

Work Package 5

Monitoring and evaluation of outputs

Deliverable 5.6.1

Monitoring of ground water quality at selected site

Beneficiary 6 (PB6) - Municipality of Petrich

**INTERREG V-A COOPERATION PROGRAMME:
GREECE – BULGARIA 2014-2020**

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Summary Report

The supervision of monitoring of ground water quality at the selected site and the technical help for elaborating a monitoring programme was assigned to HIDRORESURS LTD Company in fulfillment of the contract "Performance of technical services in implementation of the project „Groundwater REsource managemENT for non-Potable water pUrposes, baseMent protection, and heating - Pilot application”.

The carrying out measurements of the quality of groundwater from the new water abstraction facility and developing guidelines /Programme/ for monthly and annual self-monitoring of the quality of groundwater is in acc.e with the requirements of Permit for Water Abstraction No. 41520106/25.09.2019 and Ordinance No. 1 /2007 for exploration, use and protection of groundwater;

The underground water was tested twice - the first time after the construction and cleaning of the well (TK-1) were done by the construction contractor in December 2019 and the second time after the experimental filtration activities were carried out in May 2020.

The groundwater analyzes were carried out in the Laboratory for Testing Surface, Underground and Drinking Water "Vodokanalproekt Akvallabor" OOD, Sofia - Protocol No. 117/03.06.2020, in the Directorate of Testing Laboratory "EUROTEST-CONTROL" EAD, Sofia - Protocols No. 15233/23.12.2019 and No. 73/09.06.2020, as well as in the Central Research Laboratory at "DIAL" Ltd., Bukhovo - Protocols No. 2019/3937 and No. 2019/3937A of 26.12. 2019 and No. 2020/1012 of 08.06.2020

The composition of water, expressed by Kurlov's formula, is as follows:

$$M(0,721) \frac{HCO_3(75,62).SO_4^{-2}(17,58)}{Ca^{+2}(46,54).Mg^{+2}(26,83).Na^+(26,64)}, pH(7.0), T(13,5^{\circ} C);$$

The following conclusions can be drawn from the analysis:

- The water from the tube well is "cold" with a temperature of 13.5° C, Hydrogencarbonate-calcium-magnesium-sodium-sulfate;
- According to the value of the chemical indicators that determine water pollution with products of organic decay and decomposition of substances of animal and plant origin and from fertilization with artificial fertilizers (ammonia - < 0.30 mg/l, oxidizability - 0.96 mgO2/ l, chlorides – 36.29 mg/l, nitrites - < 0.02 mg/l) it can be concluded that the water lacks such pollution.
- In terms of chemical composition, the water fully meets the criteria of Appendix No. 1, to Art. 10, Para. 2, Item 1 of Ordinance No. 1/2007 on exploration, use and protection of groundwater, with the exception of the Iron indicator (Fe+2 + Fe+3) – 360 µg/l with a tolerance of 200 µg/l.

The monitoring program is elaborated according to the conditions of the issued permit for water extraction from underground waters No. 41520106/25.09.2019, namely:

- The extraction of underground water should be carried out with a maximum flow rate of up to 4.17 l/sec;
- The daily extraction of underground water should not exceed the permitted volume of 97.11 m³/day;
- The annual volume of extracted water quantities should not exceed 20,780.5 m³/year;
- On the last day of each month, the extracted amounts of underground water should be reported, according to the readings of the water meter.

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- During the extraction, the dynamic water level of the groundwater should be measured monthly. This is done during operation of the duty pump, as well as at the beginning of each season before turning on the pumping equipment
- At the beginning of each month, the static water level of the underground water should be measured. The measurement should be carried out under the condition that the pump is not working and at least 6 hours have passed since the last stop of the pump;
- Water levels should be measured from the height of the well mouth, using the level gauge installed in the water measuring shaft.
- Every year in the period August 1 - September 30, to take a water sample from the well and examine the chemical composition of the underground water according to the indicators: pH, electrical conductivity, concentration of dissolved oxygen, ammonium ions, nitrates, nitrites, phosphates, chlorides and sulfates;
- The extracted water from the well is to be used only for "Independent water supply for irrigation of agricultural crops" on the territory of the land property "the Church" of the village of Kavrakirovo, municipality of Petrich, representing "Pasture" in the manner of permanent use.