH_4 mg/l	0.050	0.045	0.029	0.014	0.020	0.034
		Suvi ostatak na 180°	-	mg/l	225	158	163	125	111	190
		Rezidue dezinfekc. sredstava	-	mg/l					<0.2	<0.2
		Gvožđe	200.0	Fe µg/l	<1.0	<1.0	35.00	21.0	<1.0	<1.0
		Mangan	50.0	Mn µg/l	1.0	<1.0	1.40	<0.5	<1.0	<0.5

UPOREDNI PREGLED REZULTATA ISPITIVANJA VODE ZA PIĆE ZA 2013.GODINU

Redni broj	Mjesto uzorkovanja	Parametar	Dozvoljena vrijednost	Jedinica mjere	Osnovna analiza				Periodična analiza	
					april	avgust 1	novembar	decembar 1	avgust 2	decembar 2
6	Bunar 8	Fenoli	-	µg/l			<0.001	<0.001	<0.0005	<0.5
		Trihalometani ukupni	100	µg/l		<0.001	<0.001	<0.001	<0.001	
		-hloroform		µg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
		-bromoform		µg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
		-dibromhlormetan		µg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
		-bromdihlormetan		µg/l	<0.001	<0.001			<0.001	<0.001
		Mineralna ulja	20.0	µg/l					<0.01	<0.1
		Zasićenost kiseonikom	-	%					67.8	76.8
		Escherichia coli(MPN)	0	broj/100 ml					0	0
		Ukupne kolimorfne bakterije(MPN)	0	broj/100 ml					0	0
		Enterococcus species	0	broj/100 ml					nisu nađene	nisu nađene
		Pseudomonas aeruginosa(MPN)	0	broj/100 ml					Nije nađen	0
		Aerobne mezofilne bakterije na 37ºC	20	broj/1ml					0	0
		Aerobne mezofilne bakterije na 22ºC	100	broj/1ml					0	0
7	Bunar 9	Temperatura vode	25	°C	15.4	16.00	14.8	14.2	15.32	14.4
		Boja	20	mg/PtCo skale	3	0	0	1	0	0
		Ukus	-	-	bez	bez	bez	bez	bez	bez
		Miris	bez	-	bez	bez	bez	bez	Bez	bez
		Mutnoća	5.0	NTU	0.402	0.225	<0.1	0.11	0.18	0.08
		Ukupna tvrdoća	-	ºdH					8.34	8.84
		Koncentracija vodonikovih jona	6.5-9.5	pH jedinica	7.52	7.245	7.48	7.78	7.34	7.62
		Elektroprovodljivost	2500	µS/cm/20^{0}C	340	292	290.5	306.5	294	305
		Hloridi	250	Cl mg/l	3.86	3.78	2.75	3.10	2.75	3.10
		Nitrati	50	NO_3 mg/l	9.5	2.68	3.97	5.08	3.06	5.95
		Nitriti	0.50	NO_2 mg/l	0.065	<0.003	<0.003	<0.003	<0.003	<0.003
		Fluoridi	1500	F µg/l	<20	68.00	126	114	82	89.0

UPOREDNI PREGLED REZULTATA ISPITIVANJA VODE ZA PIĆE ZA 2013.GODINU

Redni broj	Mjesto uzorkovanja	Parametar	Dozvoljena vrijednost	Jedinica mjere	Osnovna analiza				Periodična analiza	
					april	avgust 1	novembar	decembar 1	avgust 2	decembar 2
7	Bunar 9	HPK		mg/l O_2	2.73	<0.2	<0.2	<0.2		
		Utrošak KMnO4	5.0	Mg/l O_2					0.46	0.24
		Amonijak	0.50	NH_4 mg/l	0.07	0.055	0.040	0.048	0.034	0.034
		Suvi ostatak na 180°	-	mg/l	236	170	180	174	127	134
		Rezidue dezinfekc. sredstava	-	mg/l					<0.2	<0.2
		Gvožđe	200.0	Fe µg/l	45.0	28	<1.00	<1.00	33.0	<1.0
		Mangan	50.0	Mn µg/l	5.30	<1.00	<1.00	<0.5	<1.0	<0.5
		Fenoli	-	µg/l					<0.0005	<0.5
		Trihalometani ukupni	100	µg/l		<0.001	<0.001	<0.001	<0.001	
		-hloroform		µg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
		-bromoform		µg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
		-dibromhlormetan		µg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
		-bromdihlormetan		µg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
		Mineralna ulja	20.0	µg/l					<0.01	<0.1
		Zasićenost kiseonikom	-	%					69.7	81.7
		Escherichia coli(MPN)	0	broj/100 ml					0	0
		Ukupne kolimorfne bakterije(MPN)	0	broj/100 ml					0	0
		Enterococcus species	0	broj/100 ml					nisu nađene	nisu nađene
		Pseudomonas aeruginosa(MPN)	0	broj/100 ml					Nije nađen	0
		Aerobne mezofilne bakterije na 37ºC	20	broj/1ml					3	0
		Aerobne mezofilne bakterije na 22ºC	100	broj/1ml					1	0

	Izradio	Kontrolisao
Ime i prezime	Marina Medojević Raduša Peruničić	Marjana Kaluđerović
Potpis		

CENTAR ZA
EKOTOKSIKOLOŠKA ISPITIVANJA D.O.O.
81000 PODGORICA, PUT RADOMIRA IVANOVIĆA 2
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CETI 5100.101.01

LABORATORIJA ZA EKOTOKSIKOLOŠKA ISPITIVANJA I ZAŠTITU OD ZRAČENJA

IZVJEŠTAJ O ISPITIVANJU

Vrsta ispitivanja	**Fizičko-hemijsko ispitivanje vode za piće**
Broj izvještaja	00-15-2470/7/01
Datum izdavanja izvještaja	02.04.2013.

PODACI O PODNOSIOCU ZAHTJEVA	
Naziv podnosioca zahtjeva	A.D. KOMBINAT ALUMINIJUMA PODGORICA
Broj zahtjeva/ugovora	91-1339
Datum podnošenja zahtjeva	05.07.2012.

PODACI O UZORKU	
Datum uzorkovanja	27.03.2013.
Vrsta uzorka	**Voda za piće iz bunara br. 3**
Zahtijevano ispitivanje	parametri po Ugovoru
Uzorkovao	Ivan Đurović
Broj protokola u CETI	7/01

Napomena:

1. **Rezultati ispitivanja se odnose samo na ispitivani uzorak.**
2. **Izvještaj o ispitivanju se može umnožavati isključivo kao cjelina.**

POMOĆNIK DIREKTORA
ZA TEH. I LAB. POSLOVE
Danijela Šuković, spec.toks. hem.

IZVJEŠTAJ O ISPITIVANJU BR. 00-15-2470/7/01

ODJELJENJE ZA LABORATORIJSKU DIJAGNOSTIKU I MONITORING

REZULTATI ANALIZE

Parametar	Jedinica mjere	Rezultati analize	MDK	Oznaka metode
Br. protokola		7/01		
Datum / čas uzorkovanja		27.03.2013.		
Mjesto uzorkovanja		Bunar br. 3		
Temperatura vode (teren)	^{0}C	14,6	25	SMVP.111*
Boja	mg/PtCo skale	4	20	SMVP.120
Ukus		bez		
Miris		bez	bez	
Mutnoća	NTU	0,286±0,016	1,0	SMVP.118*
Koncentracija vodonikovih jona (ter/lab)	pH jedinica	7,53/7,17±0,26	6,5-9,5	JUS HZ1.111*
Elektroprovodljivost (teren/lab)	µS/cm/20^o C	379/379±2	2500	SMVP.143*
Hloridi	Cl mg/l	5,61	250	ISO 9297:1997
Nitrati	NO_3 mg/l	9,40±1,27	50	SMEW4500NO3B*
Nitriti	NO_2 mg/l	<0,003	0,50	SMEW4500NO2B*
Fluoridi	F µg/l	120,0±14,7	1500	SMVP.326*
HPK	mg/l O_2	3,12±0,18		JUS/ISO 6060*
Amonijak	NH_4 mg/l	0,090±0,013	0,50	SMVP.179*
Suvi ostatak na 180^0	mg/l	264±24		SMVP.129*
Gvožđe	Fe µg/l	4,00±0,98	200,0	SMEW.3500FeB*
Mangan	Mn µg/l	0,990±0,095	50,0	SMEW.3500MnB*
Trihalometani ukupni:	µg/l		100,0	SMEW 6232B
- hloroform	µg/l	<0,001		SMEW 6232 B
- bromoform	µg/l	<0,001		SMEW 6232 B

- dibromhlormetan	µg/l	<0,001		SMEW 6232 B
- bromdihlormetan	µg/l	<0,001		SMEW 6232 B

*-akreditovana metoda

Načelnik Odjeljenja za lab, dijagnostiku i monitoring
mr sci. Dejan Jančić, dipl. hem.

Dejan Jančić

STRUČNO MIŠLJENJE

Na osnovu rezultata obavljenih laboratorijskih ispitivanja i stručnog razmatranja utvrđeno je da ispitivani uzorak

Vrsta/naziv uzorka	Voda za piće iz bunara br. 3
Broj protokola uzorka u CETI	7/01

ODGOVARA

uslovima Pravilnika o bližim zahtjevima koje u pogledu bezbjednosti treba da ispunjava voda za piće („Sl. list CG", br. 24/12).

OVLAŠĆENO LICE
Danijela Šuković, spec. toks. hem.

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CETI 5100.101.01

LABORATORIJA ZA EKOTOKSIKOLOŠKA ISPITIVANJA I ZAŠTITU OD ZRAČENJA

IZVJEŠTAJ O ISPITIVANJU

Vrsta ispitivanja	**Fizičko-hemijsko ispitivanje vode za piće**
Broj izvještaja	00-15-2470/8/01
Datum izdavanja izvještaja	02.04.2013.

PODACI O PODNOSIOCU ZAHTJEVA	
Naziv podnosioca zahtjeva	A.D. KOMBINAT ALUMINIJUMA PODGORICA
Broj zahtjeva/ugovora	91-1339
Datum podnošenja zahtjeva	05.07.2012.

PODACI O UZORKU	
Datum uzorkovanja	27.03.2013.
Vrsta uzorka	**Voda za piće iz bunara br. 2**
Zahtijevano ispitivanje	parametri po Ugovoru
Uzorkovao	Ivan Đurović
Broj protokola u CETI	8/01

Napomena:

1. **Rezultati ispitivanja se odnose samo na ispitivani uzorak.**
2. **Izvještaj o ispitivanju se može umnožavati isključivo kao cjelina.**

POMOĆNIK DIREKTORA
ZA TEH. I LAB. POSLOVE
Danijela Šuković, spec.toks. hem.

ODJELJENJE ZA LABORATORIJSKU DIJAGNOSTIKU I MONITORING

REZULTATI ANALIZE

Parametar	Jedinica mjere	Rezultati analize	MDK	Oznaka metode
Br. protokola		8/01		
Datum / čas uzorkovanja		27.03.2013.		
Mjesto uzorkovanja		Bunar br. 2		
Temperatura vode (teren)	^{0}C	14,43	25	SMVP.111*
Boja	mg/PtCo skale	4	20	SMVP.120
Ukus		bez		
Miris		bez	bez	
Mutnoća	NTU	0,19±0,01	1,0	SMVP.118*
Koncentracija vodonikovih jona (ter/lab)	pH jedinica	7,73/7,36±0,27	6,5-9,5	JUS HZ1.111*
Elektroprovodljivost (teren/lab)	µS/cm/20^o C	350/350±2	2500	SMVP.143*
Hloridi	Cl mg/l	4,56	250	ISO 9297:1997
Nitrati	NO_3 mg/l	8,73±1,18	50	SMEW4500NO3B*
Nitriti	NO_2 mg/l	<0,003	0,50	SMEW4500NO2B*
Fluoridi	F µg/l	30,00±3,68	1500	SMVP.326*
HPK	mg/l O_2	0,39±0,01		JUS/ISO 6060*
Amonijak	NH_4 mg/l	0,050±0,007	0,50	SMVP.179*
Suvi ostatak na 180^0	mg/l	216±20		SMVP.129*
Gvožđe	Fe µg/l	11,0±2,7	200,0	SMEW.3500FeB*
Mangan	Mn µg/l	1,00±0,10	50,0	SMEW.3500MnB*
Trihalometani ukupni	µg/l		100,0	SMEW 6232B
- hloroform	µg/l	<0,001		SMEW 6232 B
- bromoform	µg/l	<0,001		SMEW 6232 B

- dibromhlormetan	µg/l	<0,001		SMEW 6232 B
- bromdihlormetan	µg/l	<0,001		SMEW 6232 B

*-akreditovana metoda

Načelnik Odjeljenja za lab, dijagnostiku i monitoring
mr sci. Dejan Jančić, dipl. hem.

Dejan Jančić

STRUČNO MIŠLJENJE

Na osnovu rezultata obavljenih laboratorijskih ispitivanja i stručnog razmatranja utvrđeno je da ispitivani uzorak

Vrsta/naziv uzorka	**Voda za piće iz bunara br. 2**
Broj protokola uzorka u CETI	**8/01**

ODGOVARA

uslovima Pravilnika o bližim zahtjevima koje u pogledu bezbjednosti treba da ispunjava voda za piće („Sl. list CG", br. 24/12).

OVLAŠĆENO LICE

Danijela Šuković, spec. toks. hem.

CENTAR ZA
EKOTOKSIKOLOŠKA ISPITIVANJA D.O.O.
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LABORATORIJA ZA EKOTOKSIKOLOŠKA ISPITIVANJA I ZAŠTITU OD ZRAČENJA

IZVJEŠTAJ O ISPITIVANJU

Vrsta ispitivanja	**Fizičko-hemijsko ispitivanje vode za piće**
Broj izvještaja	00-15-2470/9/01
Datum izdavanja izvještaja	02.04.2013.

PODACI O PODNOSIOCU ZAHTJEVA	
Naziv podnosioca zahtjeva	A.D. KOMBINAT ALUMINIJUMA PODGORICA
Broj zahtjeva/ugovora	91-1339
Datum podnošenja zahtjeva	05.07.2012.

PODACI O UZORKU	
Datum uzorkovanja	27.03.2013.
Vrsta uzorka	**Voda za piće iz bunara br. 1**
Zahtijevano ispitivanje	parametri po Ugovoru
Uzorkovao	Ivan Đurović
Broj protokola u CETI	9/01

Napomena:

1. **Rezultati ispitivanja se odnose samo na ispitivani uzorak.**
2. **Izvještaj o ispitivanju se može umnožavati isključivo kao cjelina.**

POMOĆNIK DIREKTORA
ZA TEH. I LAB. POSLOVE
Danijela Šuković, spec.toks. hem.

IZVJEŠTAJ O ISPITIVANJU BR. 00-15-2470/9/01

ODJELJENJE ZA LABORATORIJSKU DIJAGNOSTIKU I MONITORING

REZULTATI ANALIZE

Parametar	Jedinica mjere	Rezultati analize	MDK	Oznaka metode
Br. protokola		9/01		
Datum / čas uzorkovanja		27.03.2013.		
Mjesto uzorkovanja		Bunar br. 1		
Temperatura vode (teren)	^{0}C	14,8	25	SMVP.111*
Boja	mg/PtCo skale	3	20	SMVP.120
Ukus		bez		
Miris		bez	bez	
Mutnoća	NTU	0,139±0,008	1,0	SMVP.118*
Koncentracija vodonikovih jona (ter/lab)	pH jedinica	7,78/7,36±0,27	6,5-9,5	JUS HZ1.111*
Elektroprovodljivost (teren/lab)	µS/cm/20^o C	336/342±2	2500	SMVP.143*
Hloridi	Cl mg/l	4,20	250	ISO 9297:1997
Nitrati	NO_3 mg/l	7,80±1,05	50	SMEW4500NO3B*
Nitriti	NO_2 mg/l	0,018±0,005	0,50	SMEW4500NO2B*
Fluoridi	F µg/l	<20,0	1500	SMVP.326*
HPK	mg/l O_2	0,39±0,02		JUS/ISO 6060*
Amonijak	NH_4 mg/l	0,060±0,008	0,50	SMVP.179*
Suvi ostatak na 180^0	mg/l	224±20		SMVP.129*
Gvožđe	Fe µg/l	<1,0	200,0	SMEW.3500FeB*
Mangan	Mn µg/l	1,1±0,1	50,0	SMEW.3500MnB*
Trihalometani ukupni	µg/l		100,0	SMEW 6232B
- hloroform	µg/l	<0,001		SMEW 6232 B
- bromoform	µg/l	<0,001		SMEW 6232 B

- dibromhlormetan	µg/l	<0,001		SMEW 6232 B
- bromdihlormetan	µg/l	<0,001		SMEW 6232 B

*-akreditovana metoda

Načelnik Odjeljenja za lab, dijagnostiku i monitoring
mr sci. Dejan Jančić, dipl. hem.

Dejan Jančić

STRUČNO MIŠLJENJE

Na osnovu rezultata obavljenih laboratorijskih ispitivanja i stručnog razmatranja utvrđeno je da ispitivani uzorak

Vrsta/naziv uzorka	Voda za piće iz bunara br. 1
Broj protokola uzorka u CETI	9/01

ODGOVARA

uslovima Pravilnika o bližim zahtjevima koje u pogledu bezbjednosti treba da ispunjava voda za piće („Sl. list CG“, br. 24/12).

OVLAŠĆENO LICE

Danijela Šuković, spec. toks. hem.

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LABORATORIJA ZA EKOTOKSIKOLOŠKA ISPITIVANJA I ZAŠTITU OD ZRAČENJA

IZVJEŠTAJ O ISPITIVANJU

Vrsta ispitivanja	**Fizičko-hemijsko ispitivanje vode za piće**
Broj izvještaja	00-15-2470/10/01
Datum izdavanja izvještaja	02.04.2013.

PODAĆI O PODNOSIOCU ZAHTJEVA	
Naziv podnosioca zahtjeva	A.D. KOMBINAT ALUMINIJUMA PODGORICA
Broj zahtjeva/ugovora	91-1339
Datum podnošenja zahtjeva	05.07.2012.

PODACI O UZORKU	
Datum uzorkovanja	27.03.2013.
Vrsta uzorka	**Voda za piće iz bunara br. 6**
Zahtijevano ispitivanje	parametri po Ugovoru
Uzorkovao	Ivan Đurović
Broj protokola u CETI	10/01

Napomena:

1. **Rezultati ispitivanja se odnose samo na ispitivani uzorak.**
2. **Izvještaj o ispitivanju se može umnožavati isključivo kao cjelina.**

POMOĆNIK DIREKTORA
ZA TEH. I LAB. POSLOVE
Danijela Šuković, spec.toks. hem.

IZVJEŠTAJ O ISPITIVANJU BR. 00-15-2470/10/01

ODJELJENJE ZA LABORATORIJSKU DIJAGNOSTIKU I MONITORING

REZULTATI ANALIZE

Parametar	Jedinica mjere	Rezultati analize	MDK	Oznaka metode
Br. protokola		10/01		
Datum / čas uzorkovanja		27.03.2013.		
Mjesto uzorkovanja		Bunar br. 6		
Temperatura vode (teren)	^{0}C	15.2	25	SMVP.111*
Boja	mg/PtCo skale	3	20	SMVP.120
Ukus		bez		
Miris		bez	bez	
Mutnoća	NTU	0,230±0,013	1,0	SMVP.118*
Koncentracija vodonikovih jona (ter/lab)	pH jedinica	7,69/7,39±0,27	6,5-9,5	JUS HZ1.111*
Elektroprovodljivost (teren/lab)	µS/cm/20^0 C	335/342±2	2500	SMVP.143*
Hloridi	Cl mg/l	4,20	250	ISO 9297:1997
Nitrati	NO_3 mg/l	8,46±1,14	50	SMEW4500NO3B*
Nitriti	NO_2 mg/l	0,053±0,002	0,50	SMEW4500NO2B*
Fluoridi	F µg/l	<20,0	1500	SMVP.326*
HPK	mg/l O_2	2,73±0,16		JUS/ISO 6060*
Amonijak	NH_4 mg/l	0,066±0,009	0,50	SMVP.179*
Suvi ostatak na 180^0	mg/l	252±23		SMVP.129*
Gvožđe	Fe µg/l	18,00±4,42	200,0	SMEW.3500FeB*
Mangan	Mn µg/l	1,1±0,1	50,0	SMEW.3500MnB*
Trihalometani ukupni	µg/l		100,0	SMEW 6232B
- hloroform	µg/l	<0,001		SMEW 6232 B
- bromoform	µg/l	<0,001		SMEW 6232 B

- dibromhlormetan	µg/l	<0,001		SMEW 6232 B
- bromdihlormetan	µg/l	<0,001		SMEW 6232 B

*-akreditovana metoda

Načelnik Odjeljenja za lab, dijagnostiku i monitoring
mr sci. Dejan Jančić, dipl. hem.

Dejan Jančić

STRUČNO MIŠLJENJE

Na osnovu rezultata obavljenih laboratorijskih ispitivanja i stručnog razmatranja utvrđeno je da ispitivani uzorak

Vrsta/naziv uzorka	Voda za piće iz bunara br. 6
Broj protokola uzorka u CETI	10/01

ODGOVARA

uslovima Pravilnika o bližim zahtjevima koje u pogledu bezbjednosti treba da ispunjava voda za piće („Sl. list CG“, br. 24/12).

OVLAŠĆENO LICE

Danijela Šuković, spec. toks. hem.

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LABORATORIJA ZA EKOTOKSIKOLOŠKA ISPITIVANJA I ZAŠTITU OD ZRAČENJA

IZVJEŠTAJ O ISPITIVANJU

Vrsta ispitivanja	**Fizičko-hemijsko ispitivanje vode za piće**
Broj izvještaja	00-15-2470/11/01
Datum izdavanja izvještaja	02.04.2013.

PODACI O PODNOSIOCU ZAHTJEVA	
Naziv podnosioca zahtjeva	A.D. KOMBINAT ALUMINIJUMA PODGORICA
Broj zahtjeva/ugovora	91-1339
Datum podnošenja zahtjeva	05.07.2012.

PODACI O UZORKU	
Datum uzorkovanja	27.03.2013.
Vrsta uzorka	**Voda za piće iz bunara br. 9**
Zahtijevano ispitivanje	parametri po Ugovoru
Uzorkovao	Ivan Đurović
Broj protokola u CETI	11/01

Napomena:

1. **Rezultati ispitivanja se odnose samo na ispitivani uzorak.**
2. **Izvještaj o ispitivanju se može umnožavati isključivo kao cjelina.**

POMOĆNIK DIREKTORA
ZA TEH. I LAB. POSLOVE
Danijela Šuković, spec.toks. hem.

IZVJEŠTAJ O ISPITIVANJU BR. 00-15-2470/11/01

ODJELJENJE ZA LABORATORIJSKU DIJAGNOSTIKU I MONITORING

REZULTATI ANALIZE

Parametar	Jedinica mjere	Rezultati analize	MDK	Oznaka metode
Br. protokola		11/01		
Datum / čas uzorkovanja		27.03.2013.		
Mjesto uzorkovanja		Bunar br. 9		
Temperatura vode (teren)	^{0}C	15,4	25	SMVP.111*
Boja	mg/PtCo skale	3	20	SMVP.120
Ukus		bez		
Miris		bez	bez	
Mutnoća	NTU	0,402±0,022	1,0	SMVP.118*
Koncentracija vodonikovih jona (ter/lab)	pH jedinica	7,68/7,37±0,27	6,5-9,5	JUS HZ1.111*
Elektroprovodljivost (teren/lab)	µS/cm/20^0 C	343/337±2	2500	SMVP.143*
Hloridi	Cl mg/l	3,86	250	ISO 9297:1997
Nitrati	NO_3 mg/l	9,50±1,28	50	SMEW4500NO3B*
Nitriti	NO_2 mg/l	0,065±0,002	0,50	SMEW4500NO2B*
Fluoridi	F µg/l	<20,0	1500	SMVP.326*
HPK	mg/l O_2	2,73±0,16		JUS/ISO 6060*
Amonijak	NH_4 mg/l	0,07±0,01	0,50	SMVP.179*
Suvi ostatak na 180^0	mg/l	236±21		SMVP.129*
Gvožđe	Fe µg/l	45,0±11,05	200,0	SMEW.3500FeB*
Mangan	Mn µg/l	5,30±0,51	50,0	SMEW.3500MnB*
Trihalometani ukupni	µg/l		100,0	SMEW 6232B
- hloroform	µg/l	<0,001		SMEW 6232 B
- bromoform	µg/l	<0,001		SMEW 6232 B

- dibromhlormetan	µg/l	<0,001		SMEW 6232 B
- bromdihlormetan	µg/l	<0,001		SMEW 6232 B

*-akreditovana metoda

Načelnik Odjeljenja za lab, dijagnostiku i monitoring
mr sci. Dejan Jančić, dipl. hem.

Dejan Jančić

STRUČNO MIŠLJENJE

Na osnovu rezultata obavljenih laboratorijskih ispitivanja i stručnog razmatranja utvrđeno je da ispitivani uzorak

Vrsta/naziv uzorka	**Voda za piće iz bunara br. 9**
Broj protokola uzorka u CETI	**11/01**

ODGOVARA

uslovima Pravilnika o bližim zahtjevima koje u pogledu bezbjednosti treba da ispunjava voda za piće („Sl. list CG“, br. 24/12).

OVLAŠĆENO LICE

Danijela Šuković, spec. toks. hem.

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LABORATORIJA ZA EKOTOKSIKOLOŠKA ISPITIVANJA I ZAŠTITU OD ZRAČENJA

IZVJEŠTAJ O ISPITIVANJU

Vrsta ispitivanja	**Fizičko-hemijsko ispitivanje vode za piće**
Broj izvještaja	00-15-2470/12/01
Datum izdavanja izvještaja	02.04.2013.

PODAĆI O PODNOSIOCU ZAHTJEVA	
Naziv podnosioca zahtjeva	A.D. KOMBINAT ALUMINIJUMA PODGORICA
Broj zahtjeva/ugovora	91-1339
Datum podnošenja zahtjeva	05.07.2012.

PODACI O UZORKU	
Datum uzorkovanja	27.03.2013.
Vrsta uzorka	**Voda za piće iz bunara br. 8**
Zahtijevano ispitivanje	parametri po Ugovoru
Uzorkovao	Ivan Đurović
Broj protokola u CETI	12/01

Napomena:

1. **Rezultati ispitivanja se odnose samo na ispitivani uzorak.**
2. **Izvještaj o ispitivanju se može umnožavati isključivo kao cjelina.**

POMOĆNIK DIREKTORA
ZA TEH. I LAB. POSLOVE
Danijela Šuković, spec.toks. hem.

IZVJEŠTAJ O ISPITIVANJU BR. 00-15-2470/12/01

ODJELJENJE ZA LABORATORIJSKU DIJAGNOSTIKU I MONITORING

REZULTATI ANALIZE

Parametar	Jedinica mjere	Rezultati analize	MDK	Oznaka metode
Br. protokola		12/01		
Datum / čas uzorkovanja		27.03.2013.		
Mjesto uzorkovanja		Bunar br. 8		
Temperatura vode (teren)	^{0}C	15,7	25	SMVP.111*
Boja	mg/PtCo skale	1	20	SMVP.120
Ukus		bez		
Miris		bez	bez	
Mutnoća	NTU	0,134±0,007	1,0	SMVP.118*
Koncentracija vodonikovih jona (ter/lab)	pH jedinica	7,76/7,54±0,28	6,5-9,5	JUS HZ1.111*
Elektroprovodljivost (teren/lab)	µS/cm/20^0 C	329/337±2	2500	SMVP.143*
Hloridi	Cl mg/l	3,50	250	ISO 9297:1997
Nitrati	NO_3 mg/l	7,96±1,07	50	SMEW4500NO3B*
Nitriti	NO_2 mg/l	0,066±0,002	0,50	SMEW4500NO2B*
Fluoridi	F µg/l	<20,0	1500	SMVP.326*
HPK	mg/l O_2	0,78±0,04		JUS/ISO 6060*
Amonijak	NH_4 mg/l	0,050±0,007	0,50	SMVP.179*
Suvi ostatak na 180^0	mg/l	225±20		SMVP.129*
Gvožđe	Fe µg/l	<1,0	200,0	SMEW.3500FeB*
Mangan	Mn µg/l	1,0±0,1	50,0	SMEW.3500MnB*
Trihalometani ukupni	µg/l		100,0	SMEW 6232B
- hloroform	µg/l	<0,001		SMEW 6232 B
- bromoform	µg/l	<0,001		SMEW 6232 B

- dibromhlormetan	µg/l	<0,001		SMEW 6232 B
- bromdihlormetan	µg/l	<0,001		SMEW 6232 B

*-akreditovana metoda

Načelnik Odjeljenja za lab, dijagnostiku i monitoring
mr sci. Dejan Jančić, dipl. hem.

Dejan Jančić

STRUČNO MIŠLJENJE

Na osnovu rezultata obavljenih laboratorijskih ispitivanja i stručnog razmatranja utvrđeno je da ispitivani uzorak

Vrsta/naziv uzorka	**Voda za piće iz bunara br. 8**
Broj protokola uzorka u CETI	**12/01**

ODGOVARA

uslovima Pravilnika o bližim zahtjevima koje u pogledu bezbjednosti treba da ispunjava voda za piće („Sl. list CG", br. 24/12).

CENTAR ZA EKOTOKSIKOLOŠKA ISPITIVANJA CETI doo PODGORICA

OVLAŠĆENO LICE

Danijela Šuković, spec. toks. hem.

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LABORATORIJA ZA EKOTOKSIKOLOŠKA ISPITIVANJA I ZAŠTITU OD ZRAČENJA

IZVJEŠTAJ O ISPITIVANJU

Vrsta ispitivanja	**Fizičko-hemijsko ispitivanje vode za piće**
Broj izvještaja	00-15-2470/13/01
Datum izdavanja izvještaja	02.04.2013.

PODACI O PODNOSIOCU ZAHTJEVA	
Naziv podnosioca zahtjeva	A.D. KOMBINAT ALUMINIJUMA PODGORICA
Broj zahtjeva/ugovora	91-1339
Datum podnošenja zahtjeva	05.07.2012.

PODACI O UZORKU	
Datum uzorkovanja	27.03.2013.
Vrsta uzorka	**Voda za piće – komandna zgrada**
Zahtijevano ispitivanje	parametri po Ugovoru
Uzorkovao	Ivan Đurović
Broj protokola u CETI	13/01

Napomena:

1. **Rezultati ispitivanja se odnose samo na ispitivani uzorak.**
2. **Izvještaj o ispitivanju se može umnožavati isključivo kao cjelina.**

POMOĆNIK DIREKTORA
ZA TEH. I LAB. POSLOVE
Danijela Šuković, spec.toks. hem.

IZVJEŠTAJ O ISPITIVANJU BR. 00-15-2470/13/01

ODJELJENJE ZA LABORATORIJSKU DIJAGNOSTIKU I MONITORING

REZULTATI ANALIZE

Parametar	Jedinica mjere	Rezultati analize	MDK	Oznaka metode
Br. protokola		13/01		
Datum / čas uzorkovanja		27.03.2013.		
Mjesto uzorkovanja		Komandna zgrada		
Temperatura vode (teren)	^{0}C	12,6	25	SMVP,111*
Boja	mg/PtCo skale	1	20	SMVP,120
Ukus		bez		
Miris		bez	bez	
Mutnoća	NTU	0,130±0,007	1,0	SMVP,118*
Koncentracija vodonikovih jona (ter/lab)	pH jedinica	7,65/7,34±0,2	6,5-9,5	JUS HZ1,111*
Elektroprovodljivost (teren/lab)	µS/cm/20^0 C	338/354±2	2500	SMVP,143*
Hloridi	Cl mg/l	4,56	250	ISO 9297:1997
Nitrati	NO_3 mg/l	9,05±1,22	50	SMEW4500NO3B*
Nitriti	NO_2 mg/l	0,064±0,002	0,50	SMEW4500NO2B*
Fluoridi	F µg/l	50,00±6,13	1500	SMVP,326*
HPK	mg/l O_2	0,39±0,02		JUS/ISO 6060*
Amonijak	NH_4 mg/l	0,093±0,013	0,50	SMVP,179*
Suvi ostatak na 180^0	mg/l	236±21		SMVP,129*
Gvožđe	Fe µg/l	6,00±1,47	200,0	SMEW,3500FeB*
Mangan	Mn µg/l	0,78±0,07	50,0	SMEW,3500MnB*
Trihalometani ukupni	µg/l		100,0	SMEW 6232B
- hloroform	µg/l	<0,001		SMEW 6232 B

- bromoform	µg/l	0,083±0,009		SMEW 6232 B
- dibromhlormetan	µg/l	0,133±0,017		SMEW 6232 B
- bromdihlormetan	µg/l	0,083±0,011		SMEW 6232 B

*-akreditovana metoda

Načelnik Odjeljenja za lab, dijagnostiku i monitoring
mr sci, Dejan Jančić, dipl, hem,

Dejan Jančić

STRUČNO MIŠLJENJE

Na osnovu rezultata obavljenih laboratorijskih ispitivanja i stručnog razmatranja utvrđeno je da ispitivani uzorak

Vrsta/naziv uzorka	**Voda za piće – komandna zgrada**
Broj protokola uzorka u CETI	**13/01**

ODGOVARA

uslovima Pravilnika o bližim zahtjevima koje u pogledu bezbjednosti treba da ispunjava voda za piće („Sl. list CG", br. 24/12).

OVLAŠĆENO LICE

Danijela Šuković, spec. toks. hem.

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LABORATORIJA ZA EKOTOKSIKOLOŠKA ISPITIVANJA I ZAŠTITU OD ZRAČENJA

IZVJEŠTAJ O ISPITIVANJU

Vrsta ispitivanja	**Fizičko-hemijsko ispitivanje vode za piće**
Broj izvještaja	00-15-2624/49/01
Datum izdavanja izvještaja	09.09.2013.

PODACI O PODNOSIOCU ZAHTJEVA	
Naziv podnosioca zahtjeva	D.O.O. MONTENEGRO BONUS - CETINJE
Broj ugovora	01-786/K
Datum ugovora	30.07.2013.

PODACI O UZORKU	
Datum uzorkovanja	29.08.2013.
Vrsta uzorka	**Voda za piće iz bunara B3 (Kombinat aluminijuma Podgorica)**
Zahtijevano ispitivanje	parametri po Ugovoru
Uzorkovao	I. Đurović, P. Galičić
Broj protokola u CETI	49/01

Napomena:

1. **Rezultati ispitivanja se odnose samo na ispitivani uzorak.**
2. **Izvještaj o ispitivanju se može umnožavati isključivo kao cjelina.**

POMOĆNIK DIREKTORA
ZA TEH. I LAB. POSLOVE
Danijela Šuković, spec.toks. hem.

ODJELJENJE ZA LABORATORIJSKU DIJAGNOSTIKU I MONITORING

REZULTATI ANALIZE

Parametar	Jedinica mjere	Rezultati analize	MDK	Oznaka metode
Br. protokola		49/01		
Datum / čas uzorkovanja		29.08.2013.		
Mjesto uzorkovanja		Bunar B3		
Temperatura vode (teren)	^{0}C	15,14	25	SMVP.111*
Boja	mg/PtCo skale	0/0	20	SMVP.120
Ukus		bez		
Miris		bez	bez	
Mutnoća	NTU	0/0.567±0.031	1,0	SMVP.118*
Tvrdoća	°dH	10.60±0.29		SMEW2340*
Koncentracija vodonikovih jona (ter/lab)	pH jedinica	7,13/ 7.49±0.27	6,5-9,5	JUS HZ1.111*
Elektroprovodljivost (teren/lab)	µS/cm/20° C	301/376 ± 2	2500	SMVP.143*
Hloridi	Cl mg/l	4.82	250	ISO 9297:1997
Nitrati	NO_3 mg/l	8.16±1.10	50	SMEW4500NO3B*
Nitriti	NO_2 mg/l	<0.003	0,50	SMEW4500NO2B*
Fluoridi	F µg/l	102.0 ± 12.5	1500	SMVP.326*
Kalijum permanganat	mg/l O_2	0.31	5,0	SMVP.134
Rezidue dezinfekcionih sredstava	mg/l	< 0.2		SMVP.351
Fenoli	mg/l	<0.0005		SMVP.299
Zasićenost kiseonikom	%	79.9		SMVP.150
Amonijak	NH_4 mg/l	0.046±0.007	0,50	SMVP.179*
Suvi ostatak na 180^0	mg/l	192 ± 17		SMVP.129*

IZVJEŠTAJ O ISPITIVANJU BR. 00-15-2624/49/01

Gvožđe	Fe µg/l	2.0± 0.5	200,0	SMEW.3500FeB*
Mangan	Mn µg/l	< 1.0	50,0	SMEW.3500MnB*
Trihalometani ukupni	µg/l	<0.001	100,0	SMEW 6232B
- hloroform	µg/l	<0.001		SMEW 6232 B
- bromoform	µg/l	<0.001		SMEW 6232 B
- dibromhlormetan	µg/l	<0.001		SMEW 6232 B
- bromdihlormetan	µg/l	<0.001		SMEW 6232 B
Mineralna ulja	µg/l	<0.01	20	SMVP.430*

*-akreditovana metoda

Načelnik Odjeljenja za lab, dijagnostiku i monitoring
za mr sci, Dejan Jančić, dipl, hem,

Danijela Šuković

STRUČNO MIŠLJENJE

Na osnovu rezultata obavljenih laboratorijskih ispitivanja i stručnog razmatranja utvrđeno je da ispitivani uzorak

Vrsta/naziv uzorka	**Voda za piće iz bunara B3 (Kombinat aluminijuma Podgorica)**
Broj protokola uzorka u CETI	**49/01**

ODGOVARA

uslovima Pravilnika o bližim zahtjevima koje u pogledu bezbjednosti treba da ispunjava voda za piće („Sl. list CG", br. 24/12).

OVLAŠĆENO LICE

Danijela Šuković, spec. toks. hem.

CETI DOO PODGORICA

Danijela Šuković

ZU INSTITUT ZA JAVNO ZDRAVLJE PODGORICA
CENTAR ZA ZDRAVSTVENU EKOLOGIJU
81000 Podgorica, Džona Džeksona bb
tel./fax :020/235 441, www.ijzcg.me

ATCG Li 11.12 MEST ISO/IEC 17025 : 2006

IZVJEŠTAJ O ISPITIVANJU

Šifra uzorka:

VH1937/01

Redni broj protokola 1937

Veza: Zahtjev broj 49/01/2 datum 29.08.2013

Vlasnik uzorka CENTAR ZA EKOTOKSIKOLOŠKA ISPITIVANJA DOO PODGORICA

Naručilac ispitivanja CENTAR ZA EKOTOKSIKOLOŠKA ISPITIVANJA DOO PODGORICA

Uvoznik/ zastupnik

PODACI O MATERIJALU - UZORKU		**PODACI O UZORKOVANJU**	
Vrsta	Voda za piće – hlorisana ,kaptirana 49/01	Datum	29.08.2013
Mjesto		Uzorkovao ispitivanja	Centar za ekotoksikološka
Ostalo	Slobodni hlor 0,1 mg/l		

TRAŽENA ISPITIVANJA:

- ☐ Fizičko-hemijska ispitivanja: a)osnovna analiza b)periodična analiza c)kompletna analiza
  d) Ostalo (navesti parametre)_____
- ☑ **Mikrobiološka analiza**

Datum prijema 29.08.2013 Ispitivanje završeno 04.09.2013

MIŠLJENJE*: Na osnovu rezultata mikrobioloških analiza ispitivani uzorak:

a) ODGOVARA

b) NE ODGOVARA

važećim Propisima.

Napomena

INSTITUT ZA JAVNO ZDRAVLJE PODGORICA

Šef odsijeka za komunalnu higijenu
i humanu ekologiju
Dr med. Ivana Joksimović
spec.higijene

Prilog:
1. **Rezultati ispitivanja – SM-V-04**

IZJAVA
1. Rezultati ispitivanja se odnose samo na ispitivani uzorak
2. Izvještaj se ne smije umnožavati izuzev u cjelosti, bez saglasnosti Instituta za javno zdravlje
3. Zabranjeno je isticanje imena»Institut za javno zdravlje» u tekstu deklaracije i u reklamne svrhe,bez saglasnosti Instituta

*-Mišljenje je van obima akreditacije

ZU INSTITUT ZA JAVNO ZDRAVLJE
CENTAR ZA MEDICINSKU MIKROBIOLOGIJU-CMM
Odjeljenje za sanitarnu mikrobiologiju
Laboratorija za ispitivanje voda

ATCG Li 11.12 MEST ISO/IEC 17025 : 2006

REZULTATI ISPITIVANJA- SM-V-04

Šifra uzorka:

VH 1937 / 01

Naziv uzorka	Voda za piće-hlorisana	
Način pakovanja	Sterilna flaša	
Redni broj protokola	1-1890	
Vrsta analize	Mikrobiološko ispitivanje	
Vrsta laboratorijskog pregleda	Osnovni	
Datum i vrijeme prijema uzorka	29.08.2013.	12^{30} h
Datum završetka analize	03.09.2013.	
Metode ispitivanja	P[1)] Pravilnik o načinu uzimanja uzoraka i metodama za laboratorijsku analizu voda za piće (Sl.list SFRJ br. 33/87) VMK- validovana metoda kuće ISO metode	

MIKROBIOLOŠKA ISPITIVANJA

R.br.	Parametar ispitivanja	Jedinica mjere (ml)	Rezultat ispitivanja	Metoda ispitivanja
1.	*Escherichia coli* (MPN)	100	0	P[1)] III . 2
2.	Ukupne koliformne bakterije (MPN)	100	0	P[1)] III. 1
3.	*Enterococcus species*	100	nisu nađene	VMK
4.	*Pseudomonas aeruginosa*	100	nije nađen	P[1)] III.7
5.	Aerobne mezofilne bakterije na 37°C	1	1	ISO 6222:1999
6.	Aerobne mezofilne bakterije na 22°C	1	0	ISO 6222:1999

MIŠLJENJE*

Na osnovu navedenih mikrobioloških ispitivanja, ispitivani uzorak **ODGOVARA** uslovima Pravilnika o bližim zahtjevima koje u pogledu bezbjednosti treba da ispunjava voda za piće ("Sl.list CG" br. 24/12)

ISPITIVANJA IZVRŠIO

Dr med. LJUBICA TERIĆ spec. mikrobiologije sa parazitologijom 210471

NAČELNIK ODJELJENJA

Dr med. LJUBICA TERIĆ spec. mikrobiologije sa parazitologijom 210471

DIREKTOR CENTRA

Dr med. LJUBICA TERIĆ spec. mikrobiologije sa parazitologijom 210471

MP

Napomena: Rezultati ispitivanja se odnose samo na ispitivani uzorak
* Van obima akreditacije

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ECOTOXICOLOGICAL RESEARCH PODGORICA

ATCG
Li 08.03
MEST ISO/IEC 17025 : 2006

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LABORATORIJA ZA EKOTOKSIKOLOŠKA ISPITIVANJA I ZAŠTITU OD ZRAČENJA

IZVJEŠTAJ O ISPITIVANJU

Vrsta ispitivanja	**Fizičko-hemijsko ispitivanje vode za piće**
Broj izvještaja	00-15-2624/50/01
Datum izdavanja izvještaja	09.09.2013.

PODACI O PODNOSIOCU ZAHTJEVA	
Naziv podnosioca zahtjeva	D.O.O. MONTENEGRO BONUS - CETINJE
Broj ugovora	01-786/K
Datum ugovora	30.07.2013.

PODACI O UZORKU	
Datum uzorkovanja	29.08.2013.
Vrsta uzorka	**Voda za piće iz bunara B2 (Kombinat aluminijuma Podgorica)**
Zahtijevano ispitivanje	parametri po Ugovoru
Uzorkovao	I. Đurović, P. Galičić
Broj protokola u CETI	50/01

Napomena:

1. **Rezultati ispitivanja se odnose samo na ispitivani uzorak.**
2. **Izvještaj o ispitivanju se može umnožavati isključivo kao cjelina.**

POMOĆNIK DIREKTORA
ZA TEH. I LAB. POSLOVE
Danijela Šuković, spec.toks. hem.

ODJELJENJE ZA LABORATORIJSKU DIJAGNOSTIKU I MONITORING

REZULTATI ANALIZE

Parametar	Jedinica mjere	Rezultati analize	MDK	Oznaka metode
Br. protokola		50/01		
Datum / čas uzorkovanja		29.08.2013.		
Mjesto uzorkovanja		Bunar B2		
Temperatura vode (teren)	^{0}C	15,4	25	SMVP.111*
Boja	mg/PtCo skale	0/0	20	SMVP.120
Ukus		bez		
Miris		bez	bez	
Mutnoća	NTU	0/ 0.256 ± 0.014	1,0	SMVP.118*
Tvrdoća	°dH	9.85 ± 0.27		SMEW2340*
Koncentracija vodonikovih jona (ter/lab)	pH jedinica	7,13/ 7.49 ± 0.27	6,5-9,5	JUS HZ1.111*
Elektroprovodljivost (teren/lab)	µS/cm/20o C	301/ 337±2	2500	SMVP.143*
Hloridi	Cl mg/l	3.44	250	ISO 9297:1997
Nitrati	NO3 mg/l	8.86±1.20	50	SMEW4500NO3B*
Nitriti	NO2 mg/l	<0.003	0,50	SMEW4500NO2B*
Fluoridi	F µg/l	82 ± 10	1500	SMVP.326*
Kalijum permanganat	mg/l O2	0.08	5,0	SMVP.134
Rezidue dezinfekcionih sredstava	mg/l	< 0.2		SMVP.351
Fenoli	mg/l	<0.0005		SMVP.299
Zasićenost kiseonikom	%	82.4		SMVP.150
Amonijak	NH4 mg/l	0.05±0.007	0,50	SMVP.179*

IZVJEŠTAJ O ISPITIVANJU BR. 00-15-2624/50/01

Suvi ostatak na 1800	mg/l	166 ± 15		SMVP.129*
Gvožđe	Fe µg/l	8.0 ± 2.0	200,0	SMEW.3500FeB*
Mangan	Mn µg/l	< 1.0	50,0	SMEW.3500MnB*
Trihalometani ukupni	µg/l	<0.001	100,0	SMEW 6232B
- hloroform	µg/l	<0.001		SMEW 6232 B
- bromoform	µg/l	<0.001		SMEW 6232 B
- dibromhlormetan	µg/l	<0.001		SMEW 6232 B
- bromdihlormetan	µg/l	<0.001		SMEW 6232 B
Mineralna ulja	µg/l	<0.01	20,0	SMVP.430*

*-akreditovana metoda

Načelnik Odjeljenja za lab, dijagnostiku i monitoring
29 mr sci, Dejan Jančić, dipl, hem,

Danijela Šuković

STRUČNO MIŠLJENJE

Na osnovu rezultata obavljenih laboratorijskih ispitivanja i stručnog razmatranja utvrđeno je da ispitivani uzorak

Vrsta/naziv uzorka	**Voda za piće iz bunara B2 (Kombinat aluminijuma Podgorica)**
Broj protokola uzorka u CETI	**50/01**

ODGOVARA

uslovima Pravilnika o bližim zahtjevima koje u pogledu bezbjednosti treba da ispunjava voda za piće („Sl. list CG", br. 24/12).

OVLAŠĆENO LICE

Danijela Šuković, spec. toks. hem.

CETI doo PODGORICA

Danijela Šuković

ZU INSTITUT ZA JAVNO ZDRAVLJE PODGORICA
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81000 Podgorica, Džona Džeksona bb
tel./fax :020/235 441, www.ijzcg.me

ATCG Li 11.12 MEST ISO/IEC 17025 : 2006

IZVJEŠTAJ O ISPITIVANJU

Šifra uzorka:

VH1938/01

Redni broj protokola 1938

Veza: Zahtjev broj 49/01/2 datum 29.08.2013

Vlasnik uzorka CENTAR ZA EKOTOKSIKOLOŠKA ISPITIVANJA DOO PODGORICA

Naručilac ispitivanja CENTAR ZA EKOTOKSIKOLOŠKA ISPITIVANJA DOO PODGORICA

Uvoznik/ zastupnik

PODACI O MATERIJALU - UZORKU		**PODACI O UZORKOVANJU**	
Vrsta	Voda za piće – hlorisana ,kaptirana 50/01	Datum	29.08.2013
Mjesto		Uzorkovao ispitivanja	Centar za ekotoksikološka
Ostalo	Slobodni hlor 0,1 mg/l		

TRAŽENA ISPITIVANJA:

- ❑ Fizičko-hemijska ispitivanja: a)osnovna analiza b)periodična analiza c)kompletna analiza
  d) Ostalo (navesti parametre)_____
- ☒ **Mikrobiološka analiza**

Datum prijema 29.08.2013 Ispitivanje završeno 04.09.2013

MIŠLJENJE*: Na osnovu rezultata mikrobiloških analiza ispitivani uzorak:

a) ODGOVARA

b) NE ODGOVARA

važećim Propisima.

Napomena

CRNA GORA ZA JAVNO ZDRAVLJE CENTAR ZA ZDRAVSTVENU EKOLOGIJU PODGORICA

Šef odsijeka za komunalnu higijenu
i humanu ekologiju
Dr med. Ivana Joksimović
spec.higijene

Prilog:
1. **Rezultati ispitivanja – SM-V-04**

IZJAVA
1. Rezultati ispitivanja se odnose samo na ispitivani uzorak
2. Izvještaj se ne smije umnožavati izuzev u cjelosti, bez saglasnosti Instituta za javno zdravlje
3. Zabranjeno je isticanje imena»Institut za javno zdravlje» u tekstu deklaracije i u reklamne svrhe,bez saglasnosti Instituta

*-Mišljenje je van obima akreditacije

ZU INSTITUT ZA JAVNO ZDRAVLJE
CENTAR ZA MEDICINSKU MIKROBIOLOGIJU-CMM
Odjeljenje za sanitarnu mikrobiologiju
Laboratorija za ispitivanje voda

ATCG Li 11.12 MEST ISO/IEC 17025 : 2006

REZULTATI ISPITIVANJA- SM-V-04

Šifra uzorka:

VH 1938 / 01

Naziv uzorka	Voda za piće-hlorisana	
Način pakovanja	Sterilna flaša	
Redni broj protokola	1-1891	
Vrsta analize	Mikrobiološko ispitivanje	
Vrsta laboratorijskog pregleda	Osnovni	
Datum i vrijeme prijema uzorka	29.08.2013.	12^{30} h
Datum završetka analize	02.09.2013.	
Metode ispitivanja	P[1] Pravilnik o načinu uzimanja uzoraka i metodama za laboratorijsku analizu voda za piće (Sl.list SFRJ br. 33/87) VMK - validovana metoda kuće ISO - metode	

MIKROBIOLOŠKA ISPITIVANJA

R.br.	Parametar ispitivanja	Jedinica mjere (ml)	Rezultat ispitivanja	Metoda ispitivanja
1.	*Escherichia coli* (MPN)	100	0	P[1] III . 2
2.	Ukupne koliformne bakterije (MPN)	100	0	P[1] III. 1
3.	*Enterococcus species*	100	nisu nađene	VMK
4.	*Pseudomonas aeruginosa*	100	nije nađen	P[1] III.7
5.	Aerobne mezofilne bakterije na 37°C	1	0	ISO 6222:1999
6.	Aerobne mezofilne bakterije na 22°C	1	1	ISO 6222:1999

MIŠLJENJE*

Na osnovu navedenih mikrobioloških ispitivanja, ispitivani uzorak **ODGOVARA** uslovima Pravilnika o bližim zahtjevima koje u pogledu bezbjednosti treba da ispunjava voda za piće ("Sl.list CG" br. 24/12)

ISPITIVANJA IZVRŠIO | **NAČELNIK ODJELJENJA** | **DIREKTOR CENTRA**

MP

Napomena: Rezultati ispitivanja se odnose samo na ispitivani uzorak
* Van obima akreditacije

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81000 PODGORICA, PUT RADOMIRA IVANOVIĆA 2
LLC CENTER FOR
ECOTOXICOLOGICAL RESEARCH PODGORICA

ATCG
Li 08.03
MEST ISO/IEC 17025 : 2006

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CETI 5100.101.01

LABORATORIJA ZA EKOTOKSIKOLOŠKA ISPITIVANJA I ZAŠTITU OD ZRAČENJA

IZVJEŠTAJ O ISPITIVANJU

Vrsta ispitivanja	**Fizičko-hemijsko ispitivanje vode za piće**
Broj izvještaja	00-15-2624/51/01
Datum izdavanja izvještaja	09.09.2013.

PODACI O PODNOSIOCU ZAHTJEVA	
Naziv podnosioca zahtjeva	D.O.O. MONTENEGRO BONUS - CETINJE
Broj ugovora	01-786/K
Datum ugovora	30.07.2013.

PODACI O UZORKU	
Datum uzorkovanja	29.08.2013.
Vrsta uzorka	**Voda za piće iz bunara B7 (Kombinat aluminijuma Podgorica)**
Zahtijevano ispitivanje	parametri po Ugovoru
Uzorkovao	I. Đurović, P. Galičić
Broj protokola u CETI	51/01

Napomena:

1. **Rezultati ispitivanja se odnose samo na ispitivani uzorak.**
2. **Izvještaj o ispitivanju se može umnožavati isključivo kao cjelina.**

POMOĆNIK DIREKTORA
ZA TEH. I LAB. POSLOVE
Danijela Šuković, spec.toks. hem.

ODJELJENJE ZA LABORATORIJSKU DIJAGNOSTIKU I MONITORING

REZULTATI ANALIZE

Parametar	Jedinica mjere	Rezultati analize	MDK	Oznaka metode
Br. protokola		51/01		
Datum / čas uzorkovanja		29.08.2013.		
Mjesto uzorkovanja		Bunar B7		
Temperatura vode (teren)	^{0}C	15,32	25	SMVP.111*
Boja	mg/PtCo skale	0/0	20	SMVP.120
Ukus		bez		
Miris		bez	bez	
Mutnoća	NTU	0/ 0.537±0.030	1,0	SMVP.118*
Tvrdoća	◦dH	9.32±0.25		SMEW2340*
Koncentracija vodonikovih jona (ter/lab)	pH jedinica	7,13/ 7.11±0.26	6,5-9,5	JUS HZ1.111*
Elektroprovodljivost (teren/lab)	µS/cm/20o C	301/320±2	2500	SMVP.143*
Hloridi	Cl mg/l	3.10	250	ISO 9297:1997
Nitrati	NO3 mg/l	5.59±0.75	50	SMEW4500NO3B*
Nitriti	NO2 mg/l	<0.003	0,50	SMEW4500NO2B*
Fluoridi	F µg/l	80.0 ± 9.8	1500	SMVP.326*
Kalijum permanganat	mg/l O2	0.61	5,0	SMVP.134
Rezidue dezinfekcionih sredstava	mg/l	< 0.2		SMVP.351
Fenoli	mg/l	<0.0005		SMVP.299
Zasićenost kiseonikom	%	78.8		SMVP.150
Amonijak	NH4 mg/l	0.086±0.012	0,50	SMVP.179*

IZVJEŠTAJ O ISPITIVANJU BR. 00-15-2624/51/01

Suvi ostatak na 1800	mg/l	160±14		SMVP.129*
Gvožđe	Fe µg/l	41.0±10.0	200,0	SMEW.3500FeB*
Mangan	Mn µg/l	1.60±0.15	50,0	SMEW.3500MnB*
Trihalometani ukupni	µg/l	<0.001	100,0	SMEW 6232B
- hloroform	µg/l	<0.001		SMEW 6232 B
- bromoform	µg/l	<0.001		SMEW 6232 B
- dibromhlormetan	µg/l	<0.001		SMEW 6232 B
- bromdihlormetan	µg/l	<0.001		SMEW 6232 B
Mineralna ulja	µg/l	<0.01	20,0	SMVP.430*

*-akreditovana metoda

Načelnik Odjeljenja za lab, dijagnostiku i monitoring
za mr sci, Dejan Jančić, dipl, hem,

Jasmila Šurković

STRUČNO MIŠLJENJE

Na osnovu rezultata obavljenih laboratorijskih ispitivanja i stručnog razmatranja utvrđeno je da ispitivani uzorak

Vrsta/naziv uzorka	**Voda za piće iz bunara B7 (Kombinat aluminijuma Podgorica)**
Broj protokola uzorka u CETI	**51/01**

ODGOVARA

uslovima Pravilnika o bližim zahtjevima koje u pogledu bezbjednosti treba da ispunjava voda za piće („Sl. list CG“, br. 24/12).

OVLAŠĆENO LICE

Danijela Šuković, spec. toks. hem.

Danijela Šuković

ZU INSTITUT ZA JAVNO ZDRAVLJE
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81000 Podgorica, Džona Džeksona bb
tel./fax :020/235 441, www.ijzcg.me

ATCG Li 11.12 MEST ISO/IEC 17025 : 2006

IZVJEŠTAJ O ISPITIVANJU

Šifra uzorka:

VH1939/01

Redni broj protokola 1939

Veza: Zahtjev broj 49/01/2 datum 29.08.2013

Vlasnik uzorka CENTAR ZA EKOTOKSIKOLOŠKA ISPITIVANJA DOO PODGORICA

Naručilac ispitivanja CENTAR ZA EKOTOKSIKOLOŠKA ISPITIVANJA DOO PODGORICA

Uvoznik/ zastupnik

PODACI O MATERIJALU - UZORKU		**PODACI O UZORKOVANJU**	
Vrsta	Voda za piće – hlorisana ,kaptirana 51/01	Datum	29.08.2013
Mjesto		Uzorkovao ispitivanja	Centar za ekotoksikološka
Ostalo	Slobodni hlor 0,1 mg/l		

TRAŽENA ISPITIVANJA:

- ❑ Fizičko-hemijska ispitivanja: a)osnovna analiza b)periodična analiza c)kompletna analiza
  d) Ostalo (navesti parametre)_____
- ☒ **Mikrobiološka analiza**

Datum prijema 29.08.2013 Ispitivanje završeno 04.09.2013

MIŠLJENJE*: Na osnovu rezultata mikrobioloških analiza ispitivani uzorak:

a) ODGOVARA

b) NE ODGOVARA

važećim Propisima.

Napomena

CRNA GORA INSTITUT ZA JAVNO ZDRAVLJE PODGORICA CENTAR ZA ZDRAVSTVENU EKOLOGIJU 2

Šef odsijeka za komunalnu higijenu
i humanu ekologiju
Dr med. Ivana Joksimović
spec.higijene

Prilog:
1. **Rezultati ispitivanja – SM-V-04**

IZJAVA
1. Rezultati ispitivanja se odnose samo na ispitivani uzorak
2. Izvještaj se ne smije umnožavati izuzev u cjelosti, bez saglasnosti Instituta za javno zdravlje
3. Zabranjeno je isticanje imena»Institut za javno zdravlje» u tekstu deklaracije i u reklamne svrhe,bez saglasnosti Instituta

*-Mišljenje je van obima akreditacije

	ZU INSTITUT ZA JAVNO ZDRAVLJE **CENTAR ZA MEDICINSKU MIKROBIOLOGIJU-CMM** **Odjeljenje za sanitarnu mikrobiologiju** ***Laboratorija za ispitivanje voda***	ATCG Li 11.12 MEST ISO/IEC 17025 : 2006
REZULTATI ISPITIVANJA- SM-V-04		**Šifra uzorka:** **VH 1939 / 01**

Naziv uzorka	Voda za piće-hlorisana	
Način pakovanja	Sterilna flaša	
Redni broj protokola	1-1892	
Vrsta analize	Mikrobiološko ispitivanje	
Vrsta laboratorijskog pregleda	Osnovni	
Datum i vrijeme prijema uzorka	29.08.2013.	12^{30} h
Datum završetka analize	02.09.2013.	
Metode ispitivanja	P[1)] Pravilnik o načinu uzimanja uzoraka i metodama za laboratorijsku analizu voda za piće (Sl.list SFRJ br. 33/87) VMK- validovana metoda kuće ISO metode	

MIKROBIOLOŠKA ISPITIVANJA

R.br.	Parametar ispitivanja	Jedinica mjere (ml)	Rezultat ispitivanja	Metoda ispitivanja
1.	*Escherichia coli* (MPN)	100	0	P[1)] III . 2
2.	Ukupne koliformne bakterije (MPN)	100	0	P[1)] III. 1
3.	*Enterococcus species*	100	nisu nađene	VMK
4.	*Pseudomonas aeruginosa*	100	nije nađen	P[1)] III.7
5.	Aerobne mezofilne bakterije na 37°C	1	0	ISO 6222:1999
6.	Aerobne mezofilne bakterije na 22°C	1	2	ISO 6222:1999

MIŠLJENJE*

Na osnovu navedenih mikrobioloških ispitivanja, ispitivani uzorak **ODGOVARA** uslovima Pravilnika o bližim zahtjevima koje u pogledu bezbjednosti treba da ispunjava voda za piće ("Sl.list CG" br. 24/12)

ISPITIVANJA IZVRŠIO _____

NAČELNIK ODJELJENJA _____

DIREKTOR CENTRA _____

MP

Napomena: Rezultati ispitivanja se odnose samo na ispitivani uzorak
* Van obima akreditacije

D.O.O. CENTAR ZA
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LLC CENTER FOR
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ATCG
Li 08.03
MEST ISO/IEC 17025 : 2006

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CETI 5100.101.01

LABORATORIJA ZA EKOTOKSIKOLOŠKA ISPITIVANJA I ZAŠTITU OD ZRAČENJA

IZVJEŠTAJ O ISPITIVANJU

Vrsta ispitivanja	**Fizičko-hemijsko ispitivanje vode za piće**
Broj izvještaja	00-15-2624/52/01
Datum izdavanja izvještaja	09.09.2013.

PODACI O PODNOSIOCU ZAHTJEVA	
Naziv podnosioca zahtjeva	D.O.O. MONTENEGRO BONUS - CETINJE
Broj ugovora	01-786/K
Datum ugovora	30.07.2013.

PODACI O UZORKU	
Datum uzorkovanja	29.08.2013.
Vrsta uzorka	**Voda za piće iz bunara B1 (Kombinat aluminijuma Podgorica)**
Zahtijevano ispitivanje	parametri po Ugovoru
Uzorkovao	I. Đurović, P. Galičić
Broj protokola u CETI	52/01

Napomena:

1. **Rezultati ispitivanja se odnose samo na ispitivani uzorak.**
2. **Izvještaj o ispitivanju se može umnožavati isključivo kao cjelina.**

POMOĆNIK DIREKTORA
ZA TEH. I LAB. POSLOVE
Danijela Šuković, spec.toks. hem.

ODJELJENJE ZA LABORATORIJSKU DIJAGNOSTIKU I MONITORING

REZULTATI ANALIZE

Parametar	Jedinica mjere	Rezultati analize	MDK	Oznaka metode
Br. protokola		52/01		
Datum / čas uzorkovanja		29.08.2013.		
Mjesto uzorkovanja		Bunar B1		
Temperatura vode (teren)	^{0}C	14,90	25	SMVP.111*
Boja	mg/PtCo skale	0/0	20	SMVP.120
Ukus		bez		
Miris		bez	bez	
Mutnoća	NTU	0/ 0.227±0.030	1,0	SMVP.118*
Tvrdoća	°dH	8.96±0.24		SMEW2340*
Koncentracija vodonikovih jona (ter/lab)	pH jedinica	7,13/ 7.41±0.27	6,5-9,5	JUS HZ1.111*
Elektroprovodljivost (teren/lab)	µS/cm/20o C	301/315±2	2500	SMVP.143*
Hloridi	Cl mg/l	2.75	250	ISO 9297:1997
Nitrati	NO3 mg/l	5.19±0.70	50	SMEW4500NO3B*
Nitriti	NO2 mg/l	<0.003	0,50	SMEW4500NO2B*
Fluoridi	F µg/l	72.0±8.8	1500	SMVP.326*
Kalijum permanganat	mg/l O2	0.23	5,0	SMVP.134
Rezidue dezinfekcionih sredstava	mg/l	< 0.2		SMVP.351
Fenoli	mg/l	<0.0005		SMVP.299
Zasićenost kiseonikom	%	88.7		SMVP.150
Amonijak	NH4 mg/l	0.023±0.003	0,50	SMVP.179*

Suvi ostatak na 1800	mg/l	150±14		SMVP.129*
Gvožđe	Fe µg/l	2.0±0.5	200,0	SMEW.3500FeB*
Mangan	Mn µg/l	<1.0	50,0	SMEW.3500MnB*
Trihalometani ukupni	µg/l	<0,001	100,0	SMEW 6232B
- hloroform	µg/l	<0,001		SMEW 6232 B
- bromoform	µg/l	<0,001		SMEW 6232 B
- dibromhlormetan	µg/l	<0,001		SMEW 6232 B
- bromdihlormetan	µg/l	<0,001		SMEW 6232 B
Mineralna ulja	µg/l	<0.01	20,0	SMVP.430*

*-akreditovana metoda

Načelnik Odjeljenja za lab, dijagnostiku i monitoring
mr sci, Dejan Jančić, dipl, hem,

CETI doo PODGORICA

STRUČNO MIŠLJENJE

Na osnovu rezultata obavljenih laboratorijskih ispitivanja i stručnog razmatranja utvrđeno je da ispitivani uzorak

Vrsta/naziv uzorka	**Voda za piće iz bunara B1 (Kombinat aluminijuma Podgorica)**
Broj protokola uzorka u CETI	**52/01**

ODGOVARA

uslovima Pravilnika o bližim zahtjevima koje u pogledu bezbjednosti treba da ispunjava voda za piće („Sl. list CG", br. 24/12).

OVLAŠĆENO LICE

Danijela Šuković, spec. toks. hem.

ZU INSTITUT ZA JAVNO ZDRAVLJE PODGORICA
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ATCG Li 11.12 MEST ISO/IEC 17025 : 2006

IZVJEŠTAJ O ISPITIVANJU

Šifra uzorka:

VH1940/01

Redni broj protokola 1940

Veza: Zahtjev broj 49/01/2 datum 29.08.2013

Vlasnik uzorka CENTAR ZA EKOTOKSIKOLOŠKA ISPITIVANJA DOO PODGORICA

Naručilac ispitivanja CENTAR ZA EKOTOKSIKOLOŠKA ISPITIVANJA DOO PODGORICA

Uvoznik/ zastupnik

PODACI O MATERIJALU - UZORKU	**PODACI O UZORKOVANJU**
Vrsta Voda za piće – hlorisana ,kaptirana 52/01	Datum 29.08.2013
Mjesto	Uzorkovao ispitivanja Centar za ekotoksikološka
Ostalo Slobodni hlor 0,1 mg/l	

TRAŽENA ISPITIVANJA:

- ☐ Fizičko-hemijska ispitivanja: a)osnovna analiza b)periodična analiza c)kompletna analiza
  d) Ostalo (navesti parametre)_____
- ☑ **Mikrobiološka analiza**

Datum prijema 29.08.2013 Ispitivanje završeno 04.09.2013

MIŠLJENJE*: Na osnovu rezultata mikrobioloških analiza ispitivani uzorak:

a) ODGOVARA

b) NE ODGOVARA

važećim Propisima.

Napomena

CRNA GORA JAVNO ZDRAVLJE INSTITUT ZA CENTAR ZA ZDRAVSTVENU EKOLOGIJU PODGORICA

Šef odsijeka za komunalnu higijenu
i humanu ekologiju
Dr med. Ivana Joksimović
spec.higijene

Prilog:
1. **Rezultati ispitivanja – SM-V-04**

IZJAVA
1. Rezultati ispitivanja se odnose samo na ispitivani uzorak
2. Izvještaj se ne smije umnožavati izuzev u cjelosti, bez saglasnosti Instituta za javno zdravlje
3. Zabranjeno je isticanje imena»Institut za javno zdravlje» u tekstu deklaracije i u reklamne svrhe,bez saglasnosti Instituta

*-Mišljenje je van obima akreditacije

	ZU INSTITUT ZA JAVNO ZDRAVLJE **CENTAR ZA MEDICINSKU MIKROBIOLOGIJU-CMM** **Odjeljenje za sanitarnu mikrobiologiju** ***Laboratorija za ispitivanje voda***	ATCG Li 11.12 MEST ISO/IEC 17025 : 2006
REZULTATI ISPITIVANJA- SM-V-04		**Šifra uzorka:** **VH 1940 / 01**

Naziv uzorka	Voda za piće-hlorisana	
Način pakovanja	Sterilna flaša	
Redni broj protokola	1-1893	
Vrsta analize	Mikrobiološko ispitivanje	
Vrsta laboratorijskog pregleda	Osnovni	
Datum i vrijeme prijema uzorka	29.08.2013.	12^{30} h
Datum završetka analize	03.09.2013.	
Metode ispitivanja	P[1)] Pravilnik o načinu uzimanja uzoraka i metodama za laboratorijsku analizu voda za piće (Sl.list SFRJ br. 33/87) VMK- validovana metoda kuće ISO metode	

MIKROBIOLOŠKA ISPITIVANJA

R.br.	Parametar ispitivanja	Jedinica mjere (ml)	Rezultat ispitivanja	Metoda ispitivanja
1.	*Escherichia coli* (MPN)	100	0	P[1)] III . 2
2.	Ukupne koliformne bakterije (MPN)	100	0	P[1)] III. 1
3.	*Enterococcus species*	100	nisu nađene	VMK
4.	*Pseudomonas aeruginosa*	100	nije nađen	P[1)] III.7
5.	Aerobne mezofilne bakterije na 37°C	1	0	ISO 6222:1999
6.	Aerobne mezofilne bakterije na 22°C	1	0	ISO 6222:1999

MIŠLJENJE*
Na osnovu navedenih mikrobioloških ispitivanja, ispitivani uzorak **ODGOVARA** uslovima Pravilnika o bližim zahtjevima koje u pogledu bezbjednosti treba da ispunjava voda za piće ("Sl.list CG" br. 24/12)

ISPITIVANJA IZVRŠIO Dr med. LJUBICA TERIĆ spec. mikrobiologije sa parazitologijom 210471

NAČELNIK ODJELJENJA Dr med. LJUBICA TERIĆ spec. mikrobiologije sa parazitologijom 210471

DIREKTOR CENTRA Dr med. LJUBICA TERIĆ spec. mikrobiologije sa parazitologijom 210471

MP

Napomena: Rezultati ispitivanja se odnose samo na ispitivani uzorak
* Van obima akreditacije

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LLC CENTER FOR
ECOTOXICOLOGICAL RESEARCH PODGORICA

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Li 08.03
MEST ISO/IEC 17025 : 2006

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CETI 5100.101.01

LABORATORIJA ZA EKOTOKSIKOLOŠKA ISPITIVANJA I ZAŠTITU OD ZRAČENJA

IZVJEŠTAJ O ISPITIVANJU

Vrsta ispitivanja	**Fizičko-hemijsko ispitivanje vode za piće**
Broj izvještaja	00-15-2624/53/01
Datum izdavanja izvještaja	09.09.2013.

PODACI O PODNOSIOCU ZAHTJEVA	
Naziv podnosioca zahtjeva	D.O.O. MONTENEGRO BONUS - CETINJE
Broj ugovora	01-786/K
Datum ugovora	30.07.2013.

PODACI O UZORKU	
Datum uzorkovanja	29.08.2013.
Vrsta uzorka	**Voda za piće iz bunara B9 (Kombinat aluminijuma Podgorica)**
Zahtijevano ispitivanje	parametri po Ugovoru
Uzorkovao	I. Đurović, P. Galičić
Broj protokola u CETI	53/01

Napomena:

1. **Rezultati ispitivanja se odnose samo na ispitivani uzorak.**
2. **Izvještaj o ispitivanju se može umnožavati isključivo kao cjelina.**

POMOĆNIK DIREKTORA
ZA TEH. I LAB. POSLOVE
Danijela Šuković, spec.toks. hem.

ODJELJENJE ZA LABORATORIJSKU DIJAGNOSTIKU I MONITORING

REZULTATI ANALIZE

Parametar	Jedinica mjere	Rezultati analize	MDK	Oznaka metode
Br. protokola		53/01		
Datum / čas uzorkovanja		29.08.2013.		
Mjesto uzorkovanja		Bunar B9		
Temperatura vode (teren)	^{0}C	15,32	25	SMVP.111*
Boja	mg/PtCo skale	0/0	20	SMVP.120
Ukus		Bez		
Miris		Bez	bez	
Mutnoća	NTU	0/ 0.344±0.019	1,0	SMVP.118*
Tvrdoća	◦dH	8.34±0.23		SMEW2340*
Koncentracija vodonikovih jona (ter/lab)	pH jedinica	7,13/ 7.54±0.28	6,5-9,5	JUS HZ1.111*
Elektroprovodljivost (teren/lab)	µS/cm/20o C	301/287±2	2500	SMVP.143*
Hloridi	Cl mg/l	2.75	250	ISO 9297:1997
Nitrati	NO3 mg/l	3.06±0.41	50	SMEW4500NO3B*
Nitriti	NO2 mg/l	<0.003	0,50	SMEW4500NO2B*
Fluoridi	F µg/l	82±10	1500	SMVP.326*
Kalijum permanganat	mg/l O2	0.46	5,0	SMVP.134
Rezidue dezinfekcionih sredstava	mg/l	< 0.2		SMVP.351
Fenoli	mg/l	<0.0005		SMVP.299
Zasićenost kiseonikom	%	69.7		SMVP.150
Amonijak	NH4 mg/l	0.034±0.005	0,50	SMVP.179*

IZVJEŠTAJ O ISPITIVANJU BR. 00-15-2624/53/01

Suvi ostatak na 1800	mg/l	127±11		SMVP.129*
Gvožđe	Fe µg/l	33.0±8.1	200,0	SMEW.3500FeB*
Mangan	Mn µg/l	<1.0	50,0	SMEW.3500MnB*
Trihalometani ukupni	µg/l	<0.001	100,0	SMEW 6232B
- hloroform	µg/l	<0.001		SMEW 6232 B
- bromoform	µg/l	<0.001		SMEW 6232 B
- dibromhlormetan	µg/l	<0.001		SMEW 6232 B
- bromdihlormetan	µg/l	<0.001		SMEW 6232 B
Mineralna ulja	µg/l	<0.01	20,0	SMVP.430*

*-akreditovana metoda

Načelnik Odjeljenja za lab, dijagnostiku i monitoring
za mr sci, Dejan Jančić, dipl, hem,

Janjela Šurović

STRUČNO MIŠLJENJE

Na osnovu rezultata obavljenih laboratorijskih ispitivanja i stručnog razmatranja utvrđeno je da ispitivani uzorak

Vrsta/naziv uzorka	**Voda za piće iz bunara B9 (Kombinat aluminijuma Podgorica)**
Broj protokola uzorka u CETI	**53/01**

ODGOVARA

uslovima Pravilnika o bližim zahtjevima koje u pogledu bezbjednosti treba da ispunjava voda za piće („Sl. list CG", br. 24/12).

OVLAŠĆENO LICE

Danijela Šuković, spec. toks. hem.

Danijela Šuković

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ATCG Li 11.12 MEST ISO/IEC 17025 : 2006

IZVJEŠTAJ O ISPITIVANJU

Šifra uzorka:

VH1941/01

Redni broj protokola 1941

Veza: Zahtjev broj 49/01/2 datum 29.08.2013

Vlasnik uzorka CENTAR ZA EKOTOKSIKOLOŠKA ISPITIVANJA DOO PODGORICA

Naručilac ispitivanja CENTAR ZA EKOTOKSIKOLOŠKA ISPITIVANJA DOO PODGORICA

Uvoznik/ zastupnik

PODACI O MATERIJALU - UZORKU	**PODACI O UZORKOVANJU**
Vrsta Voda za piće – hlorisana ,kaptirana 53/01	Datum 29.08.2013
Mjesto	Uzorkovao ispitivanja Centar za ekotoksikološka
Ostalo Slobodni hlor 0,1 mg/l	

TRAŽENA ISPITIVANJA:

- ❑ Fizičko-hemijska ispitivanja: a)osnovna analiza b)periodična analiza c)kompletna analiza
  d) Ostalo (navesti parametre)_____
- ❑ **Mikrobiološka analiza**

Datum prijema 29.08.2013 Ispitivanje završeno 04.09.2013

MIŠLJENJE*: Na osnovu rezultata mikrobiloških analiza ispitivani uzorak:

a) ODGOVARA

b) NE ODGOVARA

važećim Propisima.

Napomena

CRNA GORA INSTITUT ZA JAVNO ZDRAVLJE PODGORICA CENTAR ZA ZDRAVSTVENU EKOLOGIJU

Šef odsijeka za komunalnu higijenu
i humanu ekologiju
Dr med. Ivana Joksimović
spec.higijene

Prilog:
1. **Rezultati ispitivanja – SM-V-04**

IZJAVA
1. Rezultati ispitivanja se odnose samo na ispitivani uzorak
2. Izvještaj se ne smije umnožavati izuzev u cjelosti, bez saglasnosti Instituta za javno zdravlje
3. Zabranjeno je isticanje imena»Institut za javno zdravlje» u tekstu deklaracije i u reklamne svrhe,bez saglasnosti Instituta

*-Mišljenje je van obima akreditacije

	ZU INSTITUT ZA JAVNO ZDRAVLJE **CENTAR ZA MEDICINSKU MIKROBIOLOGIJU-CMM** **Odjeljenje za sanitarnu mikrobiologiju** ***Laboratorija za ispitivanje voda***	ATCG Li 11.12 MEST ISO/IEC 17025 : 2006
REZULTATI ISPITIVANJA- SM-V-04		**Šifra uzorka:** **VH 1941 / 01**

Naziv uzorka	Voda za piće-hlorisana	
Način pakovanja	Sterilna flaša	
Redni broj protokola	1-1894	
Vrsta analize	Mikrobiološko ispitivanje	
Vrsta laboratorijskog pregleda	Osnovni	
Datum i vrijeme prijema uzorka	29.08.2013.	12^{20} h
Datum završetka analize	04.09.2013.	
Metode ispitivanja	P[1)] Pravilnik o načinu uzimanja uzoraka i metodama za laboratorijsku analizu voda za piće (Sl.list SFRJ br. 33/87) VMK- validovana metoda kuće ISO metode	

MIKROBIOLOŠKA ISPITIVANJA

R.br.	Parametar ispitivanja	Jedinica mjere (ml)	Rezultat ispitivanja	Metoda ispitivanja
1.	*Escherichia coli* (MPN)	100	0	P[1)] III . 2
2.	Ukupne koliformne bakterije (MPN)	100	0	P[1)] III. 1
3.	*Enterococcus species*	100	nisu nađene	VMK
4.	*Pseudomonas aeruginosa*	100	nije nađen	P[1)] III.7
5.	Aerobne mezofilne bakterije na 37°C	1	3	ISO 6222:1999
6.	Aerobne mezofilne bakterije na 22°C	1	1	ISO 6222:1999

MIŠLJENJE*

Na osnovu navedenih mikrobioloških ispitivanja, ispitivani uzorak **ODGOVARA** uslovima Pravilnika o bližim zahtjevima koje u pogledu bezbjednosti treba da ispunjava voda za piće ("Sl.list CG" br. 24/12)

ISPITIVANJA IZVRŠIO _____

NAČELNIK ODJELJENJA _____

DIREKTOR CENTRA _____

MP

Napomena: Rezultati ispitivanja se odnose samo na ispitivani uzorak
* Van obima akreditacije

D.O.O. CENTAR ZA
EKOTOKSIKOLOŠKA ISPITIVANJA PODGORICA
81000 PODGORICA, PUT RADOMIRA IVANOVIĆA 2
LLC CENTER FOR
ECOTOXICOLOGICAL RESEARCH PODGORICA

ATCG
Li 08.03
MEST ISO/IEC 17025 : 2006

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LABORATORIJA ZA EKOTOKSIKOLOŠKA ISPITIVANJA I ZAŠTITU OD ZRAČENJA

IZVJEŠTAJ O ISPITIVANJU

Vrsta ispitivanja	**Fizičko-hemijsko ispitivanje vode za piće**
Broj izvještaja	00-15-2624/54/01
Datum izdavanja izvještaja	09.09.2013.

PODACI O PODNOSIOCU ZAHTJEVA	
Naziv podnosioca zahtjeva	D.O.O. MONTENEGRO BONUS - CETINJE
Broj ugovora	01-786/K
Datum ugovora	30.07.2013.

PODACI O UZORKU	
Datum uzorkovanja	29.08.2013.
Vrsta uzorka	**Voda za piće iz bunara B6 (Kombinat aluminijuma Podgorica)**
Zahtijevano ispitivanje	parametri po Ugovoru
Uzorkovao	I. Đurović, P. Galičić
Broj protokola u CETI	54/01

Napomena:

1. **Rezultati ispitivanja se odnose samo na ispitivani uzorak.**
2. **Izvještaj o ispitivanju se može umnožavati isključivo kao cjelina.**

POMOĆNIK DIREKTORA
ZA TEH. I LAB. POSLOVE
Danijela Šuković, spec.toks. hem.

ODJELJENJE ZA LABORATORIJSKU DIJAGNOSTIKU I MONITORING

REZULTATI ANALIZE

Parametar	Jedinica mjere	Rezultati analize	MDK	Oznaka metode
Br. protokola		54/01		
Datum / čas uzorkovanja		29.08.2013.		
Mjesto uzorkovanja		Bunar B6		
Temperatura vode (teren)	^{0}C	15,01	25	SMVP.111*
Boja	mg/PtCo skale	0/0	20	SMVP.120
Ukus		bez		
Miris		bez	bez	
Mutnoća	NTU	0/ 0.434±0.024	1,0	SMVP.118*
Tvrdoća	°dH	7.99±0.22		SMEW2340*
Koncentracija vodonikovih jona (ter/lab)	pH jedinica	7,23/ 7.49±0.27	6,5-9,5	JUS HZ1.111*
Elektroprovodljivost (teren/lab)	µS/cm/20o C	283/283±2	2500	SMVP.143*
Hloridi	Cl mg/l	2.41	250	ISO 9297:1997
Nitrati	NO3 mg/l	2.72±0.37	50	SMEW4500NO3B*
Nitriti	NO2 mg/l	<0.003	0,50	SMEW4500NO2B*
Fluoridi	F µg/l	79.0±9.7	1500	SMVP.326*
Kalijum permanganat	mg/l O2	0.61	5,0	SMVP.134
Rezidue dezinfekcionih sredstava	mg/l	< 0.2		SMVP.351
Fenoli	mg/l	<0.0005		SMVP.299
Zasićenost kiseonikom	%	75.7		SMVP.150
Amonijak	NH4 mg/l	0.061±0.008	0,50	SMVP.179*

IZVJEŠTAJ O ISPITIVANJU BR. 00-15-2624/54/01

Suvi ostatak na 1800	mg/l	124±11		SMVP.129*
Gvožđe	Fe µg/l	3.0 ± 0.7	200,0	SMEW.3500FeB*
Mangan	Mn µg/l	< 1.0	50,0	SMEW.3500MnB*
Trihalometani ukupni	µg/l	<0.001	100,0	SMEW 6232B
- hloroform	µg/l	<0.001		SMEW 6232 B
- bromoform	µg/l	<0.001		SMEW 6232 B
- dibromhlormetan	µg/l	<0.001		SMEW 6232 B
- bromdihlormetan	µg/l	<0.001		SMEW 6232 B
Mineralna ulja	µg/l	<0.01	20,0	SMVP.430*

*-akreditovana metoda

Načelnik Odjeljenja za lab, dijagnostiku i monitoring
mr sci, Dejan Jančić, dipl, hem,

Danijela Šuković

STRUČNO MIŠLJENJE

Na osnovu rezultata obavljenih laboratorijskih ispitivanja i stručnog razmatranja utvrđeno je da ispitivani uzorak

Vrsta/naziv uzorka	**Voda za piće iz bunara B6 (Kombinat aluminijuma Podgorica)**
Broj protokola uzorka u CETI	**54/01**

ODGOVARA

uslovima Pravilnika o bližim zahtjevima koje u pogledu bezbjednosti treba da ispunjava voda za piće („Sl. list CG", br. 24/12).

OVLAŠĆENO LICE

Danijela Šuković, spec. toks. hem.

ZU INSTITUT ZA JAVNO ZDRAVLJE PODGORICA
CENTAR ZA ZDRAVSTVENU EKOLOGIJU
81000 Podgorica, Džona Džeksona bb
tel./fax :020/235 441, www.ijzcg.me

ATCG Li 11.12 MEST ISO/IEC 17025 : 2006

IZVJEŠTAJ O ISPITIVANJU

Šifra uzorka:

VH1942/01

Redni broj protokola	1942
Veza:	Zahtjev broj 49/01/2 datum 29.08.2013.
Vlasnik uzorka	CENTAR ZA EKOTOKSIKOLOŠKA ISPITIVANJA DOO PODGORICA
Naručilac ispitivanja	CENTAR ZA EKOTOKSIKOLOŠKA ISPITIVANJA DOO PODGORICA
Uvoznik/ zastupnik	

PODACI O MATERIJALU - UZORKU		**PODACI O UZORKOVANJU**	
Vrsta	Voda za piće- hlorisana, kaptirana 54/01	Datum	29.08.2013.
Mjesto		Uzorkovao	Centar za ekotoksikološka ispitivanja
Ostalo	Slobodni hlor 0,1 mg/l		

TRAŽENA ISPITIVANJA:

- ❑ Fizičko-hemijska ispitivanja: a)osnovna analiza b)periodična analiza c)kompletna analiza
  d) Ostalo (navesti parametre)_____
- ❑ **Mikrobiološka analiza**

Datum prijema 29.08.2013. Ispitivanje završeno 04.09.2013.

MIŠLJENJE*: Na osnovu rezultata mikrobioloških analiza ispitivani uzorak:

a) ODGOVARA

b) NE ODGOVARA

važećim Propisima, zbog mikrobiološke neispravnosti.

Napomena

Šef odsijeka za komunalnu higijenu
i humanu ekologiju
Dr med. Ivana Joksimović
spec.higijene

Prilog:
1. **Rezultati ispitivanja – SM-V-04**

IZJAVA
1. Rezultati ispitivanja se odnose samo na ispitivani uzorak
2. Izvještaj se ne smije umnožavati izuzev u cjelosti, bez saglasnosti Instituta za javno zdravlje
3. Zabranjeno je isticanje imena»Institut za javno zdravlje» u tekstu deklaracije i u reklamne svrhe,bez saglasnosti Instituta

*-Mišljenje je van obima akreditacije

ZU INSTITUT ZA JAVNO ZDRAVLJE
CENTAR ZA MEDICINSKU MIKROBIOLOGIJU-CMM
Odjeljenje za sanitarnu mikrobiologiju
Laboratorija za ispitivanje voda

ATCG Li 11.12 MEST ISO/IEC 17025 : 2006

REZULTATI ISPITIVANJA- SM-V-04

Šifra uzorka:

VH 1942 / 01

Naziv uzorka	Voda za piće-hlorisana	
Način pakovanja	Sterilna flaša	
Redni broj protokola	1-1895	
Vrsta analize	Mikrobiološko ispitivanje	
Vrsta laboratorijskog pregleda	Osnovni	
Datum i vrijeme prijema uzorka	29.08.2013.	12^{20} h
Datum završetka analize	04.09.2013.	
Metode ispitivanja	P[1)] Pravilnik o načinu uzimanja uzoraka i metodama za laboratorijsku analizu voda za piće (Sl.list SFRJ br. 33/87) VMK- validovana metoda kuće ISO metode	

MIKROBIOLOŠKA ISPITIVANJA

R.br.	Parametar ispitivanja	Jedinica mjere (ml)	Rezultat ispitivanja	Metoda ispitivanja
1.	*Escherichia coli* (MPN)	100	0	P[1)] III . 2
2.	Ukupne koliformne bakterije (MPN)	100	6	P[1)] III. 1
3.	*Enterococcus species*	100	nađene su	VMK
4.	*Pseudomonas aeruginosa*	100	nije nađen	P[1)] III.7
5.	Aerobne mezofilne bakterije na 37°C	1	1	ISO 6222:1999
6.	Aerobne mezofilne bakterije na 22°C	1	15	ISO 6222:1999

Identifikacija: ***Enterobacter species, Enterococcus species***

MIŠLJENJE*

Na osnovu navedenih mikrobioloških ispitivanja, ispitivani uzorak **NE ODGOVARA** uslovima Pravilnika o bližim zahtjevima koje u pogledu bezbjednosti treba da ispunjava voda za piće ("Sl.list CG" br. 24/12)

ISPITIVANJA IZVRŠIO _____

NAČELNIK ODJELJENJA _____

DIREKTOR CENTRA _____

MP

Napomena: Rezultati ispitivanja se odnose samo na ispitivani uzorak
* Van obima akreditacije

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CETI 5100.101.01

LABORATORIJA ZA EKOTOKSIKOLOŠKA ISPITIVANJA I ZAŠTITU OD ZRAČENJA

IZVJEŠTAJ O ISPITIVANJU

Vrsta ispitivanja	**Fizičko-hemijsko ispitivanje vode za piće**
Broj izvještaja	00-15-2624/55/01
Datum izdavanja izvještaja	09.09.2013.

PODACI O PODNOSIOCU ZAHTJEVA	
Naziv podnosioca zahtjeva	D.O.O. MONTENEGRO BONUS - CETINJE
Broj ugovora	01-786/K
Datum ugovora	30.07.2013.

PODACI O UZORKU	
Datum uzorkovanja	29.08.2013.
Vrsta uzorka	**Voda za piće iz bunara B8 (Kombinat aluminijuma Podgorica)**
Zahtijevano ispitivanje	parametri po Ugovoru
Uzorkovao	I. Đurović, P. Galičić
Broj protokola u CETI	55/01

Napomena:

1. **Rezultati ispitivanja se odnose samo na ispitivani uzorak.**
2. **Izvještaj o ispitivanju se može umnožavati isključivo kao cjelina.**

POMOĆNIK DIREKTORA
ZA TEH. I LAB. POSLOVE
Danijela Šuković, spec.toks. hem.

ODJELJENJE ZA LABORATORIJSKU DIJAGNOSTIKU I MONITORING

REZULTATI ANALIZE

Parametar	Jedinica mjere	Rezultati analize	MDK	Oznaka metode
Br. protokola		55/01		
Datum / čas uzorkovanja		29.08.2013.		
Mjesto uzorkovanja		Bunar B8		
Temperatura vode (teren)	^{0}C	14,10	25	SMVP.111*
Boja	mg/PtCo skale	0/0	20	SMVP.120
Ukus		Bez		
Miris		Bez	bez	
Mutnoća	NTU	0/ 0.118±0.007	1,0	SMVP.118*
Tvrdoća	°dH	8.12 ± 0.22		SMEW2340*
Koncentracija vodonikovih jona (ter/lab)	pH jedinica	7,13/ 7.33 ± 0.27	6,5-9,5	JUS HZ1.111*
Elektroprovodljivost (teren/lab)	µS/cm/20o C	301/284±2	2500	SMVP.143*
Hloridi	Cl mg/l	2.41	250	ISO 9297:1997
Nitrati	NO3 mg/l	2.55±0.34	50	SMEW4500NO3B*
Nitriti	NO2 mg/l	<0.003	0,50	SMEW4500NO2B*
Fluoridi	F µg/l	64.0 ± 7.8	1500	SMVP.326*
Kalijum permanganat	mg/l O2	0.38	5,0	SMVP.134
Rezidue dezinfekcionih sredstava	mg/l	< 0.2		SMVP.351
Fenoli	mg/l	<0.0005		SMVP.299
Zasićenost kiseonikom	%	67.8		SMVP.150
Amonijak	NH4 mg/l	0.020±0.003	0,50	SMVP.179*

IZVJEŠTAJ O ISPITIVANJU BR. 00-15-2624/55/01

Suvi ostatak na 1800	mg/l	111 ± 11		SMVP.129*
Gvožđe	Fe µg/l	< 1.0	200,0	SMEW.3500FeB*
Mangan	Mn µg/l	< 1.0	50,0	SMEW.3500MnB*
Trihalometani ukupni	µg/l	<0.001	100,0	SMEW 6232B
- hloroform	µg/l	<0.001		SMEW 6232 B
- bromoform	µg/l	<0.001		SMEW 6232 B
- dibromhlormetan	µg/l	<0.001		SMEW 6232 B
- bromdihlormetan	µg/l	<0.001		SMEW 6232 B
Mineralna ulja	µg/l	<0.01	20,0	SMVP.430*

*-akreditovana metoda

Načelnik Odjeljenja za lab, dijagnostiku i monitoring
mr sci, Dejan Jančić, dipl, hem,

Danijela Šuković

STRUČNO MIŠLJENJE

Na osnovu rezultata obavljenih laboratorijskih ispitivanja i stručnog razmatranja utvrđeno je da ispitivani uzorak

Vrsta/naziv uzorka	**Voda za piće iz bunara B8 (Kombinat aluminijuma Podgorica)**
Broj protokola uzorka u CETI	**55/01**

ODGOVARA

uslovima Pravilnika o bližim zahtjevima koje u pogledu bezbjednosti treba da ispunjava voda za piće („Sl. list CG“, br. 24/12).

OVLAŠĆENO LICE

Danijela Šuković, spec. toks. hem.

ZU INSTITUT ZA JAVNO ZDRAVLJE
PODGORICA
CENTAR ZA ZDRAVSTVENU EKOLOGIJU
81000 Podgorica, Džona Džeksona bb
tel./fax :020/235 441, www.ijzcg.me

ATCG Li 11.12 MEST ISO/IEC 17025 : 2006

IZVJEŠTAJ O ISPITIVANJU

Šifra uzorka:

VH1943/01

Redni broj protokola 1943

Veza: Zahtjev broj 49/01/2 datum 29.08.2013

Vlasnik uzorka CENTAR ZA EKOTOKSIKOLOŠKA ISPITIVANJA DOO PODGORICA

Naručilac ispitivanja CENTAR ZA EKOTOKSIKOLOŠKA ISPITIVANJA DOO PODGORICA

Uvoznik/ zastupnik

PODACI O MATERIJALU - UZORKU		**PODACI O UZORKOVANJU**	
Vrsta	Voda za piće – hlorisana ,kaptirana 55/01	Datum	29.08.2013
Mjesto		Uzorkovao ispitivanja	Centar za ekotoksikološka
Ostalo	Slobodni hlor 0,1 mg/l		

TRAŽENA ISPITIVANJA:

- ☐ Fizičko-hemijska ispitivanja: a)osnovna analiza b)periodična analiza c)kompletna analiza
  d) Ostalo (navesti parametre)_____
- ☑ **Mikrobiološka analiza**

Datum prijema 29.08.2013 Ispitivanje završeno 04.09.2013

MIŠLJENJE*: Na osnovu rezultata mikrobiloških analiza ispitivani uzorak:

a) ODGOVARA

b) NE ODGOVARA

važećim Propisima.

Napomena

CRNA GORA INSTITUT ZA JAVNO ZDRAVLJE CENTAR ZA ZDRAVSTVENU EKOLOGIJU PODGORICA

Šef odsijeka za komunalnu higijenu
i humanu ekologiju
Dr med. Ivana Joksimović
spec.higijene

Prilog:
1. **Rezultati ispitivanja – SM-V-04**

IZJAVA
1. Rezultati ispitivanja se odnose samo na ispitivani uzorak
2. Izvještaj se ne smije umnožavati izuzev u cjelosti, bez saglasnosti Instituta za javno zdravlje
3. Zabranjeno je isticanje imena»Institut za javno zdravlje» u tekstu deklaracije i u reklamne svrhe,bez saglasnosti Instituta

*-Mišljenje je van obima akreditacije

	ZU INSTITUT ZA JAVNO ZDRAVLJE **CENTAR ZA MEDICINSKU MIKROBIOLOGIJU-CMM** **Odjeljenje za sanitarnu mikrobiologiju** ***Laboratorija za ispitivanje voda***	ATCG Li 11.12 MEST ISO/IEC 17025 : 2006
REZULTATI ISPITIVANJA- SM-V-04		**Šifra uzorka:** **VH 1943 / 01**

Naziv uzorka	Voda za piće-hlorisana	
Način pakovanja	Sterilna flaša	
Redni broj protokola	1-1896	
Vrsta analize	Mikrobiološko ispitivanje	
Vrsta laboratorijskog pregleda	Osnovni	
Datum i vrijeme prijema uzorka	29.08.2013.	12^{30} h
Datum završetka analize	02.09.2013.	
Metode ispitivanja	P[1)] Pravilnik o načinu uzimanja uzoraka i metodama za laboratorijsku analizu voda za piće (Sl.list SFRJ br. 33/87) VMK- validovana metoda kuće ISO metode	

MIKROBIOLOŠKA ISPITIVANJA

R.br.	Parametar ispitivanja	Jedinica mjere (ml)	Rezultat ispitivanja	Metoda ispitivanja
1.	*Escherichia coli* (MPN)	100	0	P[1)] III . 2
2.	Ukupne koliformne bakterije (MPN)	100	0	P[1)] III. 1
3.	*Enterococcus species*	100	nisu nađene	VMK
4.	*Pseudomonas aeruginosa*	100	nije nađen	P[1)] III.7
5.	Aerobne mezofilne bakterije na 37°C	1	0	ISO 6222:1999
6.	Aerobne mezofilne bakterije na 22°C	1	0	ISO 6222:1999

MIŠLJENJE*

Na osnovu navedenih mikrobioloških ispitivanja, ispitivani uzorak **ODGOVARA** uslovima Pravilnika o bližim zahtjevima koje u pogledu bezbjednosti treba da ispunjava voda za piće ("Sl.list CG" br. 24/12)

ISPITIVANJA IZVRŠIO _____

NAČELNIK ODJELJENJA _____

DIREKTOR CENTRA _____

MP

Napomena: Rezultati ispitivanja se odnose samo na ispitivani uzorak
* Van obima akreditacije

	D.O.O. CENTAR ZA **EKOTOKSIKOLOŠKA ISPITIVANJA PODGORICA** **81000 PODGORICA, PUT RADOMIRA IVANOVIĆA 2** **LLC CENTER FOR** **ECOTOXICOLOGICAL RESEARCH PODGORICA**	ATCG Li 08.03 MEST ISO/IEC 17025 : 2006
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CETI 5100.101.01

LABORATORIJA ZA EKOTOKSIKOLOŠKA ISPITIVANJA I ZAŠTITU OD ZRAČENJA

IZVJEŠTAJ O ISPITIVANJU

Vrsta ispitivanja	**Fizičko-hemijsko ispitivanje vode za piće**
Broj izvještaja	00-15-2624/1/68/01
Datum izdavanja izvještaja	02.12.2013.

PODACI O PODNOSIOCU ZAHTJEVA	
Naziv podnosioca zahtjeva	D.O.O. MONTENEGRO BONUS - CETINJE
Broj zahtjeva/ugovora	01-1552/K
Datum podnošenja zahtjeva	11.11.2013.

PODACI O UZORKU	
Datum uzorkovanja	22.11.2013.
Vrsta uzorka	**Voda za piće iz bunara br. 9**
Zahtijevano ispitivanje	parametri po Ugovoru
Uzorkovao	Ivan Đurović, Peđa Galičić
Broj protokola u CETI	68/01

Napomena:

1. **Rezultati ispitivanja se odnose samo na ispitivani uzorak.**
2. **Izvještaj o ispitivanju se može umnožavati isključivo kao cjelina.**

POMOĆNIK DIREKTORA
ZA TEH. I LAB. POSLOVE
Danijela Šuković, spec.toks. hem.

ODJELJENJE ZA LABORATORIJSKU DIJAGNOSTIKU I MONITORING

REZULTATI ANALIZE

Parametar	Jedinica mjere	Rezultati analize	MDK	Oznaka metode
Br. protokola		68/01		
Datum / čas uzorkovanja		22.11.2013.		
Mjesto uzorkovanja		Bunar br. 9		
Temperatura vode (teren)	^{0}C	14,8	25	SMVP.111*
Boja	mg/PtCo skale	0	20	SMVP.120
Ukus		bez		
Miris		bez	bez	
Mutnoća	NTU	<0.1	1,0	SMVP.118*
Koncentracija vodonikovih jona (ter/lab)	pH jedinica	7.59/7.38±0.27	6,5-9,5	JUS HZ1.111*
Elektroprovodljivost (teren/lab)	«S/cm/20^o C	279/302±2	2500	SMVP.143*
Hloridi	Cl mg/l	2.75	250	ISO 9297:1997
Nitrati	NO_3 mg/l	3.97±0.54	50	SMEW4500NO3B*
Nitriti	NO_2 mg/l	<0.003	0,50	SMEW4500NO2B*
Fluoridi	F µg/l	126±15	1500	SMVP.326*
HPK	mg/l O_2	<0.2		JUS/ISO 6060*
Amonijak	NH_4 mg/l	0.040±0.006	0,50	SMVP.179*
Suvi ostatak na 180^0	mg/l	180±16		SMVP.129*
Gvožđe	Fe µg/l	<1.00	200,0	SMEW.3500FeB*
Mangan	Mn µg/l	<1.00	50,0	SMEW.3500MnB*
Trihalometani ukupni	µg/l	<0.001	100,0	SMEW 6232B
- hloroform	µg/l	<0.001		SMEW 6232 B
- bromoform	µg/l	<0.001		SMEW 6232 B

- dibromhlormetan	**µg/l**	**<0.001**		**SMEW 6232 B**
- bromdihlormetan	**µg/l**	**<0.001**		**SMEW 6232 B**

***-akreditovana metoda**

Načelnik Odjeljenja za lab, dijagnostiku i monitoring
mr sci. Dejan Jančić, dipl. hem.

STRUČNO MIŠLJENJE

Na osnovu rezultata obavljenih laboratorijskih ispitivanja i stručnog razmatranja utvrđeno je da ispitivani uzorak

Vrsta/naziv uzorka	**Voda za piće iz bunara B-9 (Kombinat aluminijuma Podgorica)**
Broj protokola uzorka u CETI	**68/01**

ODGOVARA

uslovima Pravilnika o bližim zahtjevima koje u pogledu bezbjednosti treba da ispunjava voda za piće („Sl. list CG“, br. 24/12).

OVLAŠĆENO LICE

Danijela Šuković, spec. toks. hem.

	D.O.O. CENTAR ZA **EKOTOKSIKOLOŠKA ISPITIVANJA PODGORICA** **81000 PODGORICA, PUT RADOMIRA IVANOVIĆA 2** **LLC CENTER FOR** **ECOTOXICOLOGICAL RESEARCH PODGORICA**	ATCG Li 08.03 MEST ISO/IEC 17025 : 2006
CETI	☎ **++382 (0)20 658-090; 658-091; Fax: ++382 (0)20 658-092; E-mail: info@ceti.co.me**	

CETI 5100.101.01

LABORATORIJA ZA EKOTOKSIKOLOŠKA ISPITIVANJA I ZAŠTITU OD ZRAČENJA

IZVJEŠTAJ O ISPITIVANJU

Vrsta ispitivanja	**Fizičko-hemijsko ispitivanje vode za piće**
Broj izvještaja	00-15-2624/1/69/01
Datum izdavanja izvještaja	02.12.2013.

PODACI O PODNOSIOCU ZAHTJEVA	
Naziv podnosioca zahtjeva	D.O.O. MONTENEGRO BONUS - CETINJE
Broj zahtjeva/ugovora	01-1552/K
Datum podnošenja zahtjeva	11.11.2013.

PODACI O UZORKU	
Datum uzorkovanja	22.11.2013.
Vrsta uzorka	**Voda za piće iz bunara br. 6**
Zahtijevano ispitivanje	parametri po Ugovoru
Uzorkovao	Ivan Đurović, Peđa Galičić
Broj protokola u CETI	69/01

Napomena:

1. **Rezultati ispitivanja se odnose samo na ispitivani uzorak.**
2. **Izvještaj o ispitivanju se može umnožavati isključivo kao cjelina.**

POMOĆNIK DIREKTORA
ZA TEH. I LAB. POSLOVE
Danijela Šuković, spec.toks. hem.

ODJELJENJE ZA LABORATORIJSKU DIJAGNOSTIKU I MONITORING

REZULTATI ANALIZE

Parametar	Jedinica mjere	Rezultati analize	MDK	Oznaka metode
Br. protokola		69/01		
Datum / čas uzorkovanja		22.11.2013.		
Mjesto uzorkovanja		Bunar br. 6		
Temperatura vode (teren)	^{0}C	15.5	25	SMVP.111*
Boja	mg/PtCo skale	1	20	SMVP.120
Ukus		bez		
Miris		bez	bez	
Mutnoća	NTU	<0.1	1,0	SMVP.118*
Koncentracija vodonikovih jona (ter/lab)	pH jedinica	7.65/7.14±0.26	6,5-9,5	JUS HZ1.111*
Elektroprovodljivost (teren/lab)	«S/cm/20^o C	280/303±2	2500	SMVP.143*
Hloridi	Cl mg/l	3.10	250	ISO 9297:1997
Nitrati	NO_3 mg/l	4.04±0.55	50	SMEW4500NO3B*
Nitriti	NO_2 mg/l	<0.003	0,50	SMEW4500NO2B*
Fluoridi	F µg/l	134±16	1500	SMVP.326*
HPK	mg/l O_2	<0.2		JUS/ISO 6060*
Amonijak	NH_4 mg/l	0.037±0.005	0,50	SMVP.179*
Suvi ostatak na 180^0	mg/l	158±14		SMVP.129*
Gvožđe	Fe µg/l	51.00±12.52	200,0	SMEW.3500FeB*
Mangan	Mn µg/l	1.60±0.15	50,0	SMEW.3500MnB*
Trihalometani ukupni	µg/l	<0.001	100,0	SMEW 6232B
- hloroform	µg/l	<0.001		SMEW 6232 B
- bromoform	µg/l	<0.001		SMEW 6232 B

- dibromhlormetan	**µg/l**	**<0.001**		**SMEW 6232 B**
- bromdihlormetan	**µg/l**	**<0.001**		**SMEW 6232 B**

***-akreditovana metoda**

Načelnik Odjeljenja za lab, dijagnostiku i monitoring
mr sci. Dejan Jančić, dipl. hem.

STRUČNO MIŠLJENJE

Na osnovu rezultata obavljenih laboratorijskih ispitivanja i stručnog razmatranja utvrđeno je da ispitivani uzorak

Vrsta/naziv uzorka	**Voda za piće iz bunara B-6 (Kombinat aluminijuma Podgorica)**
Broj protokola uzorka u CETI	**69/01**

ODGOVARA

uslovima Pravilnika o bližim zahtjevima koje u pogledu bezbjednosti treba da ispunjava voda za piće („Sl. list CG“, br. 24/12).

OVLAŠĆENO LICE

Danijela Šuković, spec. toks. hem.

	D.O.O. CENTAR ZA EKOTOKSIKOLOŠKA ISPITIVANJA PODGORICA 81000 PODGORICA, PUT RADOMIRA IVANOVIĆA 2 LLC CENTER FOR ECOTOXICOLOGICAL RESEARCH PODGORICA	ATCG Li 08.03 MEST ISO/IEC 17025 : 2006
CETI	☎ **++382 (0)20 658-090; 658-091; Fax: ++382 (0)20 658-092; E-mail: info@ceti.co.me**	

CETI 5100.101.01

LABORATORIJA ZA EKOTOKSIKOLOŠKA ISPITIVANJA I ZAŠTITU OD ZRAČENJA

IZVJEŠTAJ O ISPITIVANJU

Vrsta ispitivanja	**Fizičko-hemijsko ispitivanje vode za piće**
Broj izvještaja	00-15-2624/1/70/01
Datum izdavanja izvještaja	02.12.2013.

PODACI O PODNOSIOCU ZAHTJEVA	
Naziv podnosioca zahtjeva	D.O.O. MONTENEGRO BONUS - CETINJE
Broj zahtjeva/ugovora	01-1552/K
Datum podnošenja zahtjeva	11.11.2013.

PODACI O UZORKU	
Datum uzorkovanja	22.11.2013.
Vrsta uzorka	**Voda za piće iz bunara br. 8**
Zahtijevano ispitivanje	parametri po Ugovoru
Uzorkovao	Ivan Đurović, Peđa Galičić
Broj protokola u CETI	70/01

Napomena:

1. **Rezultati ispitivanja se odnose samo na ispitivani uzorak.**
2. **Izvještaj o ispitivanju se može umnožavati isključivo kao cjelina.**

POMOĆNIK DIREKTORA
ZA TEH. I LAB. POSLOVE
Danijela Šuković, spec.toks. hem.

ODJELJENJE ZA LABORATORIJSKU DIJAGNOSTIKU I MONITORING

REZULTATI ANALIZE

Parametar	Jedinica mjere	Rezultati analize	MDK	Oznaka metode
Br. protokola		**70/01**		
Datum / čas uzorkovanja		**22.11.2013.**		
Mjesto uzorkovanja		**Bunar br. 8**		
Temperatura vode (teren)	**^{0}C**	**15.53**	**25**	**SMVP.111***
Boja	**mg/PtCo skale**	**1**	**20**	**SMVP.120**
Ukus		**bez**		
Miris		**bez**	**bez**	
Mutnoća	**NTU**	**<0.1**	**1,0**	**SMVP.118***
Koncentracija vodonikovih jona (ter/lab)	**pH jedinica**	**7.60/7.24±0.26**	**6,5-9,5**	**JUS HZ1.111***
Elektroprovodljivost (teren/lab)	**«S/cm/20^o C**	**274/294±2**	**2500**	**SMVP.143***
Hloridi	**Cl mg/l**	**2.75**	**250**	**ISO 9297:1997**
Nitrati	**NO_3 mg/l**	**3.77±0.51**	**50**	**SMEW4500NO3B***
Nitriti	**NO_2 mg/l**	**<0.003**	**0,50**	**SMEW4500NO2B***
Fluoridi	**F µg/l**	**162±20**	**1500**	**SMVP.326***
HPK	**mg/l O_2**	**<0.2**		**JUS/ISO 6060***
Amonijak	**NH_4 mg/l**	**0.029±0.004**	**0,50**	**SMVP.179***
Suvi ostatak na 180^0	**mg/l**	**163±15**		**SMVP.129***
Gvožđe	**Fe µg/l**	**35.00±8.60**	**200,0**	**SMEW.3500FeB***
Mangan	**Mn µg/l**	**1.40±0.13**	**50,0**	**SMEW.3500MnB***
Trihalometani ukupni	**µg/l**	**<0.001**	**100,0**	**SMEW 6232B**
- hloroform	**µg/l**	**<0.001**		**SMEW 6232 B**
- bromoform	**µg/l**	**<0.001**		**SMEW 6232 B**

- dibromhlormetan	**µg/l**	**<0.001**		**SMEW 6232 B**
- bromdihlormetan	**µg/l**	**<0.001**		**SMEW 6232 B**

***-akreditovana metoda**

Načelnik Odjeljenja za lab, dijagnostiku i monitoring
mr sci. Dejan Jančić, dipl. hem.

STRUČNO MIŠLJENJE

Na osnovu rezultata obavljenih laboratorijskih ispitivanja i stručnog razmatranja utvrđeno je da ispitivani uzorak

Vrsta/naziv uzorka	**Voda za piće iz bunara B-8 (Kombinat aluminijuma Podgorica)**
Broj protokola uzorka u CETI	**70/01**

ODGOVARA

uslovima Pravilnika o bližim zahtjevima koje u pogledu bezbjednosti treba da ispunjava voda za piće („Sl. list CG“, br. 24/12).

OVLAŠĆENO LICE

Danijela Šuković, spec. toks. hem.

	D.O.O. CENTAR ZA **EKOTOKSIKOLOŠKA ISPITIVANJA PODGORICA** **81000 PODGORICA, PUT RADOMIRA IVANOVIĆA 2** **LLC CENTER FOR** **ECOTOXICOLOGICAL RESEARCH PODGORICA**	ATCG Li 08.03 MEST ISO/IEC 17025 : 2006
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LABORATORIJA ZA EKOTOKSIKOLOŠKA ISPITIVANJA I ZAŠTITU OD ZRAČENJA

IZVJEŠTAJ O ISPITIVANJU

Vrsta ispitivanja	**Fizičko-hemijsko ispitivanje vode za piće**
Broj izvještaja	00-15-2624/1/71/01
Datum izdavanja izvještaja	02.12.2013.

PODACI O PODNOSIOCU ZAHTJEVA	
Naziv podnosioca zahtjeva	D.O.O. MONTENEGRO BONUS - CETINJE
Broj zahtjeva/ugovora	01-1552/K
Datum podnošenja zahtjeva	11.11.2013.

PODACI O UZORKU	
Datum uzorkovanja	22.11.2013.
Vrsta uzorka	**Voda za piće iz bunara br. 1**
Zahtijevano ispitivanje	parametri po Ugovoru
Uzorkovao	Ivan Đurović, Peđa Galičić
Broj protokola u CETI	71/01

Napomena:

1. **Rezultati ispitivanja se odnose samo na ispitivani uzorak.**
2. **Izvještaj o ispitivanju se može umnožavati isključivo kao cjelina.**

POMOĆNIK DIREKTORA
ZA TEH. I LAB. POSLOVE
Danijela Šuković, spec.toks. hem.

ODJELJENJE ZA LABORATORIJSKU DIJAGNOSTIKU I MONITORING

REZULTATI ANALIZE

Parametar	Jedinica mjere	Rezultati analize	MDK	Oznaka metode
Br. protokola		**71/01**		
Datum / čas uzorkovanja		**22.11.2013.**		
Mjesto uzorkovanja		**Bunar br. 3**		
Temperatura vode (teren)	**^{0}C**	**15.30**	**25**	**SMVP.111***
Boja	**mg/PtCo skale**	**1**	**20**	**SMVP.120**
Ukus		**bez**		
Miris		**bez**	**bez**	
Mutnoća	**NTU**	**0.181±0.010**	**1,0**	**SMVP.118***
Koncentracija vodonikovih jona (ter/lab)	**pH jedinica**	**7.10/7.15±0.26**	**6,5-9,5**	**JUS HZ1.111***
Elektroprovodljivost (teren/lab)	**«S/cm/20^o C**	**357/354±2**	**2500**	**SMVP.143***
Hloridi	**Cl mg/l**	**4.13**	**250**	**ISO 9297:1997**
Nitrati	**NO_3 mg/l**	**6.41±0.86**	**50**	**SMEW4500NO3B***
Nitriti	**NO_2 mg/l**	**<0.003**	**0,50**	**SMEW4500NO2B***
Fluoridi	**F µg/l**	**126±15**	**1500**	**SMVP.326***
HPK	**mg/l O_2**	**<0.2**		**JUS/ISO 6060***
Amonijak	**NH_4 mg/l**	**0.038±0.005**	**0,50**	**SMVP.179***
Suvi ostatak na 180^0	**mg/l**	**212±19**		**SMVP.129***
Gvožđe	**Fe µg/l**	**<1.00**	**200,0**	**SMEW.3500FeB***
Mangan	**Mn µg/l**	**2.00±0.19**	**50,0**	**SMEW.3500MnB***
Trihalometani ukupni	**µg/l**	**<0.001**	**100,0**	**SMEW 6232B**
- hloroform	**µg/l**	**<0.001**		**SMEW 6232 B**
- bromoform	**µg/l**	**<0.001**		**SMEW 6232 B**

- dibromhlormetan	**µg/l**	**<0.001**		**SMEW 6232 B**
- bromdihlormetan	**µg/l**	**<0.001**		**SMEW 6232 B**

***-akreditovana metoda**

Načelnik Odjeljenja za lab, dijagnostiku i monitoring
mr sci. Dejan Jančić, dipl. hem.

STRUČNO MIŠLJENJE

Na osnovu rezultata obavljenih laboratorijskih ispitivanja i stručnog razmatranja utvrđeno je da ispitivani uzorak

Vrsta/naziv uzorka	**Voda za piće iz bunara B-3 (Kombinat aluminijuma Podgorica)**
Broj protokola uzorka u CETI	**71/01**

ODGOVARA

uslovima Pravilnika o bližim zahtjevima koje u pogledu bezbjednosti treba da ispunjava voda za piće („Sl. list CG“, br. 24/12).

OVLAŠĆENO LICE

Danijela Šuković, spec. toks. hem.

	D.O.O. CENTAR ZA **EKOTOKSIKOLOŠKA ISPITIVANJA PODGORICA** **81000 PODGORICA, PUT RADOMIRA IVANOVIĆA 2** **LLC CENTER FOR** **ECOTOXICOLOGICAL RESEARCH PODGORICA**	ATCG Li 08.03 MEST ISO/IEC 17025 : 2006
CETI	☎ **++382 (0)20 658-090; 658-091; Fax: ++382 (0)20 658-092; E-mail: info@ceti.co.me**	

CETI 5100.101.01

LABORATORIJA ZA EKOTOKSIKOLOŠKA ISPITIVANJA I ZAŠTITU OD ZRAČENJA

IZVJEŠTAJ O ISPITIVANJU

Vrsta ispitivanja	**Fizičko-hemijsko ispitivanje vode za piće**
Broj izvještaja	00-15-2624/1/72/01
Datum izdavanja izvještaja	02.12.2013.

PODACI O PODNOSIOCU ZAHTJEVA	
Naziv podnosioca zahtjeva	D.O.O. MONTENEGRO BONUS - CETINJE
Broj zahtjeva/ugovora	01-1552/K
Datum podnošenja zahtjeva	11.11.2013.

PODACI O UZORKU	
Datum uzorkovanja	22.11.2013.
Vrsta uzorka	**Voda za piće iz bunara br. 2**
Zahtijevano ispitivanje	parametri po Ugovoru
Uzorkovao	Ivan Đurović, Peđa Galičić
Broj protokola u CETI	72/01

Napomena:

1. **Rezultati ispitivanja se odnose samo na ispitivani uzorak.**
2. **Izvještaj o ispitivanju se može umnožavati isključivo kao cjelina.**

POMOĆNIK DIREKTORA
ZA TEH. I LAB. POSLOVE
Danijela Šuković, spec.toks. hem.

ODJELJENJE ZA LABORATORIJSKU DIJAGNOSTIKU I MONITORING

REZULTATI ANALIZE

Parametar	Jedinica mjere	Rezultati analize	MDK	Oznaka metode
Br. protokola		**72/01**		
Datum / čas uzorkovanja		**22.11.2013.**		
Mjesto uzorkovanja		**Bunar br. 2**		
Temperatura vode (teren)	**^{0}C**	**15**	**25**	**SMVP.111***
Boja	**mg/PtCo skale**	**1**	**20**	**SMVP.120**
Ukus		**bez**		
Miris		**bez**	**bez**	
Mutnoća	**NTU**	**0.252±0.013**	**1,0**	**SMVP.118***
Koncentracija vodonikovih jona (ter/lab)	**pH jedinica**	**7.40/7.25±0.27**	**6,5-9,5**	**JUS HZ1.111***
Elektroprovodljivost (teren/lab)	**«S/cm/20^o C**	**302/321±2**	**2500**	**SMVP.143***
Hloridi	**Cl mg/l**	**3.44**	**250**	**ISO 9297:1997**
Nitrati	**NO_3 mg/l**	**4.98±0.67**	**50**	**SMEW4500NO3B***
Nitriti	**NO_2 mg/l**	**<0.003**	**0,50**	**SMEW4500NO2B***
Fluoridi	**F µg/l**	**122±15**	**1500**	**SMVP.326***
HPK	**mg/l O_2**	**<0.2**		**JUS/ISO 6060***
Amonijak	**NH_4 mg/l**	**0.040±0.006**	**0,50**	**SMVP.179***
Suvi ostatak na 180^0	**mg/l**	**185±17**		**SMVP.129***
Gvožđe	**Fe µg/l**	**19.00±4.67**	**200,0**	**SMEW.3500FeB***
Mangan	**Mn µg/l**	**<1.00**	**50,0**	**SMEW.3500MnB***
Trihalometani ukupni	**µg/l**	**<0.001**	**100,0**	**SMEW 6232B**
- hloroform	**µg/l**	**<0.001**		**SMEW 6232 B**
- bromoform	**µg/l**	**<0.001**		**SMEW 6232 B**

- dibromhlormetan	**µg/l**	**<0.001**		**SMEW 6232 B**
- bromdihlormetan	**µg/l**	**<0.001**		**SMEW 6232 B**

***-akreditovana metoda**

Načelnik Odjeljenja za lab, dijagnostiku i monitoring
mr sci. Dejan Jančić, dipl. hem.

STRUČNO MIŠLJENJE

Na osnovu rezultata obavljenih laboratorijskih ispitivanja i stručnog razmatranja utvrđeno je da ispitivani uzorak

Vrsta/naziv uzorka	**Voda za piće iz bunara B-2 (Kombinat aluminijuma Podgorica)**
Broj protokola uzorka u CETI	**72/01**

ODGOVARA

uslovima Pravilnika o bližim zahtjevima koje u pogledu bezbjednosti treba da ispunjava voda za piće („Sl. list CG“, br. 24/12).

OVLAŠĆENO LICE

Danijela Šuković, spec. toks. hem.

	D.O.O. CENTAR ZA **EKOTOKSIKOLOŠKA ISPITIVANJA PODGORICA** **81000 PODGORICA, PUT RADOMIRA IVANOVIĆA 2** **LLC CENTER FOR** **ECOTOXICOLOGICAL RESEARCH PODGORICA**	ATCG Li 08.03 MEST ISO/IEC 17025 : 2006
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LABORATORIJA ZA EKOTOKSIKOLOŠKA ISPITIVANJA I ZAŠTITU OD ZRAČENJA

IZVJEŠTAJ O ISPITIVANJU

Vrsta ispitivanja	**Fizičko-hemijsko ispitivanje vode za piće**
Broj izvještaja	00-15-2624/1/73/01
Datum izdavanja izvještaja	02.12.2013.

PODACI O PODNOSIOCU ZAHTJEVA	
Naziv podnosioca zahtjeva	D.O.O. MONTENEGRO BONUS - CETINJE
Broj zahtjeva/ugovora	01-1552/K
Datum podnošenja zahtjeva	11.11.2013.

PODACI O UZORKU	
Datum uzorkovanja	22.11.2013.
Vrsta uzorka	**Voda za piće iz bunara br. 7**
Zahtijevano ispitivanje	parametri po Ugovoru
Uzorkovao	Ivan Đurović, Peđa Galičić
Broj protokola u CETI	73/01

Napomena:

1. **Rezultati ispitivanja se odnose samo na ispitivani uzorak.**
2. **Izvještaj o ispitivanju se može umnožavati isključivo kao cjelina.**

POMOĆNIK DIREKTORA
ZA TEH. I LAB. POSLOVE
Danijela Šuković, spec.toks. hem.

ODJELJENJE ZA LABORATORIJSKU DIJAGNOSTIKU I MONITORING

REZULTATI ANALIZE

Parametar	Jedinica mjere	Rezultati analize	MDK	Oznaka metode
Br. protokola		**73/01**		
Datum / čas uzorkovanja		**22.11.2013.**		
Mjesto uzorkovanja		**Bunar br. 7**		
Temperatura vode (teren)	**^{0}C**	**15.3**	**25**	**SMVP.111***
Boja	**mg/PtCo skale**	**2**	**20**	**SMVP.120**
Ukus		**bez**		
Miris		**bez**	**bez**	
Mutnoća	**NTU**	**0.415±0.023**	**1,0**	**SMVP.118***
Koncentracija vodonikovih jona (ter/lab)	**pH jedinica**	**7,60/7.24±0.26**	**6,5-9,5**	**JUS HZ1.111***
Elektroprovodljivost (teren/lab)	**«S/cm/20^o C**	**288/304±2**	**2500**	**SMVP.143***
Hloridi	**Cl mg/l**	**2.75**	**250**	**ISO 9297:1997**
Nitrati	**NO_3 mg/l**	**4.14±0.56**	**50**	**SMEW4500NO3B***
Nitriti	**NO_2 mg/l**	**<0.003**	**0,50**	**SMEW4500NO2B***
Fluoridi	**F µg/l**	**122±15**	**1500**	**SMVP.326***
HPK	**mg/l O_2**	**<0.2**		**JUS/ISO 6060***
Amonijak	**NH_4 mg/l**	**0.082±0.012**	**0,50**	**SMVP.179***
Suvi ostatak na 180^0	**mg/l**	**160±14**		**SMVP.129***
Gvožđe	**Fe µg/l**	**64.00±15.72**	**200,0**	**SMEW.3500FeB***
Mangan	**Mn µg/l**	**2.60±0.25**	**50,0**	**SMEW.3500MnB***
Trihalometani ukupni	**µg/l**	**<0.001**	**100,0**	**SMEW 6232B**
- hloroform	**µg/l**	**<0.001**		**SMEW 6232 B**
- bromoform	**µg/l**	**<0.001**		**SMEW 6232 B**

- dibromhlormetan	**µg/l**	**<0.001**		**SMEW 6232 B**
- bromdihlormetan	**µg/l**	**<0.001**		**SMEW 6232 B**

***-akreditovana metoda**

Načelnik Odjeljenja za lab, dijagnostiku i monitoring
mr sci. Dejan Jančić, dipl. hem.

STRUČNO MIŠLJENJE

Na osnovu rezultata obavljenih laboratorijskih ispitivanja i stručnog razmatranja utvrđeno je da ispitivani uzorak

Vrsta/naziv uzorka	**Voda za piće iz bunara B-7(Kombinat aluminijuma Podgorica)**
Broj protokola uzorka u CETI	**73/01**

ODGOVARA

uslovima Pravilnika o bližim zahtjevima koje u pogledu bezbjednosti treba da ispunjava voda za piće („Sl. list CG“, br. 24/12).

OVLAŠĆENO LICE

Danijela Šuković, spec. toks. hem.

	D.O.O. CENTAR ZA EKOTOKSIKOLOŠKA ISPITIVANJA PODGORICA 81000 PODGORICA, PUT RADOMIRA IVANOVIĆA 2 LLC CENTER FOR ECOTOXICOLOGICAL RESEARCH PODGORICA	ATCG Li 08.03 MEST ISO/IEC 17025 : 2006
CETI	☎ **++382 (0)20 658-090; 658-091; Fax: ++382 (0)20 658-092; E-mail: info@ceti.co.me**	

CETI 5100.101.01

LABORATORIJA ZA EKOTOKSIKOLOŠKA ISPITIVANJA I ZAŠTITU OD ZRAČENJA

IZVJEŠTAJ O ISPITIVANJU

Vrsta ispitivanja	**Fizičko-hemijsko ispitivanje vode za piće**
Broj izvještaja	00-15-2624/1/74/01
Datum izdavanja izvještaja	02.12.2013.

PODACI O PODNOSIOCU ZAHTJEVA	
Naziv podnosioca zahtjeva	D.O.O. MONTENEGRO BONUS - CETINJE
Broj zahtjeva/ugovora	01-1552/K
Datum podnošenja zahtjeva	11.11.2013.

PODACI O UZORKU	
Datum uzorkovanja	22.11.2013.
Vrsta uzorka	**Voda za piće iz bunara br. 1**
Zahtijevano ispitivanje	parametri po Ugovoru
Uzorkovao	Ivan Đurović, Peđa Galičić
Broj protokola u CETI	74/01

Napomena:

1. **Rezultati ispitivanja se odnose samo na ispitivani uzorak.**
2. **Izvještaj o ispitivanju se može umnožavati isključivo kao cjelina.**

POMOĆNIK DIREKTORA
ZA TEH. I LAB. POSLOVE
Danijela Šuković, spec.toks. hem.

ODJELJENJE ZA LABORATORIJSKU DIJAGNOSTIKU I MONITORING

REZULTATI ANALIZE

Parametar	Jedinica mjere	Rezultati analize	MDK	Oznaka metode
Br. protokola		**74/01**		
Datum / čas uzorkovanja		**22.11.2013.**		
Mjesto uzorkovanja		**Bunar br. 1**		
Temperatura vode (teren)	**^{0}C**	**15,4**	**25**	**SMVP.111***
Boja	**mg/PtCo skale**	**0**	**20**	**SMVP.120**
Ukus		**bez**		
Miris		**bez**	**bez**	
Mutnoća	**NTU**	**0.127±0.007**	**1,0**	**SMVP.118***
Koncentracija vodonikovih jona (ter/lab)	**pH jedinica**	**7,76/7.50±0.27**	**6,5-9,5**	**JUS HZ1.111***
Elektroprovodljivost (teren/lab)	**«S/cm/20^o C**	**281/302±2**	**2500**	**SMVP.143***
Hloridi	**Cl mg/l**	**2.75**	**250**	**ISO 9297:1997**
Nitrati	**NO_3 mg/l**	**4.11±0.55**	**50**	**SMEW4500NO3B***
Nitriti	**NO_2 mg/l**	**<0.003**	**0,50**	**SMEW4500NO2B***
Fluoridi	**F µg/l**	**210±26**	**1500**	**SMVP.326***
HPK	**mg/l O_2**	**<0.2**		**JUS/ISO 6060***
Amonijak	**NH_4 mg/l**	**0.037±0.005**	**0,50**	**SMVP.179***
Suvi ostatak na 180^0	**mg/l**	**159±14**		**SMVP.129***
Gvožđe	**Fe µg/l**	**109.00±26.77**	**200,0**	**SMEW.3500FeB***
Mangan	**Mn µg/l**	**1.70±0.16**	**50,0**	**SMEW.3500MnB***
Trihalometani ukupni	**µg/l**	**<0.001**	**100,0**	**SMEW 6232B**
- hloroform	**µg/l**	**<0.001**		**SMEW 6232 B**
- bromoform	**µg/l**	**<0.001**		**SMEW 6232 B**

- dibromhlormetan	**µg/l**	**<0.001**		**SMEW 6232 B**
- bromdihlormetan	**µg/l**	**<0.001**		**SMEW 6232 B**

***-akreditovana metoda**

Načelnik Odjeljenja za lab, dijagnostiku i monitoring
mr sci. Dejan Jančić, dipl. hem.

STRUČNO MIŠLJENJE

Na osnovu rezultata obavljenih laboratorijskih ispitivanja i stručnog razmatranja utvrđeno je da ispitivani uzorak

Vrsta/naziv uzorka	**Voda za piće iz bunara B-1 (Kombinat aluminijuma Podgorica)**
Broj protokola uzorka u CETI	**74/01**

ODGOVARA

uslovima Pravilnika o bližim zahtjevima koje u pogledu bezbjednosti treba da ispunjava voda za piće („Sl. list CG“, br. 24/12).

OVLAŠĆENO LICE

Danijela Šuković, spec. toks. hem.

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LABORATORIJA ZA EKOTOKSIKOLOŠKA ISPITIVANJA I ZAŠTITU OD ZRAČENJA

IZVJEŠTAJ O ISPITIVANJU

Vrsta ispitivanja	**Fizičko-hemijsko ispitivanje vode za piće**
Broj izvještaja	00-20-3535/4/78/01
Datum izdavanja izvještaja	30.12.2013.

PODACI O PODNOSIOCU ZAHTJEVA	
Naziv podnosioca zahtjeva	D.O.O. MONTENEGRO BONUS - CETINJE
Broj zahtjeva/ugovora	01-1769/K
Datum podnošenja zahtjeva	12.12.2013

PODACI O UZORKU	
Datum uzorkovanja	20.12.2013.
Vrsta uzorka	**Voda za piće iz bunara br-1**
Zahtijevano ispitivanje	parametri po Ugovoru
Uzorkovao	Željka Bulatović, Peđa Galičić
Broj protokola u CETI	78/01

Napomena:

1. **Rezultati ispitivanja se odnose samo na ispitivani uzorak.**
2. **Izvještaj o ispitivanju se može umnožavati isključivo kao cjelina.**

POMOĆNIK DIREKTORA
ZA TEH. I LAB. POSLOVE
Danijela Šuković, spec.toks. hem.

Danijela Šuković

ODJELJENJE ZA LABORATORIJSKU DIJAGNOSTIKU I MONITORING

REZULTATI ANALIZE

Parametar	Jedinica mjere	Rezultati analize	MDK	Oznaka metode
Br. protokola		78/01		
Datum / čas uzorkovanja		20.12.2013.		
Mjesto uzorkovanja		Bunara br-1		
Temperatura vode (teren)	^{0}C	14.45	25	SMVP.111*
Boja	mg/PtCo skale	3	20	SMVP.120
Ukus		bez		
Miris		bez	bez	
Mutnoća	NTU	0/0.202±0.011	5,0	SMVP.118*
Koncentracija vodonikovih jona (ter/lab)	pH jedinica	6.75/6.79±0.25	6,5-9,5	JUS HZ1.111*
Elektroprovodljivost (teren/lab)	µS/cm/20^o C	305/336.0±1.9	2500	SMVP.143*
Hloridi	Cl mg/l	3.10	250	ISO 9297:1997
Nitrati	NO_3 mg/l	5.54±0.75	50	SMEW4500NO3B*
Nitriti	NO_2 mg/l	<0.003	0,50	SMEW4500NO2B*
Fluoridi	F µg/l	84.0±10.3	1500	SMVP.326*
HPK	mg/l O_2	< 0.20		JUS/ISO 6060*
Amonijak	NH_4 mg/l	0.025±0.004	0,50	SMVP.179*
Suvi ostatak na 180^0	mg/l	222±20		SMVP.129*
Gvožđe	Fe µg/l	< 1.0	200,0	SMEW.3500FeB*
Mangan	Mn µg/l	< 0.5	50,0	SMEW.3500MnB*
Trihalometani ukupni	µg/l		100,0	SMEW 6232B
- hloroform	µg/l	<0.001		SMEW 6232 B
- bromoform	µg/l	<0.001		SMEW 6232 B

- dibromhlormetan	µg/l	<0.001		SMEW 6232 B
- bromdihlormetan	µg/l	<0.001		SMEW 6232 B

*-akreditovana metoda

Načelnik Odjeljenja za lab, dijagnostiku i monitoring
mr sci. Dejan Jančić, dipl. hem.

Dejan Jančić

STRUČNO MIŠLJENJE

Na osnovu rezultata obavljenih laboratorijskih ispitivanja i stručnog razmatranja utvrđeno je da ispitivani uzorak

Vrsta/naziv uzorka	**Voda za piće iz bunara B-1 (Kombinat aluminijuma Podgorica)**
Broj protokola uzorka u CETI	**78/01**

ODGOVARA

uslovima Pravilnika o bližim zahtjevima koje u pogledu bezbjednosti treba da ispunjava voda za piće („Sl. list CG", br. 24/12).

OVLAŠĆENO LICE

Danijela Šuković, spec. toks. hem.

Danijela Šuković

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LABORATORIJA ZA EKOTOKSIKOLOŠKA ISPITIVANJA I ZAŠTITU OD ZRAČENJA

IZVJEŠTAJ O ISPITIVANJU

Vrsta ispitivanja	**Fizičko-hemijsko ispitivanje vode za piće**
Broj izvještaja	00-20-3535/4/79/01
Datum izdavanja izvještaja	30.12.2013.

PODACI O PODNOSIOCU ZAHTJEVA	
Naziv podnosioca zahtjeva	D.O.O. MONTENEGRO BONUS - CETINJE
Broj zahtjeva/ugovora	01-1769/K
Datum podnošenja zahtjeva	12.12.2013.

PODACI O UZORKU	
Datum uzorkovanja	20.12.2013.
Vrsta uzorka	**Voda za piće iz bunara br-2**
Zahtijevano ispitivanje	parametri po Ugovoru
Uzorkovao	Željka Bulatović, Peđa Galičić
Broj protokola u CETI	79/01

Napomena:

1. **Rezultati ispitivanja se odnose samo na ispitivani uzorak.**
2. **Izvještaj o ispitivanju se može umnožavati isključivo kao cjelina.**

POMOĆNIK DIREKTORA
ZA TEH. I LAB. POSLOVE
Danijela Šuković, spec.toks. hem.

ODJELJENJE ZA LABORATORIJSKU DIJAGNOSTIKU I MONITORING

REZULTATI ANALIZE

Parametar	Jedinica mjere	Rezultati analize	MDK	Oznaka metode
Br. protokola		79/01		
Datum / čas uzorkovanja		20.12.2013.		
Mjesto uzorkovanja		Bunara br-2		
Temperatura vode (teren)	^{0}C	14.85	25	SMVP.111*
Boja	mg/PtCo skale	1	20	SMVP.120
Ukus		bez		
Miris		bez	bez	
Mutnoća	NTU	0/0.107±0.006	5,0	SMVP.118*
Koncentracija vodonikovih jona (ter/lab)	pH jedinica	7.65/7.66±0.28	6,5-9,5	JUS HZ1.111*
Elektroprovodljivost (teren/lab)	µS/cm/20^0 C	309/325.0±1.8	2500	SMVP.143*
Hloridi	Cl mg/l	3.10	250	ISO 9297:1997
Nitrati	NO_3 mg/l	5.78±0.83	50	SMEW4500NO3B*
Nitriti	NO_2 mg/l	<0.003	0,50	SMEW4500NO2B*
Fluoridi	F µg/l	77.0±9.4	1500	SMVP.326*
HPK	mg/l O_2	< 0.20		JUS/ISO 6060*
Amonijak	NH_4 mg/l	0.170±0.002	0,50	SMVP.179*
Suvi ostatak na 180^0	mg/l	214±19		SMVP.129*
Gvožđe	Fe µg/l	< 1.0	200,0	SMEW.3500FeB*
Mangan	Mn µg/l	< 0.5	50,0	SMEW.3500MnB*
Trihalometani ukupni	µg/l		100,0	SMEW 6232B
- hloroform	µg/l	<0.001		SMEW 6232 B
- bromoform	µg/l	<0.001		SMEW 6232 B

- dibromhlormetan	µg/l	<0.001		SMEW 6232 B
- bromdihlormetan	µg/l	<0.001		SMEW 6232 B

***-akreditovana metoda**

Načelnik Odjeljenja za lab, dijagnostiku i monitoring
mr sci. Dejan Jančić, dipl. hem.

Dejan Jančić

STRUČNO MIŠLJENJE

Na osnovu rezultata obavljenih laboratorijskih ispitivanja i stručnog razmatranja utvrđeno je da ispitivani uzorak

Vrsta/naziv uzorka	**Voda za piće iz bunara B-2 (Kombinat aluminijuma Podgorica)**
Broj protokola uzorka u CETI	**79/01**

ODGOVARA

uslovima Pravilnika o bližim zahtjevima koje u pogledu bezbjednosti treba da ispunjava voda za piće („Sl. list CG", br. 24/12).

OVLAŠĆENO LICE

Danijela Šuković, spec. toks. hem.

Danijela Šuković

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LABORATORIJA ZA EKOTOKSIKOLOŠKA ISPITIVANJA I ZAŠTITU OD ZRAČENJA

IZVJEŠTAJ O ISPITIVANJU

Vrsta ispitivanja	**Fizičko-hemijsko ispitivanje vode za piće**
Broj izvještaja	00-20-3535/4/80/01
Datum izdavanja izvještaja	30.12.2013.

PODACI O PODNOSIOCU ZAHTJEVA	
Naziv podnosioca zahtjeva	D.O.O. MONTENEGRO BONUS - CETINJE
Broj zahtjeva/ugovora	01-1769/K
Datum podnošenja zahtjeva	12.12.2013.

PODACI O UZORKU	
Datum uzorkovanja	20.12.2013.
Vrsta uzorka	**Voda za piće iz bunara br-3**
Zahtijevano ispitivanje	parametri po Ugovoru
Uzorkovao	Željka Bulatović, Peđa Galičić
Broj protokola u CETI	80/01

Napomena:

1. **Rezultati ispitivanja se odnose samo na ispitivani uzorak.**
2. **Izvještaj o ispitivanju se može umnožavati isključivo kao cjelina.**

POMOĆNIK DIREKTORA
ZA TEH. I LAB. POSLOVE
Danijela Šuković, spec.toks. hem.
Danijela Šuković

ODJELJENJE ZA LABORATORIJSKU DIJAGNOSTIKU I MONITORING

REZULTATI ANALIZE

Parametar	Jedinica mjere	Rezultati analize	MDK	Oznaka metode
Br. protokola		80/01		
Datum / čas uzorkovanja		20.12.2013.		
Mjesto uzorkovanja		Bunara br-3		
Temperatura vode (teren)	^{0}C	15.9	25	SMVP.111*
Boja	mg/PtCo skale	1	20	SMVP.120
Ukus		bez		
Miris		bez	bez	
Mutnoća	NTU	0/0.121±0.007	5,0	SMVP.118*
Koncentracija vodonikovih jona (ter/lab)	pH jedinica	7.65/7.73±0.28	6,5-9,5	JUS HZ1.111*
Elektroprovodljivost (teren/lab)	µS/cm/20^o C	369/364±2.04	2500	SMVP.143*
Hloridi	Cl mg/l	4.82	250	ISO 9297:1997
Nitrati	NO_3 mg/l	7.06±0.95	50	SMEW4500NO3B*
Nitriti	NO_2 mg/l	<0.003	0,50	SMEW4500NO2B*
Fluoridi	F µg/l	101±12.38	1500	SMVP.326*
HPK	mg/l O_2	< 0.20		JUS/ISO 6060*
Amonijak	NH_4 mg/l	0.0067±0.001	0,50	SMVP.179*
Suvi ostatak na 180^0	mg/l	224±20		SMVP.129*
Gvožđe	Fe µg/l	< 1.0	200,0	SMEW.3500FeB*
Mangan	Mn µg/l	< 0.5	50,0	SMEW.3500MnB*
Trihalometani ukupni	µg/l		100,0	SMEW 6232B
- hloroform	µg/l	<0.001		SMEW 6232 B
- bromoform	µg/l	<0.001		SMEW 6232 B

- dibromhlormetan	µg/l	<0.001		SMEW 6232 B
- bromdihlormetan	µg/l	<0.001		SMEW 6232 B

*-akreditovana metoda

Načelnik Odjeljenja za lab, dijagnostiku i monitoring
mr sci. Dejan Jančić, dipl. hem.

STRUČNO MIŠLJENJE

Na osnovu rezultata obavljenih laboratorijskih ispitivanja i stručnog razmatranja utvrđeno je da ispitivani uzorak

Vrsta/naziv uzorka	**Voda za piće iz bunara B-3 (Kombinat aluminijuma Podgorica)**
Broj protokola uzorka u CETI	**80/01**

ODGOVARA

uslovima Pravilnika o bližim zahtjevima koje u pogledu bezbjednosti treba da ispunjava voda za piće („Sl. list CG“, br. 24/12).

OVLAŠĆENO LICE

Danijela Šuković, spec. toks. hem.

Danijela Šuković

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LABORATORIJA ZA EKOTOKSIKOLOŠKA ISPITIVANJA I ZAŠTITU OD ZRAČENJA

IZVJEŠTAJ O ISPITIVANJU

Vrsta ispitivanja	**Fizičko-hemijsko ispitivanje vode za piće**
Broj izvještaja	00-20-3535/4/81/01
Datum izdavanja izvještaja	30.12.2013.

PODACI O PODNOSIOCU ZAHTJEVA	
Naziv podnosioca zahtjeva	D.O.O. MONTENEGRO BONUS - CETINJE
Broj zahtjeva/ugovora	01-1769/K
Datum podnošenja zahtjeva	12.12.2013.

PODACI O UZORKU	
Datum uzorkovanja	20.12.2013.
Vrsta uzorka	**Voda za piće iz bunara br-6**
Zahtijevano ispitivanje	parametri po Ugovoru
Uzorkovao	Željka Bulatović, Peđa Galičić
Broj protokola u CETI	81/01

Napomena:

1. **Rezultati ispitivanja se odnose samo na ispitivani uzorak.**
2. **Izvještaj o ispitivanju se može umnožavati isključivo kao cjelina.**

POMOĆNIK DIREKTORA
ZA TEH. I LAB. POSLOVE
Danijela Šuković, spec.toks. hem.
Danijela Šuković

ODJELJENJE ZA LABORATORIJSKU DIJAGNOSTIKU I MONITORING

REZULTATI ANALIZE

Parametar	Jedinica mjere	Rezultati analize	MDK	Oznaka metode
Br. protokola		81/01		
Datum / čas uzorkovanja		20.12.2013.		
Mjesto uzorkovanja		Bunara br-6		
Temperatura vode (teren)	^{0}C	15.05	25	SMVP.111*
Boja	mg/PtCo skale	2	20	SMVP.120
Ukus		bez		
Miris		bez	bez	
Mutnoća	NTU	0/0.416±0.023	5,0	SMVP.118*
Koncentracija vodonikovih jona (ter/lab)	pH jedinica	7.72/7.90±0.29	6,5-9,5	JUS HZ1.111*
Elektroprovodljivost (teren/lab)	µS/cm/20^0 C	303/315.0±1.8	2500	SMVP.143*
Hloridi	Cl mg/l	3.10	250	ISO 9297:1997
Nitrati	NO_3 mg/l	5.52±0.75	50	SMEW4500NO3B*
Nitriti	NO_2 mg/l	<0.003	0,50	SMEW4500NO2B*
Fluoridi	F µg/l	88.0±10.8	1500	SMVP.326*
HPK	mg/l O_2	< 0.2		JUS/ISO 6060*
Amonijak	NH_4 mg/l	0.063±0.009	0,50	SMVP.179*
Suvi ostatak na 180^0	mg/l	258±23		SMVP.129*
Gvožđe	Fe µg/l	< 1.0	200,0	SMEW.3500FeB*
Mangan	Mn µg/l	1.30±0.12	50,0	SMEW.3500MnB*
Trihalometani ukupni	µg/l		100,0	SMEW 6232B
- hloroform	µg/l	<0.001		SMEW 6232 B
- bromoform	µg/l	<0.001		SMEW 6232 B

- dibromhlormetan	µg/l	<0.001		SMEW 6232 B
- bromdihlormetan	µg/l	<0.001		SMEW 6232 B

*-akreditovana metoda

Načelnik Odjeljenja za lab, dijagnostiku i monitoring
mr sci. Dejan Jančić, dipl. hem.

Dejan Jančić

STRUČNO MIŠLJENJE

Na osnovu rezultata obavljenih laboratorijskih ispitivanja i stručnog razmatranja utvrđeno je da ispitivani uzorak

Vrsta/naziv uzorka	**Voda za piće iz bunara B-6 (Kombinat aluminijuma Podgorica)**
Broj protokola uzorka u CETI	**81/01**

ODGOVARA

uslovima Pravilnika o bližim zahtjevima koje u pogledu bezbjednosti treba da ispunjava voda za piće („Sl. list CG“, br. 24/12).

OVLAŠĆENO LICE

Danijela Šuković, spec. toks. hem.

Danijela Šuković

D.O.O. CENTAR ZA
EKOTOKSIKOLOŠKA ISPITIVANJA PODGORICA
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CETI 5100.101.01

LABORATORIJA ZA EKOTOKSIKOLOŠKA ISPITIVANJA I ZAŠTITU OD ZRAČENJA

IZVJEŠTAJ O ISPITIVANJU

Vrsta ispitivanja	**Fizičko-hemijsko ispitivanje vode za piće**
Broj izvještaja	00-20-3535/4/82/01
Datum izdavanja izvještaja	30.12.2013.

PODACI O PODNOSIOCU ZAHTJEVA	
Naziv podnosioca zahtjeva	D.O.O. MONTENEGRO BONUS - CETINJE
Broj zahtjeva/ugovora	01-1769/K
Datum podnošenja zahtjeva	12.12.2013.

PODACI O UZORKU	
Datum uzorkovanja	20.12.2013.
Vrsta uzorka	**Voda za piće iz bunara br-7**
Zahtijevano ispitivanje	parametri po Ugovoru
Uzorkovao	Željka Bulatović, Peđa Galičić
Broj protokola u CETI	82/01

Napomena:

1. **Rezultati ispitivanja se odnose samo na ispitivani uzorak.**
2. **Izvještaj o ispitivanju se može umnožavati isključivo kao cjelina.**

POMOĆNIK DIREKTORA
ZA TEH. I LAB. POSLOVE
Danijela Šuković, spec.toks. hem.
Danijela Šuković

ODJELJENJE ZA LABORATORIJSKU DIJAGNOSTIKU I MONITORING

REZULTATI ANALIZE

Parametar	Jedinica mjere	Rezultati analize	MDK	Oznaka metode
Br. protokola		82/01		
Datum / čas uzorkovanja		20.12.2013.		
Mjesto uzorkovanja		Bunara br-7		
Temperatura vode (teren)	^{0}C	15.10	25	SMVP.111*
Boja	mg/PtCo skale	1	20	SMVP.120
Ukus		bez		
Miris		bez	bez	
Mutnoća	NTU	0/0.199±0.011	5,0	SMVP.118*
Koncentracija vodonikovih jona (ter/lab)	pH jedinica	7.65/7.85±0.29	6,5-9,5	JUS HZ1.111*
Elektroprovodljivost (teren/lab)	µS/cm/20^0 C	314/326.0±1.8	2500	SMVP.143*
Hloridi	Cl mg/l	3.44	250	ISO 9297:1997
Nitrati	NO_3 mg/l	6.01±0.81	50	SMEW4500NO3B*
Nitriti	NO_2 mg/l	<0.003	0,50	SMEW4500NO2B*
Fluoridi	F µg/l	89.0±10.9	1500	SMVP.326*
HPK	mg/l O_2	< 0.2		JUS/ISO 6060*
Amonijak	NH_4 mg/l	0.031±0.004	0,50	SMVP.179*
Suvi ostatak na 180^0	mg/l	200±18		SMVP.129*
Gvožđe	Fe µg/l	< 1.0	200,0	SMEW.3500FeB*
Mangan	Mn µg/l	< 0.5	50,0	SMEW.3500MnB*
Trihalometani ukupni	µg/l		100,0	SMEW 6232B
- hloroform	µg/l	<0.001		SMEW 6232 B
- bromoform	µg/l	<0.001		SMEW 6232 B

- dibromhlormetan	µg/l	<0.001		SMEW 6232 B
- bromdihlormetan	µg/l	<0.001		SMEW 6232 B

*-akreditovana metoda

Načelnik Odjeljenja za lab, dijagnostiku i monitoring
mr sci. Dejan Jančić, dipl. hem.

Dejan Jančić

STRUČNO MIŠLJENJE

Na osnovu rezultata obavljenih laboratorijskih ispitivanja i stručnog razmatranja utvrđeno je da ispitivani uzorak

Vrsta/naziv uzorka	**Voda za piće iz bunara B-7 (Kombinat aluminijuma Podgorica)**
Broj protokola uzorka u CETI	**82/01**

ODGOVARA

uslovima Pravilnika o bližim zahtjevima koje u pogledu bezbjednosti treba da ispunjava voda za piće („Sl. list CG“, br. 24/12).

OVLAŠĆENO LICE

Danijela Šuković, spec. toks. hem.

Danijela Šuković

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LABORATORIJA ZA EKOTOKSIKOLOŠKA ISPITIVANJA I ZAŠTITU OD ZRAČENJA

IZVJEŠTAJ O ISPITIVANJU

Vrsta ispitivanja	**Fizičko-hemijsko ispitivanje vode za piće**
Broj izvještaja	00-20-3535/4/83/01
Datum izdavanja izvještaja	30.12.2013.

PODACI O PODNOSIOCU ZAHTJEVA	
Naziv podnosioca zahtjeva	D.O.O. MONTENEGRO BONUS - CETINJE
Broj zahtjeva/ugovora	01-1769/K
Datum podnošenja zahtjeva	12.12.2013.

PODACI O UZORKU	
Datum uzorkovanja	20.12.2013.
Vrsta uzorka	**Voda za piće iz bunara br-8**
Zahtijevano ispitivanje	parametri po Ugovoru
Uzorkovao	Željka Bulatović, Peđa Galičić
Broj protokola u CETI	83/01

Napomena:

1. **Rezultati ispitivanja se odnose samo na ispitivani uzorak.**
2. **Izvještaj o ispitivanju se može umnožavati isključivo kao cjelina.**

POMOĆNIK DIREKTORA
ZA TEH. I LAB. POSLOVE
Danijela Šuković, spec.toks. hem.
Danijela Šuković

ODJELJENJE ZA LABORATORIJSKU DIJAGNOSTIKU I MONITORING

REZULTATI ANALIZE

Parametar	Jedinica mjere	Rezultati analize	MDK	Oznaka metode
Br. protokola		83/01		
Datum / čas uzorkovanja		20.12.2013.		
Mjesto uzorkovanja		Bunara br-8		
Temperatura vode (teren)	^{0}C	15.45	25	SMVP.111*
Boja	mg/PtCo skale	0	20	SMVP.120
Ukus		bez		
Miris		bez	bez	
Mutnoća	NTU	0/0.152±0.008	5,0	SMVP.118*
Koncentracija vodonikovih jona (ter/lab)	pH jedinica	7.64/7.88±0.29	6,5-9,5	JUS HZ1.111*
Elektroprovodljivost (teren/lab)	µS/cm/20^0 C	292/304.0±1.7	2500	SMVP.143*
Hloridi	Cl mg/l	2.75	250	ISO 9297:1997
Nitrati	NO_3 mg/l	4.22±0.57	50	SMEW4500NO3B*
Nitriti	NO_2 mg/l	<0.003	0,50	SMEW4500NO2B*
Fluoridi	F µg/l	103±12.63	1500	SMVP.326*
HPK	mg/l O_2	< 0.20		JUS/ISO 6060*
Amonijak	NH_4 mg/l	0.014±0.002	0,50	SMVP.179*
Suvi ostatak na 180^0	mg/l	125±12		SMVP.129*
Gvožđe	Fe µg/l	21.0±5.0	200,0	SMEW.3500FeB*
Mangan	Mn µg/l	< 0.5	50,0	SMEW.3500MnB*
Trihalometani ukupni	µg/l		100,0	SMEW 6232B
- hloroform	µg/l	<0.001		SMEW 6232 B
- bromoform	µg/l	<0.001		SMEW 6232 B

- dibromhlormetan	µg/l	<0.001		SMEW 6232 B
- bromdihlormetan	µg/l	<0.001		SMEW 6232 B

*-akreditovana metoda

Načelnik Odjeljenja za lab, dijagnostiku i monitoring
mr sci. Dejan Jančić, dipl. hem.

Dejan Jančić

STRUČNO MIŠLJENJE

Na osnovu rezultata obavljenih laboratorijskih ispitivanja i stručnog razmatranja utvrđeno je da ispitivani uzorak

Vrsta/naziv uzorka	**Voda za piće iz bunara B-8 (Kombinat aluminijuma Podgorica)**
Broj protokola uzorka u CETI	**83/01**

ODGOVARA

uslovima Pravilnika o bližim zahtjevima koje u pogledu bezbjednosti treba da ispunjava voda za piće („Sl. list CG“, br. 24/12).

OVLAŠĆENO LICE

Danijela Šuković, spec. toks. hem.

Danijela Šuković

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IZVJEŠTAJ O ISPITIVANJU

Vrsta ispitivanja	**Fizičko-hemijsko ispitivanje vode za piće**
Broj izvještaja	00-20-3535/4/84/01
Datum izdavanja izvještaja	30.12.2013.

PODACI O PODNOSIOCU ZAHTJEVA	
Naziv podnosioca zahtjeva	D.O.O. MONTENEGRO BONUS - CETINJE
Broj zahtjeva/ugovora	01-1769/K
Datum podnošenja zahtjeva	12.12.2013.

PODACI O UZORKU	
Datum uzorkovanja	20.12.2013.
Vrsta uzorka	**Voda za piće iz bunara br-9**
Zahtijevano ispitivanje	parametri po Ugovoru
Uzorkovao	Željka Bulatović, Peđa Galičić
Broj protokola u CETI	84/01

Napomena:

1. **Rezultati ispitivanja se odnose samo na ispitivani uzorak.**
2. **Izvještaj o ispitivanju se može umnožavati isključivo kao cjelina.**

POMOĆNIK DIREKTORA
ZA TEH. I LAB. POSLOVE
Danijela Šuković, spec.toks. hem.

Danijela Šuković

ODJELJENJE ZA LABORATORIJSKU DIJAGNOSTIKU I MONITORING

REZULTATI ANALIZE

Parametar	Jedinica mjere	Rezultati analize	MDK	Oznaka metode
Br. protokola		84/01		
Datum / čas uzorkovanja		20.12.2013.		
Mjesto uzorkovanja		Bunara br-9		
Temperatura vode (teren)	^{0}C	14.2	25	SMVP.111*
Boja	mg/PtCo skale	1	20	SMVP.120
Ukus		bez		
Miris		bez	bez	
Mutnoća	NTU	0/0.223±0.012	5,0	SMVP.118*
Koncentracija vodonikovih jona (ter/lab)	pH jedinica	7.70/7.86±0.29	6,5-9,5	JUS HZ1.111*
Elektroprovodljivost (teren/lab)	µS/cm/20^o C	300/313.0±1.7	2500	SMVP.143*
Hloridi	Cl mg/l	3.10	250	ISO 9297:1997
Nitrati	NO_3 mg/l	5.08±0.68	50	SMEW4500NO3B*
Nitriti	NO_2 mg/l	<0.003	0,50	SMEW4500NO2B*
Fluoridi	F µg/l	114±14	1500	SMVP.326*
HPK	mg/l O_2	< 0.20		JUS/ISO 6060*
Amonijak	NH_4 mg/l	0.048±0.007	0,50	SMVP.179*
Suvi ostatak na 180^0	mg/l	174±16		SMVP.129*
Gvožđe	Fe µg/l	< 1.0	200,0	SMEW.3500FeB*
Mangan	Mn µg/l	< 0.5	50,0	SMEW.3500MnB*
Trihalometani ukupni	µg/l		100,0	SMEW 6232B
- hloroform	µg/l	<0.001		SMEW 6232 B
- bromoform	µg/l	<0.001		SMEW 6232 B

- dibromhlormetan	µg/l	<0.001		SMEW 6232 B
- bromdihlormetan	µg/l	<0.001		SMEW 6232 B

*-akreditovana metoda

Načelnik Odjeljenja za lab, dijagnostiku i monitoring
mr sci. Dejan Jančić, dipl. hem.

Dejan Jančić

STRUČNO MIŠLJENJE

Na osnovu rezultata obavljenih laboratorijskih ispitivanja i stručnog razmatranja utvrđeno je da ispitivani uzorak

Vrsta/naziv uzorka	**Voda za piće iz bunara B-9 (Kombinat aluminijuma Podgorica)**
Broj protokola uzorka u CETI	**84/01**

ODGOVARA

uslovima Pravilnika o bližim zahtjevima koje u pogledu bezbjednosti treba da ispunjava voda za piće („Sl. list CG“, br. 24/12).

OVLAŠĆENO LICE

Danijela Šuković, spec. toks. hem.

Danijela Šuković

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IZVJEŠTAJ O ISPITIVANJU

Vrsta ispitivanja	**Fizičko-hemijsko ispitivanje vode za piće**
Broj izvještaja	00-20-3535/4/85/01
Datum izdavanja izvještaja	30.12.2013.

PODACI O PODNOSIOCU ZAHTJEVA	
Naziv podnosioca zahtjeva	D.O.O. MONTENEGRO BONUS - CETINJE
Broj zahtjeva/ugovora	01-1769/K
Datum podnošenja zahtjeva	12.12.2013.

PODACI O UZORKU	
Datum uzorkovanja	23.12.2013.
Vrsta uzorka	**Voda za piće iz bunara br. 1**
Zahtijevano ispitivanje	parametri po Ugovoru
Uzorkovao	Ž. Bulatović, M. Živković
Broj protokola u CETI	85/01

Napomena:

1. **Rezultati ispitivanja se odnose samo na ispitivani uzorak.**
2. **Izvještaj o ispitivanju se može umnožavati isključivo kao cjelina.**

POMOĆNIK DIREKTORA
ZA TEH. I LAB. POSLOVE
Danijela Šuković, spec.toks. hem.

Danijela Šuković

ODJELJENJE ZA LABORATORIJSKU DIJAGNOSTIKU I MONITORING

REZULTATI ANALIZE

Parametar	Jedinica mjere	Rezultati analize	MDK	Oznaka metode
Br. protokola		85/01		
Datum / čas uzorkovanja		23.12.2013.		
Mjesto uzorkovanja		Bunar br. 1		
Temperatura vode (teren)	^{0}C	13.9	25	SMVP.111*
Boja	mg/PtCo skale	0	20	SMVP.120
Ukus		bez		
Miris		bez	bez	
Mutnoća	NTU	0/0.257±0.001	5,0	SMVP.118*
Ukupna tvrdoća	^{o}dH	9.01±0.24		SMEW.2340
Koncentracija vodonikovih jona (ter/lab)	pH jedinica	7.41/7.70±0.28	6,5-9,5	JUS HZ1.111*
Elektroprovodljivost (teren/lab)	µS/cm/20^o C	300/327±2	2500	SMVP.143*
Hloridi	Cl mg/l	3.10	250	ISO 9297:1997
Nitrati	NO_3 mg/l	5.50±0.74	50	SMEW4500NO3B*
Nitriti	NO_2 mg/l	<0.003	0,50	SMEW4500NO2B*
Fluoridi	F µg/l	76.0±9.3	1500	SMVP.326*
Utrošak KMnO4	mg/l O_2	0.24	5	SMVP.134
Amonijak	NH_4 mg/l	0.037±0.005	0,50	SMVP.179*
Suvi ostatak na 180^0	mg/l	212±19		SMVP.129*
Rezidue dezinfekcionih sredstava	mg/l	<0.2		SMVP.295
Gvožđe	Fe µg/l	< 1.0	200,0	SMEW.3500FeB*

IZVJEŠTAJ O ISPITIVANJU BR. 00-20-3535/4/85/01

Mangan	Mn µg/l	< 0.5	50,0	SMEW.3500MnB*
Fenoli	µg/l	<0.5		SMVP.299*
Trihalometani ukupni	µg/l		100,0	SMEW 6232B*
- hloroform	µg/l	<0.001		SMEW 6232 B*
- bromoform	µg/l	<0.001		SMEW 6232 B*
- dibromhlormetan	µg/l	<0.001		SMEW 6232 B*
- bromdihlormetan	µg/l	<0.001		SMEW 6232 B*
Mineralna ulja	µg/l	<0.1	20,0	SMVP.430*
Zasićenost kiseonikom	%	88.1		SMVP.150

*-akreditovana metoda

Načelnik Odjeljenja za lab, dijagnostiku i monitoring
mr sci. Dejan Jančić, dipl. hem.

Dejan Jančić

STRUČNO MIŠLJENJE

Na osnovu rezultata obavljenih laboratorijskih ispitivanja i stručnog razmatranja utvrđeno je da ispitivani uzorak

Vrsta/naziv uzorka	**Voda za piće iz bunara B-1 (Kombinat aluminijuma Podgorica)**
Broj protokola uzorka u CETI	**85/01**

ODGOVARA

uslovima Pravilnika o bližim zahtjevima koje u pogledu bezbjednosti treba da ispunjava voda za piće („Sl. list CG", br. 24/12).

OVLAŠĆENO LICE

Danijela Šuković, spec. toks. hem.

Danijela Šuković

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tel./fax :020/235 441, www.ijzcg.me

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MEST ISO/IEC 17025 : 2006

IZVJEŠTAJ O ISPITIVANJU

Šifra uzorka:

VH3111/04

Redni broj protokola	3111
Veza:	Zahtjev broj 85/01/2 datum 23.12.2013.
Vlasnik uzorka	CENTAR ZA EKOTOKSIKOLOŠKA ISPITIVANJA DOO PODGORICA
Naručilac ispitivanja	CENTAR ZA EKOTOKSIKOLOŠKA ISPITIVANJA DOO PODGORICA
Uvoznik/ zastupnik	

PODACI O MATERIJALU - UZORKU		**PODACI O UZORKOVANJU**	
Vrsta	Voda za piće- kaptirana bunar-hlorisana 85/01	Datum	23.12.2013.
Mjesto		Uzorkovao	Centar za ekotoksikološka ispitivanja
Ostalo			

TRAŽENA ISPITIVANJA:

- ☐ Fizičko-hemijska ispitivanja: a)osnovna analiza b)periodična analiza c)kompletna analiza
  d) Ostalo (navesti parametre)_____
- ☑ **Mikrobiološka analiza**

Datum prijema 23.12.2013. Ispitivanje završeno 26.12.2013.

MIŠLJENJE*: Na osnovu rezultata mikrobioloških analiza ispitivani uzorak:

a) **ODGOVARA**
b) NE ODGOVARA

važećim Propisima.

Napomena

Šef odsijeka za komunalnu higijenu
i humanu ekologiju
Dr med. Ivana Joksimović
spec.higijene

Prilog:
1. **Rezultati ispitivanja – SM-V-04**

IZJAVA
1. Rezultati ispitivanja se odnose samo na ispitivani uzorak
2. Izvještaj se ne smije umnožavati izuzev u cjelosti, bez saglasnosti Instituta za javno zdravlje
3. Zabranjeno je isticanje imena»Institut za javno zdravlje» u tekstu deklaracije i u reklamne svrhe,bez saglasnosti Instituta

*-Mišljenje je van obima akreditacije

ZU INSTITUT ZA JAVNO ZDRAVLJE
CENTAR ZA MEDICINSKU MIKROBIOLOGIJU-CMM
Odjeljenje za sanitarnu mikrobiologiju
Laboratorija za ispitivanje voda

ATCG Li 11.12 MEST ISO/IEC 17025 : 2006

REZULTATI ISPITIVANJA- SM-V-04

Šifra uzorka:

VH 3111 /04

Naziv uzorka	Voda za piće-kaptirani bunar-hlorisana 85/01	
Način pakovanja	Sterilna flaša	
Redni broj protokola	1-2966	
Vrsta analize	Mikrobiološko ispitivanje	
Vrsta laboratorijskog pregleda	Osnovni	
Datum i vrijeme prijema uzorka	23.12.2013.	14^{00} h
Datum završetka analize	26.12.2013.	
Metode ispitivanja	P[1)] Pravilnik o načinu uzimanja uzoraka i metodama za laboratorijsku analizu voda za piće, (Sl.list SFRJ br. 33/87) VMK- validovana metoda kuće ISO metode	

MIKROBIOLOŠKA ISPITIVANJA

R.br.	Parametar ispitivanja	Jedinica mjere (ml)	Rezultat ispitivanja	Metoda ispitivanja
1.	*Escherichia coli* (MPN)	100	0	P[1)] III . 2
2.	Ukupne koliformne bakterije (MPN)	100	0	P[1)] III. 1
3.	*Enterococcus species*	100	nisu nađene	VMK
4.	*Pseudomonas aeruginosa* (MPN)	100	0	P[1)] III.7
5.	Aerobne mezofilne bakterije na 37°C	1	0	ISO 6222:1999
6.	Aerobne mezofilne bakterije na 22°C	1	0	ISO 6222:1999

MIŠLJENJE*

Na osnovu navedenih mikrobioloških ispitivanja, ispitivani uzorak **ODGOVARA** uslovima Pravilnika o bližim zahtjevima koje u pogledu bezbjednosti treba da ispunjava voda za piće ("Sl.list CG" br.24/12)

ISPITIVANJA IZVRŠIO T. Radonović

NAČELNIK ODJELJENJA Dr med. LIDIJA TERIĆ spec. mikrobiologije 21.01.71

DIREKTOR CENTRA

MP

Napomena: Rezultati ispitivanja se odnose samo na ispitivani uzorak
* Van obima akreditacije

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LABORATORIJA ZA EKOTOKSIKOLOŠKA ISPITIVANJA I ZAŠTITU OD ZRAČENJA

IZVJEŠTAJ O ISPITIVANJU

Vrsta ispitivanja	**Fizičko-hemijsko ispitivanje vode za piće**
Broj izvještaja	00-20-3535/4/86/01
Datum izdavanja izvještaja	30.12.2013.

PODACI O PODNOSIOCU ZAHTJEVA	
Naziv podnosioca zahtjeva	D.O.O. MONTENEGRO BONUS - CETINJE
Broj zahtjeva/ugovora	01-1769/K
Datum podnošenja zahtjeva	12.12.2013.

PODACI O UZORKU	
Datum uzorkovanja	23.12.2013.
Vrsta uzorka	**Voda za piće iz bunara br. 2**
Zahtijevano ispitivanje	parametri po Ugovoru
Uzorkovao	Ž. Bulatović, M. Živković
Broj protokola u CETI	86/01

Napomena:

1. **Rezultati ispitivanja se odnose samo na ispitivani uzorak.**
2. **Izvještaj o ispitivanju se može umnožavati isključivo kao cjelina.**

POMOĆNIK DIREKTORA
ZA TEH. I LAB. POSLOVE
Danijela Šuković, spec.toks. hem.
Danijela Šuković

ODJELJENJE ZA LABORATORIJSKU DIJAGNOSTIKU I MONITORING

REZULTATI ANALIZE

Parametar	Jedinica mjere	Rezultati analize	MDK	Oznaka metode
Br. protokola		86/01		
Datum / čas uzorkovanja		23.12.2013.		
Mjesto uzorkovanja		Bunar br. 2		
Temperatura vode (teren)	^{0}C	14.2	25	SMVP.111*
Boja	mg/PtCo skale	0	20	SMVP.120
Ukus		bez		
Miris		bez	bez	
Mutnoća	NTU	0/0.190±0.010	5,0	SMVP.118*
Ukupna tvrdoća	^{0}dH	9.27±0.25		SMEW.2340
Koncentracija vodonikovih jona (ter/lab)	pH jedinica	7.39/7.76±0.28	6,5-9,5	JUS HZ1.111*
Elektroprovodljivost (teren/lab)	µS/cm/20^0 C	308/323±2	2500	SMVP.143*
Hloridi	Cl mg/l	3.10	250	ISO 9297:1997
Nitrati	NO_3 mg/l	6.02±0.81	50	SMEW4500NO3B*
Nitriti	NO_2 mg/l	<0.003	0,50	SMEW4500NO2B*
Fluoridi	F µg/l	76.0±9.3	1500	SMVP.326*
Utrošak KMnO4	mg/l O_2	0.16	5	SMVP.134
Amonijak	NH_4 mg/l	0.037±0.005	0,50	SMVP.179*
Suvi ostatak na 180^0	mg/l	147±13		SMVP.129*
Rezidue dezinfekcionih sredstava	mg/l	<0.2		SMVP.295
Gvožđe	Fe µg/l	< 1.0	200,0	SMEW.3500FeB*
Mangan	Mn µg/l	< 0.5	50,0	SMEW.3500MnB*

IZVJEŠTAJ O ISPITIVANJU BR. 00-20-3535/4/86/01

Fenoli	µg/l	<0.5		SMVP.299*
Trihalometani ukupni	µg/l		100,0	SMEW 6232B*
- hloroform	µg/l	<0.001		SMEW 6232 B*
- bromoform	µg/l	<0.001		SMEW 6232 B*
- dibromhlormetan	µg/l	<0.001		SMEW 6232 B*
- bromdihlormetan	µg/l	<0.001		SMEW 6232 B*
Mineralna ulja	µg/l	<0.1	20,0	SMVP.430*
Zasićenost kiseonikom	%	73.6		SMVP.150

*-akreditovana metoda

Načelnik Odjeljenja za lab, dijagnostiku i monitoring
mr sci. Dejan Jančić, dipl. hem.

Dejan Jancic

STRUČNO MIŠLJENJE

Na osnovu rezultata obavljenih laboratorijskih ispitivanja i stručnog razmatranja utvrđeno je da ispitivani uzorak

Vrsta/naziv uzorka	**Voda za piće iz bunara B-2 (Kombinat aluminijuma Podgorica)**
Broj protokola uzorka u CETI	**86/01**

ODGOVARA

uslovima Pravilnika o bližim zahtjevima koje u pogledu bezbjednosti treba da ispunjava voda za piće („Sl. list CG", br. 24/12).

OVLAŠĆENO LICE

Danijela Šuković, spec. toks. hem.

Danijela Šuković

ZU INSTITUT ZA JAVNO ZDRAVLJE
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IZVJEŠTAJ O ISPITIVANJU

Šifra uzorka:

VH3112/04

Redni broj protokola	3112
Veza:	Zahtjev broj 85/01/2 datum 23.12.2013.
Vlasnik uzorka	CENTAR ZA EKOTOKSIKOLOŠKA ISPITIVANJA DOO PODGORICA
Naručilac ispitivanja	CENTAR ZA EKOTOKSIKOLOŠKA ISPITIVANJA DOO PODGORICA
Uvoznik/ zastupnik	

PODACI O MATERIJALU - UZORKU		**PODACI O UZORKOVANJU**	
Vrsta	Voda za piće- kaptirana bunar-hlorisana 86/01	Datum	23.12.2013.
Mjesto		Uzorkovao	Centar za ekotoksikološka ispitivanja
Ostalo			

TRAŽENA ISPITIVANJA:

- ❑ Fizičko-hemijska ispitivanja: a)osnovna analiza b)periodična analiza c)kompletna analiza
  d) Ostalo (navesti parametre)____
- ❑ **Mikrobiološka analiza**

Datum prijema 23.12.2013. Ispitivanje završeno 26.12.2013.

MIŠLJENJE*: Na osnovu rezultata mikrobioloških analiza ispitivani uzorak:

a) **ODGOVARA**
b) NE ODGOVARA

važećim Propisima.

Napomena

Šef odsijeka za komunalnu higijenu
i humanu ekologiju
Dr med. Ivana Joksimović
spec.higijene

Prilog:
1. **Rezultati ispitivanja – SM-V-04**

IZJAVA
1. Rezultati ispitivanja se odnose samo na ispitivani uzorak
2. Izvještaj se ne smije umnožavati izuzev u cjelosti, bez saglasnosti Instituta za javno zdravlje
3. Zabranjeno je isticanje imena»Institut za javno zdravlje» u tekstu deklaracije i u reklamne svrhe,bez saglasnosti Instituta

*-Mišljenje je van obima akreditacije

ZU INSTITUT ZA JAVNO ZDRAVLJE
CENTAR ZA MEDICINSKU MIKROBIOLOGIJU-CMM
Odjeljenje za sanitarnu mikrobiologiju
Laboratorija za ispitivanje voda

ATCG Li 11.12 MEST ISO/IEC 17025 : 2006

REZULTATI ISPITIVANJA- SM-V-04

Šifra uzorka:

VH 3112 /04

Naziv uzorka	Voda za piće-kaptirani bunar-hlorisana 86/01	
Način pakovanja	Sterilna flaša	
Redni broj protokola	1-2967	
Vrsta analize	Mikrobiološko ispitivanje	
Vrsta laboratorijskog pregleda	Osnovni	
Datum i vrijeme prijema uzorka	23.12.2013.	14^{00} h
Datum završetka analize	26.12.2013.	
Metode ispitivanja	P[1)] Pravilnik o načinu uzimanja uzoraka i metodama za laboratorijsku analizu voda za piće, (Sl.list SFRJ br. 33/87) VMK- validovana metoda kuće ISO metode	

MIKROBIOLOŠKA ISPITIVANJA

R.br.	Parametar ispitivanja	Jedinica mjere (ml)	Rezultat ispitivanja	Metoda ispitivanja
1.	*Escherichia coli* (MPN)	100	0	P[1)] III . 2
2.	Ukupne koliformne bakterije (MPN)	100	0	P[1)] III. 1
3.	*Enterococcus species*	100	nisu nađene	VMK
4.	*Pseudomonas aeruginosa* (MPN)	100	0	P[1)] III.7
5.	Aerobne mezofilne bakterije na 37°C	1	0	ISO 6222:1999
6.	Aerobne mezofilne bakterije na 22°C	1	0	ISO 6222:1999

MIŠLJENJE*

Na osnovu navedenih mikrobioloških ispitivanja, ispitivani uzorak **ODGOVARA** uslovima Pravilnika o bližim zahtjevima koje u pogledu bezbjednosti treba da ispunjava voda za piće ("Sl.list CG" br.24/12)

ISPITIVANJA IZVRŠIO — Dr Ljubica Radunović, spec. mikrobiologije, A. Radunović

NAČELNIK ODJELJENJA — mr Ljubica Terić, spec. mikrobiologijom

DIREKTOR CENTRA

MP

Napomena: Rezultati ispitivanja se odnose samo na ispitivani uzorak
* Van obima akreditacije

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LABORATORIJA ZA EKOTOKSIKOLOŠKA ISPITIVANJA I ZAŠTITU OD ZRAČENJA

IZVJEŠTAJ O ISPITIVANJU

Vrsta ispitivanja	**Fizičko-hemijsko ispitivanje vode za piće**
Broj izvještaja	00-20-3535/4/87/01
Datum izdavanja izvještaja	30.12.2013.

PODACI O PODNOSIOCU ZAHTJEVA	
Naziv podnosioca zahtjeva	D.O.O. MONTENEGRO BONUS - CETINJE
Broj zahtjeva/ugovora	01-1769/K
Datum podnošenja zahtjeva	12.12.2013.

PODACI O UZORKU	
Datum uzorkovanja	23.12.2013.
Vrsta uzorka	**Voda za piće iz bunara br. 3**
Zahtijevano ispitivanje	parametri po Ugovoru
Uzorkovao	Ž. Bulatović, M. Živković
Broj protokola u CETI	87/01

Napomena:

1. **Rezultati ispitivanja se odnose samo na ispitivani uzorak.**
2. **Izvještaj o ispitivanju se može umnožavati isključivo kao cjelina.**

POMOĆNIK DIREKTORA
ZA TEH. I LAB. POSLOVE
Danijela Šuković, spec.toks. hem.

Danijela Šuković

IZVJEŠTAJ O ISPITIVANJU BR. 00-20-3535/4/87/01

ODJELJENJE ZA LABORATORIJSKU DIJAGNOSTIKU I MONITORING

REZULTATI ANALIZE

Parametar	Jedinica mjere	Rezultati analize	MDK	Oznaka metode
Br. protokola		87/01		
Datum / čas uzorkovanja		23.12.2013.		
Mjesto uzorkovanja		Bunar br. 3		
Temperatura vode (teren)	^{0}C	14.3	25	SMVP.111*
Boja	mg/PtCo skale	1	20	SMVP.120
Ukus		bez		
Miris		bez	bez	
Mutnoća	NTU	0/0.725±0.040	5,0	SMVP.118*
Ukupna tvrdoća	^{o}dH	10.33±0.28		SMEW.2340
Koncentracija vodonikovih jona (ter/lab)	pH jedinica	7.34/7.77±0.28	6,5-9,5	JUS HZ1.111*
Elektroprovodljivost (teren/lab)	µS/cm/20^o C	344/357±2	2500	SMVP.143*
Hloridi	Cl mg/l	4.82	250	ISO 9297:1997
Nitrati	NO_3 mg/l	7.82±1.05	50	SMEW4500NO3B*
Nitriti	NO_2 mg/l	<0.003	0,50	SMEW4500NO2B*
Fluoridi	F µg/l	91.0±11.2	1500	SMVP.326*
Utrošak KMnO4	mg/l O_2	0.24	5	SMVP.134
Amonijak	NH_4 mg/l	0.050±0.007	0,50	SMVP.179*
Suvi ostatak na 180^0	mg/l	195±18		SMVP.129*
Rezidue dezinfekcionih sredstava	mg/l	<0.2		SMVP.295
Gvožđe	Fe µg/l	< 1.0	200,0	SMEW.3500FeB*
Mangan	Mn µg/l	< 0.5	50,0	SMEW.3500MnB*
Fenoli	µg/l	<0.5		SMVP.299*

Trihalometani ukupni	µg/l		100,0	SMEW 6232B*
- hloroform	µg/l	<0.001		SMEW 6232 B*
- bromoform	µg/l	<0.001		SMEW 6232 B*
- dibromhlormetan	µg/l	<0.001		SMEW 6232 B*
- bromdihlormetan	µg/l	<0.001		SMEW 6232 B*
Mineralna ulja	µg/l	<0.1	20,0	SMVP.430*
Zasićenost kiseonikom	%	75.0		SMVP.150

*-akreditovana metoda

Načelnik Odjeljenja za lab, dijagnostiku i monitoring
mr sci. Dejan Jančić, dipl. hem.

Dejan Jančić

STRUČNO MIŠLJENJE

Na osnovu rezultata obavljenih laboratorijskih ispitivanja i stručnog razmatranja utvrđeno je da ispitivani uzorak

Vrsta/naziv uzorka	**Voda za piće iz bunara B-3 (Kombinat aluminijuma Podgorica)**
Broj protokola uzorka u CETI	**87/01**

ODGOVARA

uslovima Pravilnika o bližim zahtjevima koje u pogledu bezbjednosti treba da ispunjava voda za piće („Sl. list CG", br. 24/12).

OVLAŠĆENO LICE

Danijela Šuković, spec. toks. hem.

Danijela Šuković

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IZVJEŠTAJ O ISPITIVANJU

Šifra uzorka:

VH3113/04

Redni broj protokola	3113
Veza:	Zahtjev broj 85/01/2 datum 23.12.2013.
Vlasnik uzorka	CENTAR ZA EKOTOKSIKOLOŠKA ISPITIVANJA DOO PODGORICA
Naručilac ispitivanja	CENTAR ZA EKOTOKSIKOLOŠKA ISPITIVANJA DOO PODGORICA
Uvoznik/ zastupnik	

PODACI O MATERIJALU - UZORKU		**PODACI O UZORKOVANJU**	
Vrsta	Voda za piće- kaptirana bunar-hlorisana 87/01	Datum	23.12.2013.
Mjesto		Uzorkovao	Centar za ekotoksikološka ispitivanja
Ostalo			

TRAŽENA ISPITIVANJA:

- ☐ Fizičko-hemijska ispitivanja: a)osnovna analiza b)periodična analiza c)kompletna analiza
  d) Ostalo (navesti parametre)_____
- ☑ **Mikrobiološka analiza**

Datum prijema 23.12.2013. Ispitivanje završeno 26.12.2013.

MIŠLJENJE*: Na osnovu rezultata mikrobioloških analiza ispitivani uzorak:

a) **ODGOVARA**
b) NE ODGOVARA

važećim Propisima.

Napomena

Šef odsijeka za komunalnu higijenu
i humanu ekologiju
Dr med. Ivana Joksimović
spec.higijene

Prilog:
1. **Rezultati ispitivanja – SM-V-04**

IZJAVA
1. Rezultati ispitivanja se odnose samo na ispitivani uzorak
2. Izvještaj se ne smije umnožavati izuzev u cjelosti, bez saglasnosti Instituta za javno zdravlje
3. Zabranjeno je isticanje imena»Institut za javno zdravlje» u tekstu deklaracije i u reklamne svrhe,bez saglasnosti Instituta

*-Mišljenje je van obima akreditacije

ZU INSTITUT ZA JAVNO ZDRAVLJE
CENTAR ZA MEDICINSKU MIKROBIOLOGIJU-CMM
Odjeljenje za sanitarnu mikrobiologiju
Laboratorija za ispitivanje voda

ATCG Li 11.12 MEST ISO/IEC 17025 : 2006

REZULTATI ISPITIVANJA- SM-V-04

Šifra uzorka:

VH 3113 /04

Naziv uzorka	Voda za piće-kaptirani bunar-hlorisana 87/01	
Način pakovanja	Sterilna flaša	
Redni broj protokola	1-2968	
Vrsta analize	Mikrobiološko ispitivanje	
Vrsta laboratorijskog pregleda	Osnovni	
Datum i vrijeme prijema uzorka	23.12.2013.	14^{00} h
Datum završetka analize	26.12.2013.	
Metode ispitivanja	P[1)] Pravilnik o načinu uzimanja uzoraka i metodama za laboratorijsku analizu voda za piće, (Sl.list SFRJ br. 33/87) VMK- validovana metoda kuće ISO metode	

MIKROBIOLOŠKA ISPITIVANJA

R.br.	Parametar ispitivanja	Jedinica mjere (ml)	Rezultat ispitivanja	Metoda ispitivanja
1.	*Escherichia coli* (MPN)	100	0	P[1)] III . 2
2.	Ukupne koliformne bakterije (MPN)	100	0	P[1)] III. 1
3.	*Enterococcus species*	100	nisu nađene	VMK
4.	*Pseudomonas aeruginosa* (MPN)	100	0	P[1)] III.7
5.	Aerobne mezofilne bakterije na 37°C	1	0	ISO 6222:1999
6.	Aerobne mezofilne bakterije na 22°C	1	0	ISO 6222:1999

MIŠLJENJE*

Na osnovu navedenih mikrobioloških ispitivanja, ispitivani uzorak **ODGOVARA** uslovima Pravilnika o bližim zahtjevima koje u pogledu bezbjednosti treba da ispunjava voda za piće ("Sl.list CG" br.24/12)

ISPITIVANJA IZVRŠIO Dr Tatjana Radunović SPECIJALISTA MIKROBIOLOGIJE J. Radunović

NAČELNIK ODJELJENJA Dr med LJUBICA TERIĆ spec. mikrobiologijom 2104

DIREKTOR CENTRA

MP

Napomena: Rezultati ispitivanja se odnose samo na ispitivani uzorak
* Van obima akreditacije

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LLC CENTER FOR
ECOTOXICOLOGICAL RESEARCH PODGORICA

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Li 08.03
MEST ISO/IEC 17025 : 2006

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CETI 5100.101.01

LABORATORIJA ZA EKOTOKSIKOLOŠKA ISPITIVANJA I ZAŠTITU OD ZRAČENJA

IZVJEŠTAJ O ISPITIVANJU

Vrsta ispitivanja	**Fizičko-hemijsko ispitivanje vode za piće**
Broj izvještaja	00-20-3535/4/88/01
Datum izdavanja izvještaja	30.12.2013.

PODACI O PODNOSIOCU ZAHTJEVA	
Naziv podnosioca zahtjeva	D.O.O. MONTENEGRO BONUS - CETINJE
Broj zahtjeva/ugovora	01-1769/K
Datum podnošenja zahtjeva	12.12.2013.

PODACI O UZORKU	
Datum uzorkovanja	23.12.2013.
Vrsta uzorka	**Voda za piće iz bunara br. 7**
Zahtijevano ispitivanje	parametri po Ugovoru
Uzorkovao	Ž. Bulatović, M. Živković
Broj protokola u CETI	88/01

Napomena:

1. **Rezultati ispitivanja se odnose samo na ispitivani uzorak.**
2. **Izvještaj o ispitivanju se može umnožavati isključivo kao cjelina.**

POMOĆNIK DIREKTORA
ZA TEH. I LAB. POSLOVE
Danijela Šuković, spec.toks. hem.
Danijela Šuković

IZVJEŠTAJ O ISPITIVANJU BR. 00-20-3535/4/88/01

ODJELJENJE ZA LABORATORIJSKU DIJAGNOSTIKU I MONITORING

REZULTATI ANALIZE

Parametar	Jedinica mjere	Rezultati analize	MDK	Oznaka metode
Br. protokola		88/01		
Datum / čas uzorkovanja		23.12.2013.		
Mjesto uzorkovanja		Bunar br. 7		
Temperatura vode (teren)	^{0}C	14.2	25	SMVP.111*
Boja	mg/PtCo skale	1	20	SMVP.120
Ukus		bez		
Miris		bez	bez	
Mutnoća	NTU	0/0.207±0.011	5,0	SMVP.118*
Ukupna tvrdoća	^{o}dH	9.29±0.25		SMEW.2340
Koncentracija vodonikovih jona (ter/lab)	pH jedinica	7.37/7.84±0.29	6,5-9,5	JUS HZ1.111*
Elektroprovodljivost (teren/lab)	µS/cm/20^o C	306/320±2	2500	SMVP.143*
Hloridi	Cl mg/l	3.10	250	ISO 9297:1997
Nitrati	NO_3 mg/l	6.35±0.86	50	SMEW4500NO3B*
Nitriti	NO_2 mg/l	<0.003	0,50	SMEW4500NO2B*
Fluoridi	F µg/l	82.0±10.1	1500	SMVP.326*
Utrošak KMnO4	mg/l O_2	0.39	5	SMVP.134
Amonijak	NH_4 mg/l	0.040±0.006	0,50	SMVP.179*
Suvi ostatak na 180^0	mg/l	165±15		SMVP.129*
Rezidue dezinfekcionih sredstava	mg/l	<0.2		SMVP.295
Gvožđe	Fe µg/l	< 1.0	200,0	SMEW.3500FeB*
Mangan	Mn µg/l	< 0.5	50,0	SMEW.3500MnB*
Fenoli	µg/l	<0.5		SMVP.299*

IZVJEŠTAJ O ISPITIVANJU BR. 00-20-3535/4/88/01

ODJELJENJE ZA LABORATORIJSKU DIJAGNOSTIKU I MONITORING

REZULTATI ANALIZE

Parametar	Jedinica mjere	Rezultati analize	MDK	Oznaka metode
Br. protokola		88/01		
Datum / čas uzorkovanja		23.12.2013.		
Mjesto uzorkovanja		Bunar br. 7		
Temperatura vode (teren)	^{0}C	14.2	25	SMVP.111*
Boja	mg/PtCo skale	1	20	SMVP.120
Ukus		bez		
Miris		bez	bez	
Mutnoća	NTU	0/0.207±0.011	1,0	SMVP.118*
Ukupna tvrdoća	^{o}dH	9.29±0.25		SMEW.2340
Koncentracija vodonikovih jona (ter/lab)	pH jedinica	7.37/7.84±0.29	6,5-9,5	JUS HZ1.111*
Elektroprovodljivost (teren/lab)	µS/cm/20^o C	306/320±2	2500	SMVP.143*
Hloridi	Cl mg/l	3.10	250	ISO 9297:1997
Nitrati	NO_3 mg/l	6.35±0.86	50	SMEW4500NO3B*
Nitriti	NO_2 mg/l	<0.003	0,50	SMEW4500NO2B*
Fluoridi	F µg/l	82.0±10.1	1500	SMVP.326*
Utrošak KMnO4	mg/l O_2	0.39	5	SMVP.134
Amonijak	NH_4 mg/l	0.040±0.006	0,50	SMVP.179*
Suvi ostatak na 180^0	mg/l	165±15		SMVP.129*
Rezidue dezinfekcionih sredstava	mg/l	<0.2		SMVP.295
Gvožđe	Fe µg/l	< 1.0	200,0	SMEW.3500FeB*
Mangan	Mn µg/l	< 0.5	50,0	SMEW.3500MnB*
Fenoli	µg/l	<0.5		SMVP.299*

IZVJEŠTAJ O ISPITIVANJU BR. 00-20-3535/4/88/01

Trihalometani ukupni	µg/l		100,0	SMEW 6232B*
- hloroform	µg/l	<0.001		SMEW 6232 B*
- bromoform	µg/l	<0.001		SMEW 6232 B*
- dibromhlormetan	µg/l	<0.001		SMEW 6232 B*
- bromdihlormetan	µg/l	<0.001		SMEW 6232 B*
Mineralna ulja	µg/l	<0.1	20,0	SMVP.430*
Zasićenost kiseonikom	%	64.6		SMVP.150

*-akreditovana metoda

Načelnik Odjeljenja za lab, dijagnostiku i monitoring
mr sci. Dejan Jančić, dipl. hem.

Dejan Jančić

STRUČNO MIŠLJENJE

Na osnovu rezultata obavljenih laboratorijskih ispitivanja i stručnog razmatranja utvrđeno je dá ispitivani uzorak

Vrsta/naziv uzorka	**Voda za piće iz bunara B-7 (Kombinat aluminijuma Podgorica)**
Broj protokola uzorka u CETI	**88/01**

ODGOVARA

uslovima Pravilnika o bližim zahtjevima koje u pogledu bezbjednosti treba da ispunjava voda za piće („Sl. list CG", br. 24/12).

OVLAŠĆENO LICE

Danijela Šuković, spec. toks. hem.

ZU INSTITUT ZA JAVNO ZDRAVLJE
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tel./fax :020/235 441, www.ijzcg.me

ATCG
Li 11.12
MEST ISO/IEC 17025 : 2006

IZVJEŠTAJ O ISPITIVANJU

Šifra uzorka:

VH3114/04

Redni broj protokola	3114
Veza:	Zahtjev broj 85/01/2 datum 23.12.2013.
Vlasnik uzorka	CENTAR ZA EKOTOKSIKOLOŠKA ISPITIVANJA DOO PODGORICA
Naručilac ispitivanja	CENTAR ZA EKOTOKSIKOLOŠKA ISPITIVANJA DOO PODGORICA
Uvoznik/ zastupnik	

PODACI O MATERIJALU - UZORKU		**PODACI O UZORKOVANJU**	
Vrsta	Voda za piće- kaptirana bunar-hlorisana 88/01	Datum	23.12.2013.
Mjesto		Uzorkovao	Centar za ekotoksikološka ispitivanja
Ostalo			

TRAŽENA ISPITIVANJA:

- ☐ Fizičko-hemijska ispitivanja: a)osnovna analiza b)periodična analiza c)kompletna analiza
- d) Ostalo (navesti parametre)_____
- ☑ **Mikrobiološka analiza**

Datum prijema	23.12.2013.	Ispitivanje završeno	26.12.2013.

MIŠLJENJE*: Na osnovu rezultata mikrobioloških analiza ispitivani uzorak:

a) **ODGOVARA**
b) NE ODGOVARA

važećim Propisima.

Napomena

Šef odsijeka za komunalnu higijenu
i humanu ekologiju
Dr med. Ivana Joksimović
spec.higijene

Prilog:
1. **Rezultati ispitivanja – SM-V-04**

IZJAVA
1. Rezultati ispitivanja se odnose samo na ispitivani uzorak
2. Izvještaj se ne smije umnožavati izuzev u cjelosti, bez saglasnosti Instituta za javno zdravlje
3. Zabranjeno je isticanje imena»Institut za javno zdravlje» u tekstu deklaracije i u reklamne svrhe,bez saglasnosti Instituta

*-Mišljenje je van obima akreditacije

ZU INSTITUT ZA JAVNO ZDRAVLJE
CENTAR ZA MEDICINSKU MIKROBIOLOGIJU-CMM
Odjeljenje za sanitarnu mikrobiologiju
Laboratorija za ispitivanje voda

ATCG Li 11.12 MEST ISO/IEC 17025 : 2006

REZULTATI ISPITIVANJA- SM-V-04

Šifra uzorka:

VH 3114 /04

Naziv uzorka	Voda za piće-kaptirani bunar-hlorisana 88/01	
Način pakovanja	Sterilna flaša	
Redni broj protokola	1-2969	
Vrsta analize	Mikrobiološko ispitivanje	
Vrsta laboratorijskog pregleda	Osnovni	
Datum i vrijeme prijema uzorka	23.12.2013.	14^{00} h
Datum završetka analize	26.12.2013.	
Metode ispitivanja	P[1)] Pravilnik o načinu uzimanja uzoraka i metodama za laboratorijsku analizu voda za piće, (Sl.list SFRJ br. 33/87) VMK- validovana metoda kuće ISO metode	

MIKROBIOLOŠKA ISPITIVANJA

R.br.	Parametar ispitivanja	Jedinica mjere (ml)	Rezultat ispitivanja	Metoda ispitivanja
1.	*Escherichia coli* (MPN)	100	0	P[1)] III . 2
2.	Ukupne koliformne bakterije (MPN)	100	0	P[1)] III. 1
3.	*Enterococcus species*	100	nisu nađene	VMK
4.	*Pseudomonas aeruginosa* (MPN)	100	0	P[1)] III.7
5.	Aerobne mezofilne bakterije na 37°C	1	0	ISO 6222:1999
6.	Aerobne mezofilne bakterije na 22°C	1	0	ISO 6222:1999

MIŠLJENJE*

Na osnovu navedenih mikrobioloških ispitivanja, ispitivani uzorak **ODGOVARA** uslovima Pravilnika o bližim zahtjevima koje u pogledu bezbjednosti treba da ispunjava voda za piće ("Sl.list CG" br.24/12)

ISPITIVANJA IZVRŠIO | **NAČELNIK ODJELJENJA** | **DIREKTOR CENTRA**

Dr med. LJUBICA TERIĆ

MP

Napomena: Rezultati ispitivanja se odnose samo na ispitivani uzorak
* Van obima akreditacije

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CETI 5100.101.01

LABORATORIJA ZA EKOTOKSIKOLOŠKA ISPITIVANJA I ZAŠTITU OD ZRAČENJA

IZVJEŠTAJ O ISPITIVANJU

Vrsta ispitivanja	**Fizičko-hemijsko ispitivanje vode za piće**
Broj izvještaja	00-20-3535/4/89/01
Datum izdavanja izvještaja	30.12.2013.

PODACI O PODNOSIOCU ZAHTJEVA	
Naziv podnosioca zahtjeva	D.O.O. MONTENEGRO BONUS - CETINJE
Broj zahtjeva/ugovora	01-1769/K
Datum podnošenja zahtjeva	12.12.2013.

PODACI O UZORKU	
Datum uzorkovanja	23.12.2013.
Vrsta uzorka	**Voda za piće iz bunara br. 8**
Zahtijevano ispitivanje	parametri po Ugovoru
Uzorkovao	Ž. Bulatović, M. Živković
Broj protokola u CETI	89/01

Napomena:

1. **Rezultati ispitivanja se odnose samo na ispitivani uzorak.**
2. **Izvještaj o ispitivanju se može umnožavati isključivo kao cjelina.**

POMOĆNIK DIREKTORA
ZA TEH. I LAB. POSLOVE
Danijela Šuković, spec.toks. hem.

Danijela Šuković

IZVJEŠTAJ O ISPITIVANJU BR. 00-20-3535/4/89/01

ODJELJENJE ZA LABORATORIJSKU DIJAGNOSTIKU I MONITORING

REZULTATI ANALIZE

Parametar	Jedinica mjere	Rezultati analize	MDK	Oznaka metode
Br. protokola		89/01		
Datum / čas uzorkovanja		23.12.2013.		
Mjesto uzorkovanja		Bunar br. 8		
Temperatura vode (teren)	^{0}C	16.2	25	SMVP.111*
Boja	mg/PtCo skale	1	20	SMVP.120
Ukus		bez		
Miris		bez	bez	
Mutnoća	NTU	0/0.178±0.010	5,0	SMVP.118*
Ukupna tvrdoća	^{o}dH	8.85±0.24		SMEW.2340
Koncentracija vodonikovih jona (ter/lab)	pH jedinica	7.41/7.90±0.29	6,5-9,5	JUS HZ1.111*
Elektroprovodljivost (teren/lab)	µS/cm/20^o C	281/307±2	2500	SMVP.143*
Hloridi	Cl mg/l	2.41	250	ISO 9297:1997
Nitrati	NO_3 mg/l	4.49±0.61	50	SMEW4500NO3B*
Nitriti	NO_2 mg/l	<0.003	0,50	SMEW4500NO2B*
Fluoridi	F µg/l	88.0±10.8	1500	SMVP.326*
Utrošak KMnO4	mg/l O_2	0.24	5	SMVP.134
Amonijak	NH_4 mg/l	0.034±0.005	0,50	SMVP.179*
Suvi ostatak na 180^0	mg/l	190±17		SMVP.129*
Rezidue dezinfekcionih sredstava	mg/l	<0.2		SMVP.295
Gvožđe	Fe µg/l	< 1.0	200,0	SMEW.3500FeB*
Mangan	Mn µg/l	< 0.5	50,0	SMEW.3500MnB*
Fenoli	µg/l	<0.5		SMVP.299*

IZVJEŠTAJ O ISPITIVANJU BR. 00-20-3535/4/89/01

Trihalometani ukupni	µg/l		100,0	SMEW 6232B*
- hloroform	µg/l	<0.001		SMEW 6232 B*
- bromoform	µg/l	<0.001		SMEW 6232 B*
- dibromhlormetan	µg/l	<0.001		SMEW 6232 B*
- bromdihlormetan	µg/l	<0.001		SMEW 6232 B*
Mineralna ulja	µg/l	<0.1	20,0	SMVP.430*
Zasićenost kiseonikom	%	76.8		SMVP.150

*-akreditovana metoda

Načelnik Odjeljenja za lab, dijagnostiku i monitoring
mr sci. Dejan Jančić, dipl. hem.

Dejan Jančić

STRUČNO MIŠLJENJE

Na osnovu rezultata obavljenih laboratorijskih ispitivanja i stručnog razmatranja utvrđeno je da ispitivani uzorak

Vrsta/naziv uzorka	**Voda za piće iz bunara B-8 (Kombinat aluminijuma Podgorica)**
Broj protokola uzorka u CETI	**89/01**

ODGOVARA

uslovima Pravilnika o bližim zahtjevima koje u pogledu bezbjednosti treba da ispunjava voda za piće („Sl. list CG", br. 24/12).

OVLAŠĆENO LICE

Danijela Šuković, spec. toks. hem.

Danijela Šuković

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tel./fax :020/235 441, www.ijzcg.me

ATCG
Li 11.12
MEST ISO/IEC 17025 : 2006

IZVJEŠTAJ O ISPITIVANJU

Šifra uzorka:

VH3115/04

Redni broj protokola	3115
Veza:	Zahtjev broj 85/01/2 datum 23.12.2013.
Vlasnik uzorka	CENTAR ZA EKOTOKSIKOLOŠKA ISPITIVANJA DOO PODGORICA
Naručilac ispitivanja	CENTAR ZA EKOTOKSIKOLOŠKA ISPITIVANJA DOO PODGORICA
Uvoznik/ zastupnik	

PODACI O MATERIJALU - UZORKU		**PODACI O UZORKOVANJU**	
Vrsta	Voda za piće- kaptirana bunar-hlorisana 89/01	Datum	23.12.2013.
Mjesto		Uzorkovao	Centar za ekotoksikološka ispitivanja
Ostalo			

TRAŽENA ISPITIVANJA:

- ☐ Fizičko-hemijska ispitivanja: a)osnovna analiza b)periodična analiza c)kompletna analiza
  d) Ostalo (navesti parametre)_____
- ☑ **Mikrobiološka analiza**

Datum prijema	23.12.2013.	Ispitivanje završeno	26.12.2013.

MIŠLJENJE*: Na osnovu rezultata mikrobioloških analiza ispitivani uzorak:

a) **ODGOVARA**
b) NE ODGOVARA

važećim Propisima.

Napomena

Šef odsijeka za komunalnu higijenu
i humanu ekologiju
Dr med. Ivana Joksimović
spec.higijene

Prilog:
1. **Rezultati ispitivanja – SM-V-04**

IZJAVA
1. Rezultati ispitivanja se odnose samo na ispitivani uzorak
2. Izvještaj se ne smije umnožavati izuzev u cjelosti, bez saglasnosti Instituta za javno zdravlje
3. Zabranjeno je isticanje imena»Institut za javno zdravlje» u tekstu deklaracije i u reklamne svrhe,bez saglasnosti Instituta

*-Mišljenje je van obima akreditacije

ZU INSTITUT ZA JAVNO ZDRAVLJE
CENTAR ZA MEDICINSKU MIKROBIOLOGIJU-CMM
Odjeljenje za sanitarnu mikrobiologiju
Laboratorija za ispitivanje voda

ATCG Li 11.12 MEST ISO/IEC 17025 : 2006

REZULTATI ISPITIVANJA- SM-V-04

Šifra uzorka:

VH 3115 /04

Naziv uzorka	Voda za piće-kaptirani bunar-hlorisana 89/01	
Način pakovanja	Sterilna flaša	
Redni broj protokola	1-2970	
Vrsta analize	Mikrobiološko ispitivanje	
Vrsta laboratorijskog pregleda	Osnovni	
Datum i vrijeme prijema uzorka	23.12.2013.	14^{00} h
Datum završetka analize	26.12.2013.	
Metode ispitivanja	P[1)] Pravilnik o načinu uzimanja uzoraka i metodama za laboratorijsku analizu voda za piće, (Sl.list SFRJ br. 33/87) VMK- validovana metoda kuće ISO metode	

MIKROBIOLOŠKA ISPITIVANJA

R.br.	Parametar ispitivanja	Jedinica mjere (ml)	Rezultat ispitivanja	Metoda ispitivanja
1.	*Escherichia coli* (MPN)	100	0	P[1)] III . 2
2.	Ukupne koliformne bakterije (MPN)	100	0	P[1)] III. 1
3.	*Enterococcus species*	100	nisu nađene	VMK
4.	*Pseudomonas aeruginosa* (MPN)	100	0	P[1)] III.7
5.	Aerobne mezofilne bakterije na 37°C	1	0	ISO 6222:1999
6.	Aerobne mezofilne bakterije na 22°C	1	0	ISO 6222:1999

MIŠLJENJE*

Na osnovu navedenih mikrobioloških ispitivanja, ispitivani uzorak **ODGOVARA** uslovima Pravilnika o bližim zahtjevima koje u pogledu bezbjednosti treba da ispunjava voda za piće ("Sl.list CG" br.24/12)

Dr Tatjana Radunović SPEC. MIKROBIOLOGIJE PARAZITOLOGIJE

ISPITIVANJA IZVRŠIO

T. Radunović

Dr med LJUBICA TERIĆ spec. mikrobiologije i parazitologije

NAČELNIK ODJELJENJA

DIREKTOR CENTRA

MP

Napomena: Rezultati ispitivanja se odnose samo na ispitivani uzorak
* Van obima akreditacije

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81000 PODGORICA, PUT RADOMIRA IVANOVIĆA 2
LLC CENTER FOR
ECOTOXICOLOGICAL RESEARCH PODGORICA

ATCG
Li 08.03
MEST ISO/IEC 17025 : 2006

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CETI 5100.101.01

LABORATORIJA ZA EKOTOKSIKOLOŠKA ISPITIVANJA I ZAŠTITU OD ZRAČENJA

IZVJEŠTAJ O ISPITIVANJU

Vrsta ispitivanja	**Fizičko-hemijsko ispitivanje vode za piće**
Broj izvještaja	00-20-3535/4/90/01
Datum izdavanja izvještaja	30.12.2013.

PODACI O PODNOSIOCU ZAHTJEVA	
Naziv podnosioca zahtjeva	D.O.O. MONTENEGRO BONUS - CETINJE
Broj zahtjeva/ugovora	01-1769/K
Datum podnošenja zahtjeva	12.12.2013.

PODACI O UZORKU	
Datum uzorkovanja	23.12.2013.
Vrsta uzorka	**Voda za piće iz bunara br. 9**
Zahtijevano ispitivanje	parametri po Ugovoru
Uzorkovao	Ž. Bulatović, M. Živković
Broj protokola u CETI	90/01

Napomena:

1. **Rezultati ispitivanja se odnose samo na ispitivani uzorak.**
2. **Izvještaj o ispitivanju se može umnožavati isključivo kao cjelina.**

POMOĆNIK DIREKTORA
ZA TEH. I LAB. POSLOVE
Danijela Šuković, spec.toks. hem.

CETI doo
Jamela Šuković

ODJELJENJE ZA LABORATORIJSKU DIJAGNOSTIKU I MONITORING

REZULTATI ANALIZE

Parametar	Jedinica mjere	Rezultati analize	MDK	Oznaka metode
Br. protokola		90/01		
Datum / čas uzorkovanja		23.12.2013.		
Mjesto uzorkovanja		Bunar br. 9		
Temperatura vode (teren)	^{0}C	14.4	25	SMVP.111*
Boja	mg/PtCo skale	0	20	SMVP.120
Ukus		bez		
Miris		bez	bez	
Mutnoća	NTU	0/0.163±0.009	5,0	SMVP.118*
Ukupna tvrdoća	^{o}dH	8.84±0.24		SMEW.2340
Koncentracija vodonikovih jona (ter/lab)	pH jedinica	7.31/7.93±0.29	6,5-9,5	JUS HZ1.111*
Elektroprovodljivost (teren/lab)	µS/cm/20^o C	291/319±2	2500	SMVP.143*
Hloridi	Cl mg/l	3.10	250	ISO 9297:1997
Nitrati	NO_3 mg/l	5.95±0.80	50	SMEW4500NO3B*
Nitriti	NO_2 mg/l	<0.003	0,50	SMEW4500NO2B*
Fluoridi	F µg/l	89.0±10.9	1500	SMVP.326*
Utrošak KMnO4	mg/l O_2	134±12	5	SMVP.134
Amonijak	NH_4 mg/l	0.034±0.005	0,50	SMVP.179*
Suvi ostatak na 180^0	mg/l	134±12		SMVP.129*
Rezidue dezinfekcionih sredstava	mg/l	<0.2		SMVP.295
Gvožđe	Fe µg/l	< 1.0	200,0	SMEW.3500FeB*

Mangan	Mn µg/l	< 0.5	50,0	SMEW.3500MnB*
Fenoli	µg/l	<0.5		SMVP.299*
Trihalometani ukupni	µg/l		100,0	SMEW 6232B*
- hloroform	µg/l	<0.001		SMEW 6232 B*
- bromoform	µg/l	<0.001		SMEW 6232 B*
- dibromhlormetan	µg/l	<0.001		SMEW 6232 B*
- bromdihlormetan	µg/l	<0.001		SMEW 6232 B*
Mineralna ulja	µg/l	<0.1	20,0	SMVP.430*
Zasićenost kiseonikom	%	81.7		SMVP.150

*-akreditovana metoda

Načelnik Odjeljenja za lab, dijagnostiku i monitoring
mr sci. Dejan Jančić, dipl. hem.

Dejan Jančić

STRUČNO MIŠLJENJE

Na osnovu rezultata obavljenih laboratorijskih ispitivanja i stručnog razmatranja utvrđeno je da ispitivani uzorak

Vrsta/naziv uzorka	**Voda za piće iz bunara B-9 (Kombinat aluminijuma Podgorica)**
Broj protokola uzorka u CETI	**90/01**

ODGOVARA

uslovima Pravilnika o bližim zahtjevima koje u pogledu bezbjednosti treba da ispunjava voda za piće („Sl. list CG", br. 24/12).

OVLAŠĆENO LICE

Danijela Šuković, spec. toks. hem.

Danijela Šuković

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ATCG
Li 11.12
MEST ISO/IEC 17025 : 2006

IZVJEŠTAJ O ISPITIVANJU

Šifra uzorka:

VH3116/04

Redni broj protokola 3116

Veza: Zahtjev broj 85/01/2 datum 23.12.2013

Vlasnik uzorka CENTAR ZA EKOTOKSIKOLOŠKA ISPITIVANJA DOO PODGORICA

Naručilac ispitivanja CENTAR ZA EKOTOKSIKOLOŠKA ISPITIVANJA DOO PODGORICA

Uvoznik/ zastupnik

PODACI O MATERIJALU - UZORKU		**PODACI O UZORKOVANJU**	
Vrsta	Voda za piće – kaptirana bunar – hlorisana 90/01	Datum	23.12.2013
Mjesto		Uzorkovao ispitivanja	Centar za ekotoksikološka
Ostalo			

TRAŽENA ISPITIVANJA:

- ☐ Fizičko-hemijska ispitivanja: a)osnovna analiza b)periodična analiza c)kompletna analiza
- d) Ostalo (navesti parametre)_____
- ☑ **Mikrobiološka analiza**

Datum prijema 23.12.2013 Ispitivanje završeno 30.12.2013

MIŠLJENJE*: Na osnovu rezultata mikrobioloških analiza ispitivani uzorak:

a) ODGOVARA

b) NE ODGOVARA

važećim Propisima.

Napomena

Šef odsijeka za komunalnu higijenu
i humanu ekologiju
Dr med. Ivana Joksimović
spec.higijene

Prilog:

1. **Rezultati ispitivanja – SM-V-04**

IZJAVA

1. Rezultati ispitivanja se odnose samo na ispitivani uzorak
2. Izvještaj se ne smije umnožavati izuzev u cjelosti, bez saglasnosti Instituta za javno zdravlje
3. Zabranjeno je isticanje imena»Institut za javno zdravlje» u tekstu deklaracije i u reklamne svrhe,bez saglasnosti Instituta

*-Mišljenje je van obima akreditacije

ZU INSTITUT ZA JAVNO ZDRAVLJE
CENTAR ZA MEDICINSKU MIKROBIOLOGIJU-CMM
Odjeljenje za sanitarnu mikrobiologiju
Laboratorija za ispitivanje voda

ATCG Li 11.12 MEST ISO/IEC 17025 : 2006

REZULTATI ISPITIVANJA- SM-V-04

Šifra uzorka:

VH 3116 /04

Naziv uzorka	Voda za piće-kaptirani bunar-hlorisana 90/01	
Način pakovanja	Sterilna flaša	
Redni broj protokola	1-2971	
Vrsta analize	Mikrobiološko ispitivanje	
Vrsta laboratorijskog pregleda	Osnovni	
Datum i vrijeme prijema uzorka	23.12.2013.	14^{00} h
Datum završetka analize	30.12.2013.	
Metode ispitivanja	P[1)] Pravilnik o načinu uzimanja uzoraka i metodama za laboratorijsku analizu voda za piće, (Sl.list SFRJ br. 33/87) VMK- validovana metoda kuće ISO metode	

MIKROBIOLOŠKA ISPITIVANJA

R.br.	Parametar ispitivanja	Jedinica mjere (ml)	Rezultat ispitivanja	Metoda ispitivanja
1.	*Escherichia coli* (MPN)	100	0	P[1)] III . 2
2.	Ukupne koliformne bakterije (MPN)	100	0	P[1)] III. 1
3.	*Enterococcus species*	100	nisu nađene	VMK
4.	*Pseudomonas aeruginosa* (MPN)	100	0	P[1)] III.7
5.	Aerobne mezofilne bakterije na 37°C	1	0	ISO 6222:1999
6.	Aerobne mezofilne bakterije na 22°C	1	0	ISO 6222:1999

MIŠLJENJE*

Na osnovu navedenih mikrobioloških ispitivanja, ispitivani uzorak **ODGOVARA** uslovima Pravilnika o bližim zahtjevima koje u pogledu bezbjednosti treba da ispunjava voda za piće ("Sl.list CG" br.24/12)

ISPITIVANJA IZVRŠIO

NAČELNIK ODJELJENJA

Dr LJUBICA TERIĆ spec. mikrobiologije i parazitologijom 210471

DIREKTOR CENTRA

MP

Napomena: Rezultati ispitivanja se odnose samo na ispitivani uzorak
* Van obima akreditacije

D.O.O. CENTAR ZA
EKOTOKSIKOLOŠKA ISPITIVANJA PODGORICA
81000 PODGORICA, PUT RADOMIRA IVANOVIĆA 2
LLC CENTER FOR
ECOTOXICOLOGICAL RESEARCH PODGORICA

ATCG
Li 08.03
MEST ISO/IEC 17025 : 2006

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CETI 5100.101.01

LABORATORIJA ZA EKOTOKSIKOLOŠKA ISPITIVANJA I ZAŠTITU OD ZRAČENJA

IZVJEŠTAJ O ISPITIVANJU

Vrsta ispitivanja	**Fizičko-hemijsko ispitivanje vode za piće**
Broj izvještaja	00-20-3535/4/91/01
Datum izdavanja izvještaja	30.12.2013.

PODACI O PODNOSIOCU ZAHTJEVA	
Naziv podnosioca zahtjeva	D.O.O. MONTENEGRO BONUS - CETINJE
Broj zahtjeva/ugovora	01-1769/K
Datum podnošenja zahtjeva	12.12.2013.

PODACI O UZORKU	
Datum uzorkovanja	23.12.2013.
Vrsta uzorka	**Voda za piće iz bunara br. 6**
Zahtijevano ispitivanje	parametri po Ugovoru
Uzorkovao	Ž. Bulatović, M. Živković
Broj protokola u CETI	91/01

Napomena:

1. **Rezultati ispitivanja se odnose samo na ispitivani uzorak.**
2. **Izvještaj o ispitivanju se može umnožavati isključivo kao cjelina.**

POMOĆNIK DIREKTORA
ZA TEH. I LAB. POSLOVE
Danijela Šuković, spec.toks. hem.

CETI doo PODGORICA

IZVJEŠTAJ O ISPITIVANJU BR. 00-20-3535/4/91/01

ODJELJENJE ZA LABORATORIJSKU DIJAGNOSTIKU I MONITORING

REZULTATI ANALIZE

Parametar	Jedinica mjere	Rezultati analize	MDK	Oznaka metode
Br. protokola		91/01		
Datum / čas uzorkovanja		23.12.2013.		
Mjesto uzorkovanja		Bunar br. 6		
Temperatura vode (teren)	^{0}C	15.5	25	SMVP.111*
Boja	mg/PtCo skale	0	20	SMVP.120
Ukus		bez		
Miris		bez	bez	
Mutnoća	NTU	0/0.124±0.007	5,0	SMVP.118*
Ukupna tvrdoća	^{o}dH			SMEW.2340
Koncentracija vodonikovih jona (ter/lab)	pH jedinica	7.32/8.00±0.29	6,5-9,5	JUS HZ1.111*
Elektroprovodljivost (teren/lab)	µS/cm/20^o C	291/308±2	2500	SMVP.143*
Hloridi	Cl mg/l	3.10	250	ISO 9297:1997
Nitrati	NO_3 mg/l	5.28±0.71	50	SMEW4500NO3B*
Nitriti	NO_2 mg/l	<0.003	0,50	SMEW4500NO2B*
Fluoridi	F µg/l	83.0±10.2	1500	SMVP.326*
Utrošak KMnO4	mg/l O_2	0.39	5	SMVP.134
Amonijak	NH_4 mg/l	0.031±0.005	0,50	SMVP.179*
Suvi ostatak na 180^0	mg/l	196±18		SMVP.129*
Rezidue dezinfekcionih sredstava	mg/l	<0.2		SMVP.295
Gvožđe	Fe µg/l	< 1.0	200,0	SMEW.3500FeB*
Mangan	Mn µg/l	< 0.5	50,0	SMEW.3500MnB*
Fenoli	µg/l	<0.5		SMVP.299*

Trihalometani ukupni	µg/l		100,0	SMEW 6232B*
- hloroform	µg/l	<0.001		SMEW 6232 B*
- bromoform	µg/l	<0.001		SMEW 6232 B*
- dibromhlormetan	µg/l	<0.001		SMEW 6232 B*
- bromdihlormetan	µg/l	<0.001		SMEW 6232 B*
Mineralna ulja	µg/l	<0.1	20,0	SMVP.430*
Zasićenost kiseonikom	%	79.7		SMVP.150

*-akreditovana metoda

Načelnik Odjeljenja za lab, dijagnostiku i monitoring
mr sci. Dejan Jančić, dipl. hem.

Dejan Jančić

STRUČNO MIŠLJENJE

Na osnovu rezultata obavljenih laboratorijskih ispitivanja i stručnog razmatranja utvrđeno je da ispitivani uzorak

Vrsta/naziv uzorka	**Voda za piće iz bunara B-6 (Kombinat aluminijuma Podgorica)**
Broj protokola uzorka u CETI	**91/01**

ODGOVARA

uslovima Pravilnika o bližim zahtjevima koje u pogledu bezbjednosti treba da ispunjava voda za piće („Sl. list CG", br. 24/12).

OVLAŠĆENO LICE

Danijela Šuković, spec. toks. hem.

Danijela Šuković

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PODGORICA
CENTAR ZA ZDRAVSTVENU EKOLOGIJU
81000 Podgorica, Džona Džeksona bb
tel./fax :020/235 441, www.ijzcg.me

ATCG
Li 11.12
MEST ISO/IEC 17025 : 2006

IZVJEŠTAJ O ISPITIVANJU

Šifra uzorka:

VH3117/04

Redni broj protokola 3117

Veza: Zahtjev broj 85/01/2 datum 23.12.2013

Vlasnik uzorka CENTAR ZA EKOTOKSIKOLOŠKA ISPITIVANJA DOO PODGORICA

Naručilac ispitivanja CENTAR ZA EKOTOKSIKOLOŠKA ISPITIVANJA DOO PODGORICA

Uvoznik/ zastupnik

PODACI O MATERIJALU - UZORKU	**PODACI O UZORKOVANJU**
Vrsta Voda za piće – kaptirana bunar – hlorisana 91/01	Datum 23.12.2013
Mjesto	Uzorkovao ispitivanja Centar za ekotoksikološka
Ostalo	

TRAŽENA ISPITIVANJA:

- ☐ Fizičko-hemijska ispitivanja: a)osnovna analiza b)periodična analiza c)kompletna analiza
  d) Ostalo (navesti parametre)_____
- ☑ **Mikrobiološka analiza**

Datum prijema 23.12.2013 Ispitivanje završeno 27.12.2013

MIŠLJENJE*: Na osnovu rezultata mikrobiloških analiza ispitivani uzorak:

a) **ODGOVARA**
b) NE ODGOVARA

važećim Propisima.

Napomena

Šef odsijeka za komunalnu higijenu
i humanu ekologiju
Dr med. Ivana Joksimović
spec.higijene

Prilog:
1. **Rezultati ispitivanja – SM-V-04**

IZJAVA
1. Rezultati ispitivanja se odnose samo na ispitivani uzorak
2. Izvještaj se ne smije umnožavati izuzev u cjelosti, bez saglasnosti Instituta za javno zdravlje
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REZULTATI ISPITIVANJA- SM-V-04

Šifra uzorka:

VH 3117 /04

Naziv uzorka	Voda za piće-kaptirani bunar-hlorisana 91/01
Način pakovanja	Sterilna flaša
Redni broj protokola	1-2972
Vrsta analize	Mikrobiološko ispitivanje
Vrsta laboratorijskog pregleda	Osnovni
Datum i vrijeme prijema uzorka	23.12.2013. 14^{00} h
Datum završetka analize	27.12.2013.
Metode ispitivanja	P[1)] Pravilnik o načinu uzimanja uzoraka i metodama za laboratorijsku analizu voda za piće, (Sl.list SFRJ br. 33/87) VMK- validovana metoda kuće ISO metode

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ISPITIVANJA IZVRŠIO T. Radunović

NAČELNIK ODJELJENJA

DIREKTOR CENTRA

MP

Napomena: Rezultati ispitivanja se odnose samo na ispitivani uzorak
* Van obima akreditacije