
Work Package 3

Construction of pilot installation

Deliverable 3.6.3

Functionality test report of installation

Beneficiary 6 (PB6) - Municipality of Petrich

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

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Table of Contents

1. Summary

2. Conclusions

1. Summary

Field tests to check the functionality of a new water abstraction facility - Tube well (TK-1) for non-potable water in land property cadastral identifier 35081.1.39 in the locality "The Church", land of Kavrakirovo village, Municipality of Petrich, Blagoevgrad region were carried out according to the conditions in the permit for water abstraction from underground water, through a new water abstraction facility and preparation of the necessary documents for the acceptance of the water abstraction facility by the reception commission and its entry in the registers of the Basin Directorate of West Aegean Region in Blagoevgrad;

The purpose of field tests was to verify the functionality of a new aquifer facility and to determine the hydrogeological parameters in the section of the aquifer and the hydraulic efficiency of the facility.

- The temperature of the underground water from the tube well was measured, and it was constant: 13.5 °C.
- The static water level was measured at a depth of 17.28 m from the mouth of the well.
- A submersible pump brand "CALPEDA", model "4SD 15/12" with parameters: P = 3 kW was installed in the well at a depth of 55 m; Qmax. = 9.6 m³/h (2.666 l/sec); Hmax.= 56 m.
- An experimental water extraction was carried out with a maximum flow rate of the pump Q = 2.666 l/sec in 24 hours. At the 5th hour and 45 minutes (345 minutes) from the start of water extraction, the decrease (S) of the water level stabilized at 19.16 m (36.44 m - dynamic water level from the mouth elevation), and by the 24th hour (1440 minutes) no significant change in lowering was observed (S stable = 19.16 m). Water extraction was carried out from 08:00 on 05/23/2020 to 08:00 on 05/24/2020. The recovery of the water level was monitored after the pumping equipment was turned off for 855 minutes from 08:00 on 05/24/2020. until 22:15 on 24.05.2020.
- An experimental water extraction was carried out with the permitted average daily flow rate Qavg.day = 0.66 l/sec and a duration of 24 hours (from 08:00 on 05/25/2020 to 08:00 on 05/26/2020). At a stabilized flow rate of 0.66 l/sec, a stabilized drop of 3.36 m (dynamic water level at a depth of 20.64 m from the mouth of the well) was achieved at the 90th minute from the start of water extraction. The restoration of the water level after the cessation of water extraction was monitored - 600 min (from 08:00 on 05/26/2020 to 18:00 on 05/26/2020).
- An experimental water extraction was carried out with the maximum permitted flow rate of the pumping equipment Qmax.= 2,666 l/sec for a period of 5 hours and 57 minutes. At the 5th hour and 45 minutes (345 minutes) the drop in the water level stabilized at 19.16 m (36.44 m - DVN from the mouth elevation), reaching 357 -th min no change in lowering is observed (S stable = 19.16 m).

Water extraction was carried out from 08:00 on 27/05/2020 to 13:57 on 27/05/2020. The recovery of the water level was monitored for 855 min after the pump was stopped from 13:57 on 27/05/2020 to 04:12 on 05/28/2020, until the static water level is restored to 17.28 m from the well-head.

- A hydraulic test was conducted with a total duration of 3 hours (180 min) on three stages (from 09:00 on 28.05.2020 to 12:00 on 28.05.2020), as follows:

- I degree: flow rate $Q_1 = 0.660$ l/sec and unstabilized drop $S_1 = 2.62$ m;

- II degree: flow rate $Q_2 = 1,000$ l/sec and unstabilized drop $S_2 = 4.30$ m;

- III degree: flow rate $Q_3 = 2.666$ l/sec and unstabilized drop $S_3 = 11.21$ m;

- On the basis of the conducted hydraulic test, the technically possible flow rate of the tube well was calculated, with a permissible drop $S_{dop} = 22.63$ m, respectively:

$Q_{tvd.} = 445,824$ m³/day = 5.16 l/sec.

Municipality of Petrich sent a notification to the West Aegean Basin Directorate with attached documents certifying that the well has been constructed in accordance with the Permit for groundwater abstraction № 41520106 / 25.09.2019 as follows:

1. Information about the equipment of the pipe well
2. Requirements for the operation of the water intake facility
3. Geological journal for the performed activities
4. Protocol 1 for designation of the work site
5. Protocol 2 for covert operations
6. Protocol 3 for conducted water abstraction with maximum flow - 24 hours
7. Protocol 4 for conducted water abstraction with average daily flow - 24 hours
8. Protocol 5 for a three-stage hydraulic test
9. Protocol 6 for conducted water abstraction with maximum flow - 357 minutes
10. Protocol 7 for geodetic survey of the coordinates of the well
11. Chemical analysis of a water sample from the well
12. Geological-lithological column and construction of the pipe well
12. Diagram of the equipment of the water meter shaft and the mouth of the pipe well

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13. Documents - certificates of the materials and equipment
 14. List of the persons who will be present at the admission commission
 15. Substantiated request for updating the permitted flow and the maximum permissible lowering of the water level

On 31.07.2020 the acceptance commission inspected and accepted the facility and the new facility is registered in West Aegean Basin Directorate.

2. Conclusions

The Permit for groundwater abstraction № 41520106 / 25.09.2019 issued to Petrich Municipality proved as follows:

- the abstraction is sustainable
- the abstractor has a reasonable need for the water
- the abstractor will use the water efficiently

The assessment of the technically possible flow rate of the new groundwater supply facility shows that the required average daily flow rate for the needs of the Municipality of Petrich of 0.66 l/ sec can be reached without a detrimental impact on ecology.