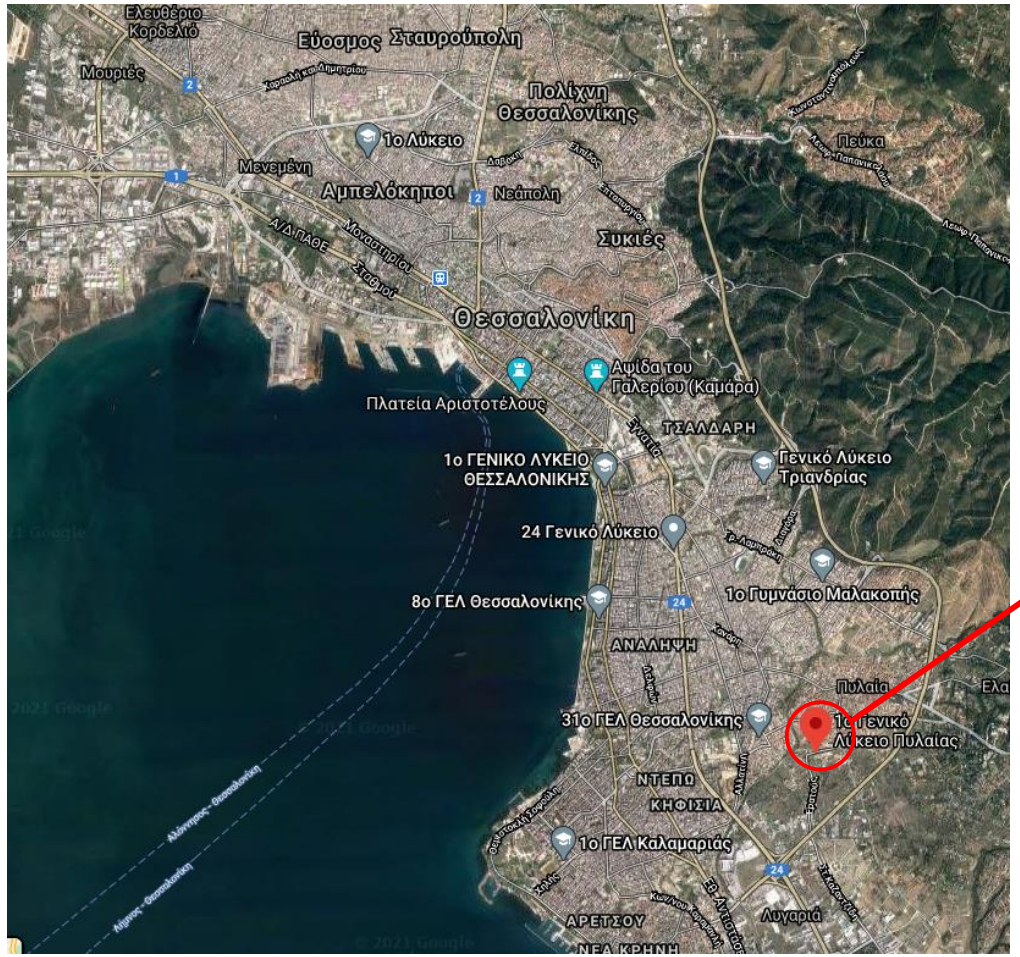
Management of Underground Water Resources for the Needs of Non-potable Water, Heating and Underground Areas Protection (GREEN PUMP)

INTERREG V-A "Greece-Bulgaria 2014-2020"

MUNICIPALITY OF
PILEA-HORTIATIS

PILEA | PANORAMA | HORTIATIS
EXOHI | ASVESTOHORI | FILYRO

Location

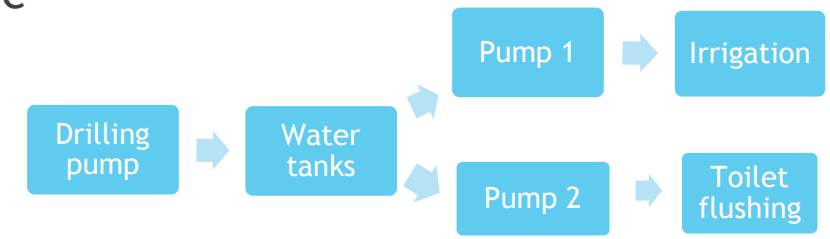

Ελευθέριο-Κορδελιό
Εύοσμος
Σταυρούπολη
Μουριές
Πολίχνη
Θεσσαλονίκης
1ο Λύκειο
Μενεμένη
Αμπελόκηποι
Νεάπολη
Πεύκα
Συκιές
Θεσσαλονίκη
Αψίδα του Γαλερίου (Καμάρα)
Πλατεία Αριστοτέλους
ΤΣΑΛΔΑΡΗ
1ο ΓΕΝΙΚΟ ΛΥΚΕΙΟ ΘΕΣΣΑΛΟΝΙΚΗΣ
Γενικό Λύκειο Τριανδρίας
24 Γενικό Λύκειο
1ο Γυμνάσιο Μαλακοπής
8ο ΓΕΛ Θεσσαλονίκης
ΑΝΑΛΗΨΗ
Πυλαία
31ο ΓΕΛ Θεσσαλονίκης
1ο Γενικό Λύκειο Πυλαίας
ΝΤΕΠΟ
ΚΗΦΙΣΙΑ
1ο ΓΕΛ Καλαμαριάς
ΑΡΕΤΣΟΥ
Λυγαριά
ΝΕΑ ΚΡΗΝΗ


Ιαμήνης
Drilling position
ΔΑΚ Πυλαίας

General Information (1)

Project:

- Installation of a drilling system at the High School of Pilea, Thessaloniki.
- Use of water for toilet flushing and irrigation.



Technical Description:

- 4 water tanks (plastic) x 500 lit
- Drilling depth: 52 m
- Flow: 5 m^3/h
- Tube (PE) diameter: 12 in
- 2 Multistage pumps
- Recording equipment

General Information (2)

Initial drilling depth → 25±5m

Soil containing clay → Inability to hold underground water

Final depth → 52m

Extra cost: **2.612,23 €**

Cost
D3.5.2
«Infrastructure & Works»
18.135,24 €

Suggestion:
New cost of «Infrastructure & Works»
18.135,24 € + 2.612,23 € = **20.747,47 €**

- Ph meter (KNICK-Portavo 902pH)
- Conductivity meter (METTLER TOLEDO-F3 Standard kit)

Staff Costs	Office and Administration			Travel and Accommodation			External Expertise and Services			Equipment			Infrastructure and Works			TOTAL
0,00 €	Del. code	Updated version	Request	Del. code	Updated version	Request	Del. code	Updated version	Request	Del. code	Updated version	Request	Del. code	Updated version	Request	
	D 1.5.2	300,00 €	0 €	D 1.5.2	2.200 €	107,77€	D 1.5.2	300 €	0€	D 4.5.2	500 €	2.000 €	D 3.5.2	18.135,24 €	20.747,47 €	
				D 6.5.1	1.200 €	0 €										
0,00 €	**0,00 €**			**107,77€**			**23.100,00€**			**3.991,44€**			**20.747,47€**			**47.946,68**

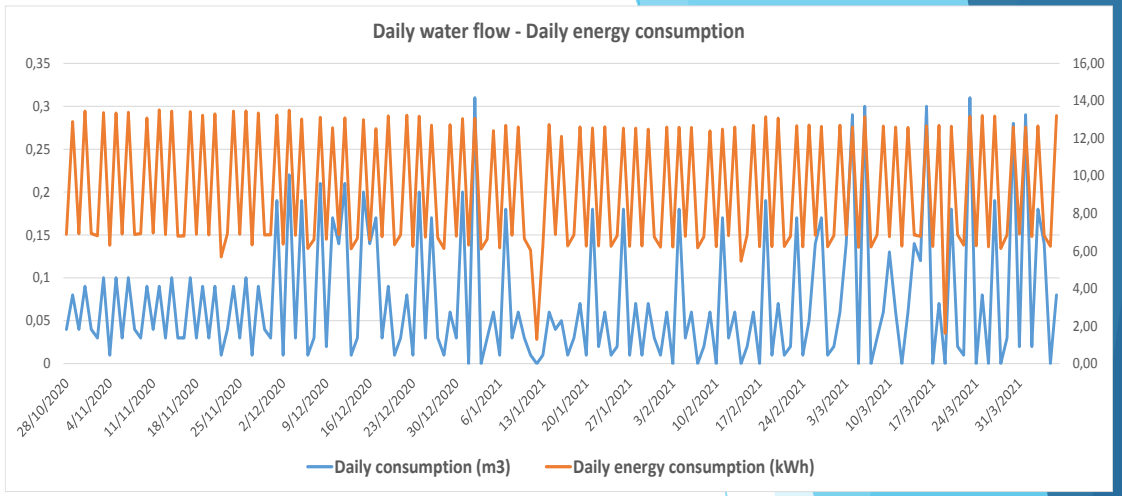
New totals = Previous values + Requests

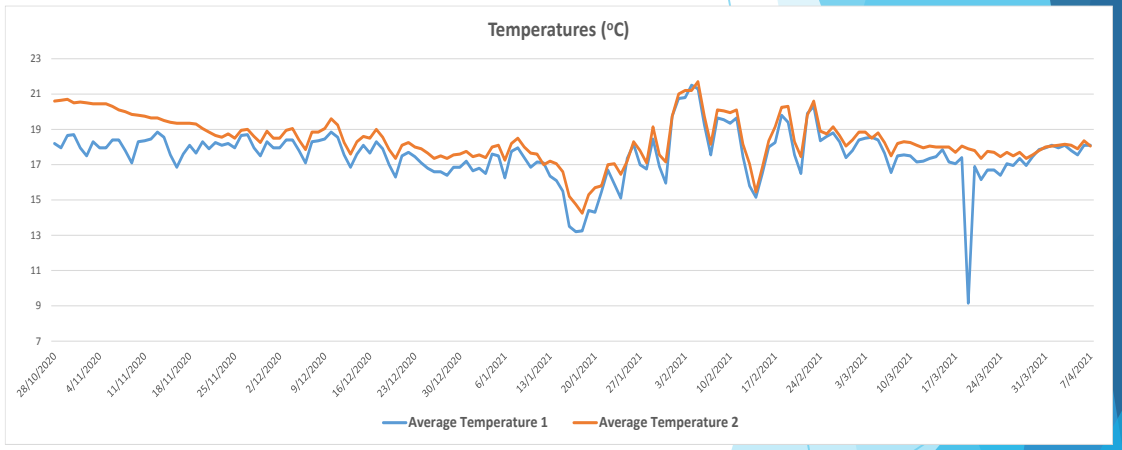
Monitoring

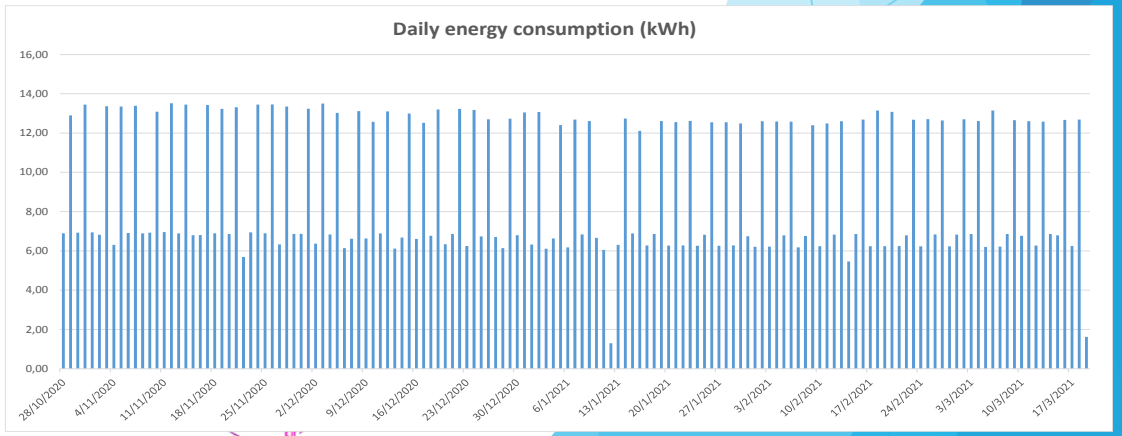
(26/10/2020-6/4/2021)

	Consump. Start	Consump. End	Daily Consump. (m3)	Energy consump. Start	Energy consump. End	Daily Energy Consump. (kWh)	Eenrgy Consump./m3	Mean Temperature 1 (°C)	Mean Temperature 2 (°C)
28/10/2020	4,76	4,8	0,04	354,6	361,5	6,90	172,50	18,2	20,60
29/10/2020	4,8	4,88	0,08	361,53	374,43	12,90	161,25	17,95	20,65
30/10/2020	4,88	4,92	0,04	374,46	381,39	6,93	173,25	18,65	20,70
31/10/2020	4,92	5,01	0,09	381,42	394,87	13,45	149,44	18,70	20,50
1/11/2020	5,01	5,05	0,04	394,89	401,83	6,94	173,50	17,95	20,55
2/11/2020	5,05	5,08	0,03	401,85	408,67	6,82	227,33	17,50	20,50
3/11/2020	5,08	5,18	0,1	408,7	422,07	13,37	133,70	18,3	20,45
4/11/2020	5,18	5,19	0,01	**422,09**	**428,4**	6,31	631,00	17,95	20,45
5/11/2020	5,19	5,29	0,1	428,42	441,77	13,35	133,50	17,95	20,45
6/11/2020	5,29	5,32	0,03	441,8	448,71	6,91	230,33	18,40	20,30
7/11/2020	5,32	5,42	0,1	448,73	462,12	13,39	133,90	18,4	20,10
8/11/2020	5,42	5,46	0,04	462,15	469,04	6,89	172,25	17,80	20,00
9/11/2020	5,46	5,49	0,03	469,07	476	6,93	231,00	17,1	19,85
10/11/2020	5,49	5,58	0,09	476,03	489,12	13,09	145,44	18,30	19,80
11/11/2020	5,58	5,62	0,04	489,57	496,53	6,96	174,00	18,35	19,75
12/11/2020	5,62	5,71	0,09	496,56	510,08	13,52	150,22	18,45	19,65
13/11/2020	5,71	5,74	0,03	510,1	516,99	6,89	229,67	18,85	19,65
14/11/2020	5,74	5,84	0,1	517,02	530,47	13,45	134,50	18,55	19,50
15/11/2020	5,84	5,87	0,03	530,49	537,29	6,80	226,67	17,55	19,40
16/11/2020	5,87	5,9	0,03	537,32	544,13	6,81	227,00	16,85	19,35
17/11/2020	5,9	6	0,1	544,16	557,59	13,43	134,30	17,6	19,35
18/11/2020	6	6,03	0,03	557,61	564,51	6,90	230,00	18,10	19,35
19/11/2020	6,03	6,12	0,09	564,53	577,76	13,23	147,00	17,65	19,30
20/11/2020	6,12	6,15	0,03	577,79	584,65	6,86	228,67	18,30	19,05
21/11/2020	6,15	6,24	0,09	584,68	597,99	13,31	147,89	17,9	18,85
22/11/2020	6,24	6,25	0,01	598,02	603,71	5,69	569,00	18,25	18,65
23/11/2020	6,25	6,29	0,04	603,74	610,68	6,94	173,50	18,1	18,55
24/11/2020	6,29	6,38	0,09	610,7	624,15	13,45	149,44	18,20	18,75
25/11/2020	6,38	6,41	0,03	624,18	631,08	6,90	230,00	17,95	18,50
26/11/2020	6,41	6,51	0,1	631,11	644,57	13,46	134,60	18,65	18,95
27/11/2020	6,51	6,52	0,01	644,59	650,92	6,33	633,00	18,7	19,00
28/11/2020	6,52	6,61	0,09	650,95	664,3	13,35	148,33	17,95	18,60

Data			
Days (total)	**162**	***Average energy consumption/m³***	
Min consumption (kWh)	**354,60**	**238,96**	kWh/m³
Max consumption (kWh)	**1853,78**	***Average energy consumption/day***	
Min water flow (m³)	**4,76**	**9,12**	kWh/day
Max water flow (m³)	**16,61**	***Average water flow/day***	
		0,07	m³/day
Total			
Total consumption (kWh)	**1499,18**	kwh/m³/day	**0,78**
Total water flow (m³)	**11,85**		







Water Analysis

Comparison of Water Analysis Results - Drinking water limits					
Parameter	Units	Result			Limits
Microbiological Test					
		Analysis			
		1st	2nd	3rd	
Total Plate Count 36°C	CFU/ml	680	220	250	20
Coliforms	CFU/100 ml	280	4	6	0
Escherichia coli	CFU/100 ml	1	<1	1	0
Enterococcus	CFU/100 ml	1	<1	7	0
Physicochemical Tests					
pH	pH units	7,74	7,7	7,52	≤6,5 και ≥9,5
Electrical Conductivity 20°C	μS/cm	2260	2316	1922	2500
Total dissolved salts (TDS)	mg/L	1684,3	1726,1	1432,4	250
Total hardness (TH)	°F	25	26,2	24,9	6
Ionic chromatography					
F^-	mg/L	0,75	<0,45	0,44	1,5
Cl^-	mg/L	340,08	314,67	302,56	250
NO_2^-	mg/L	<0,45	<0,45	<0,30	0,5
NO_3^-	mg/L	16,2	19,32	18,88	50
PO_4^{-3}	mg/L	<0,45	<0,45	<0,30	5
SO_4^{-2}	mg/L	267,93	288,57	253,54	250
Metals					
Ca	mg/L	45,94	47,75	46,23	100
K	mg/L	1,4	1,63	1,70	12
Mg	mg/L	32,85	34,79	32,52	50
Na	mg/L	330,6	359,27	337,13	200
As	μg/L	<3,3	<3,3	<3,3	10
Cd	μg/L	<1,65	<1,65	<1,65	5
Cr	μg/L	<3,3	4,5	<3,3	50
Fe	μg/L	33	56,7	34,1	200
Mn	μg/L	31,2	14,8	7,3	50
Ni	μg/L	<3,3	<3,3	<3,3	20
Pb	μg/L	<3,3	<3,3	<3,3	10

2^{nd}+3^{rd} Analysis: Reduced values but above limits

~~Toilet flushing~~

Irrigation ✓

Next steps….

Deliverables:

- 2.5.1. Implementation of internal and external communication tools and rules
- 2.5.2. Overall public open report on the projects results (partners contribution)
- 4.5.2. On site measurements for groundwater quality of pump
- 5.5.1. Monitoring of ground water quality at the pump
- 5.5.2. Evaluation of the environmental and social benefits

Thank you for your attention….