

Pilot evaluation in Poland

First pilot

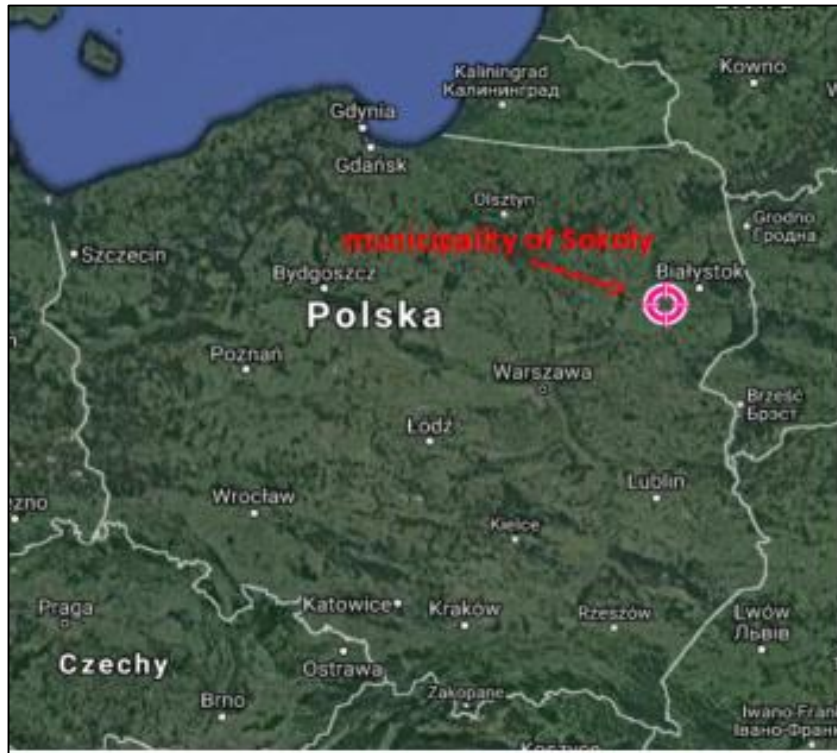
Individual wastewater treatment plant for a single household in Sokoły municipality

Institute of Technology and Life Sciences in Poland

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Techn. Michał Kuźniar

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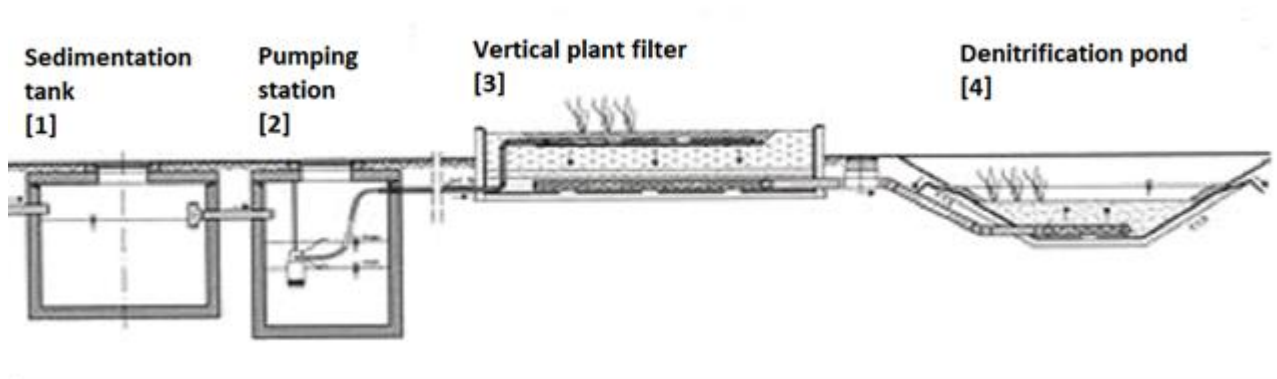
Location



- First pilot individual wastewater treatment plant is located in municipality of Sokoły in Idźki-Wykno village.
- Population in the municipality of Sokoły is 5797 inhabitants.
- Scattered dwellings are common in the area of the municipality.
- This pilot installation is for a single household (3 people) and it was built in 2004.
- The manufacturer of this technology is Institute of Applied Technology.

Individual wastewater treatment plant for a single household in Sokoły municipality

Description of technology tested (1)



The individual domestic wastewater plant in the Idźki-Wykno village (Sokoły municipality) is composed of 4 elements: a sedimentation tank [1], a pumping station [2], a vertical plant filter [3] and a denitrification pond [4]. The basic principle of treatment in this technology is the decomposition of pollutants contained in wastewater by microorganisms found in the soil, assisted by the root system of macrophytes.

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Description of technology tested (2)



The sedimentation tank [1] and the pumping station [2]: The sedimentation tank fulfils the function of preliminary mechanical treatment of wastewater. In the sedimentation process, solids fall to the bottom of the sedimentation tank, where they ferment. The pumping station [2] ensures the discharge of liquid to the vertical plant filter [3] when the gravity flow is unobtainable.

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Description of technology tested (3)



The vertical plant filter [3]: this is the main component of the treatment plant. It is isolated from the soil by a foil layer. The filling of the filter is composed of soil mixed with organic material. The filter area is planted with carefully selected marsh water vegetation. The following plants were planted on the filter:

- stiff sedge (*Caricetum hudsonii*),
- rush (*Juncus*),
- Great manna grass (*Glyceria maksima*),
- yellow flag (*Iris pseudoacorus*).

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Description of technology tested (4)



The denitrification pond [4]: it is the last, cleaning element, serving for further purification of the sewage. Most often it has a round shape. Based mainly on the evapotranspiration process. Like the filter, it is isolated from the soil by a foil layer and it is also filled with multi-species macrophytes. The pond can also be a life place for different species of fish and amphibians.

Individual wastewater treatment plant for a single household in Sokoły municipality

Why do we test this technology (1) ?

We test this technology because:

- In our opinion this technology is suitable for scattered dwellings areas in Sokoły municipality.
- The maintenance of this technology is very easy: sludge removal once per year and mowing vegetation once per year.
- The maintenance is performed by the owners themselves.
- This technology uses the natural processes occurring in the soil and in the water.
- This technology has only one mechanical device – the pump.
- The annual working cost of the pump is very low (max. 12 euro).
- It is the best-fitted technology for a single household.
- In Sokoły municipality there are over 100 households equipped with this technology.
- In some households this technology already works for over 10 years.

Individual wastewater treatment plant for a single household in Sokoły municipality

Why do we test this technology (2) ?



We test this technology because we are going to design and build a very similar installation for a school in Bruszewo village in Sokoły municipality.



We are not going to change this technology that we test because this is the knowledge base and a prototype for us.

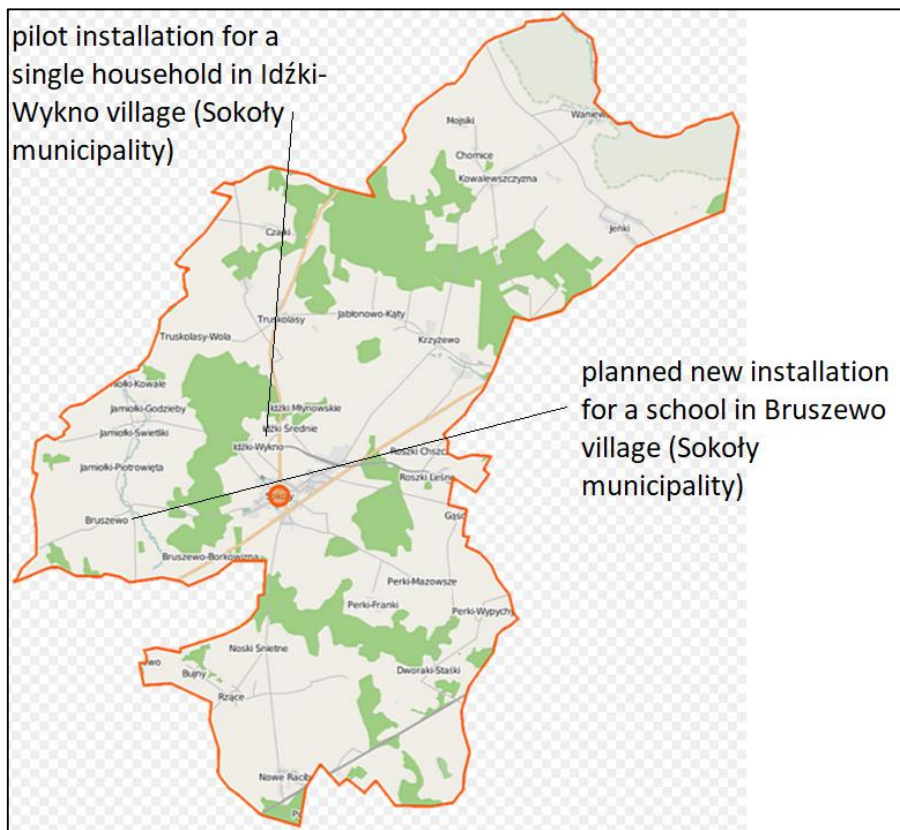


The new installation is based on the tested technology and it is enriched with additional elements.

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Individual wastewater treatment plant for a single household in Sokoły municipality

Location of the new installation based on tested technology



The school in Bruszewo village is located in the same municipality as the installation we tested.

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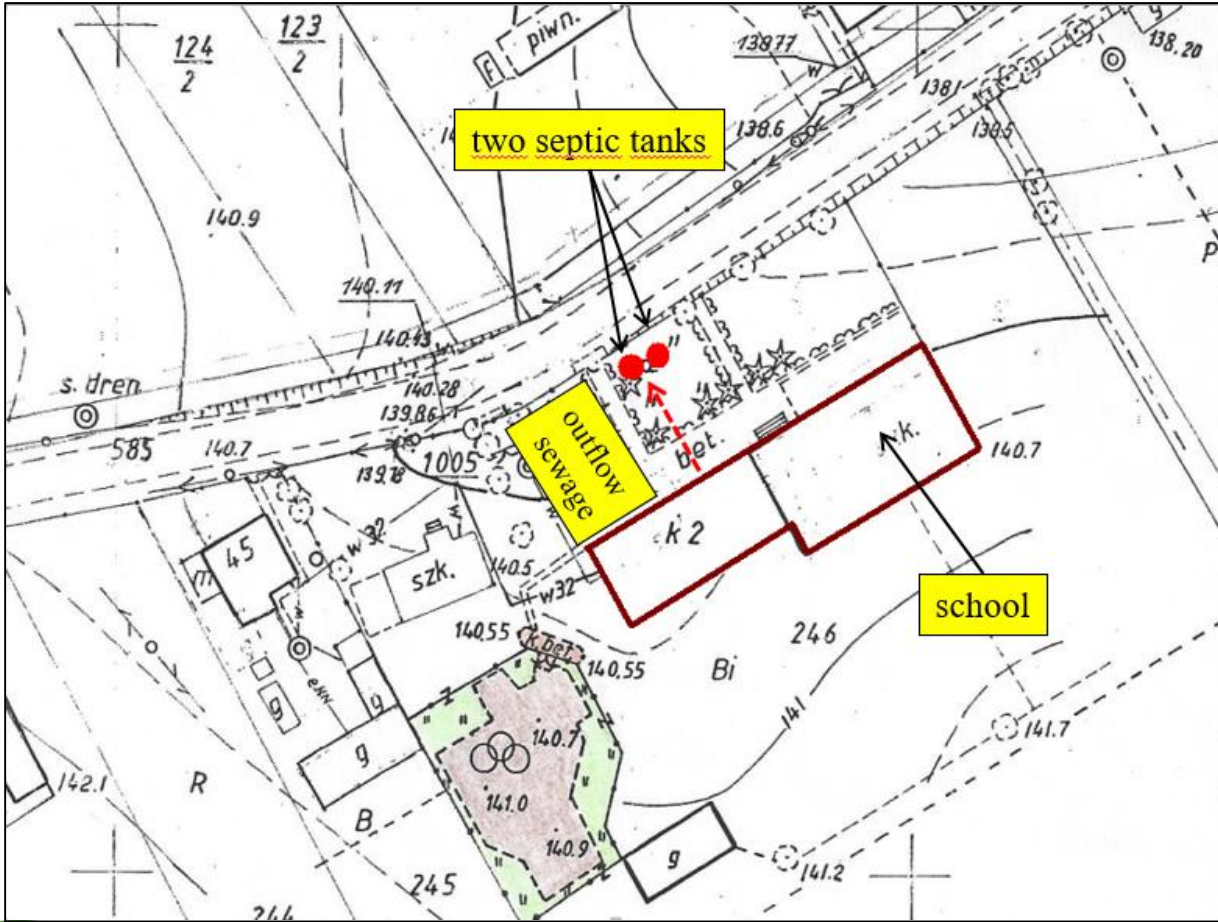
What was the old technology (1) ?



- Nowadays sewage is collected in two, concrete old and leaky septic tanks.
- The capacity of both septic tanks is 8m^3 , but the sewage is disposed of once it reaches 6m^3 .
- Septic tanks are 17 years old.

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What was the old technology (2) ?



The existing wastewater collection system at the school in the village of Bruszewo in Sokóły commune

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What is the new technology (1) ?

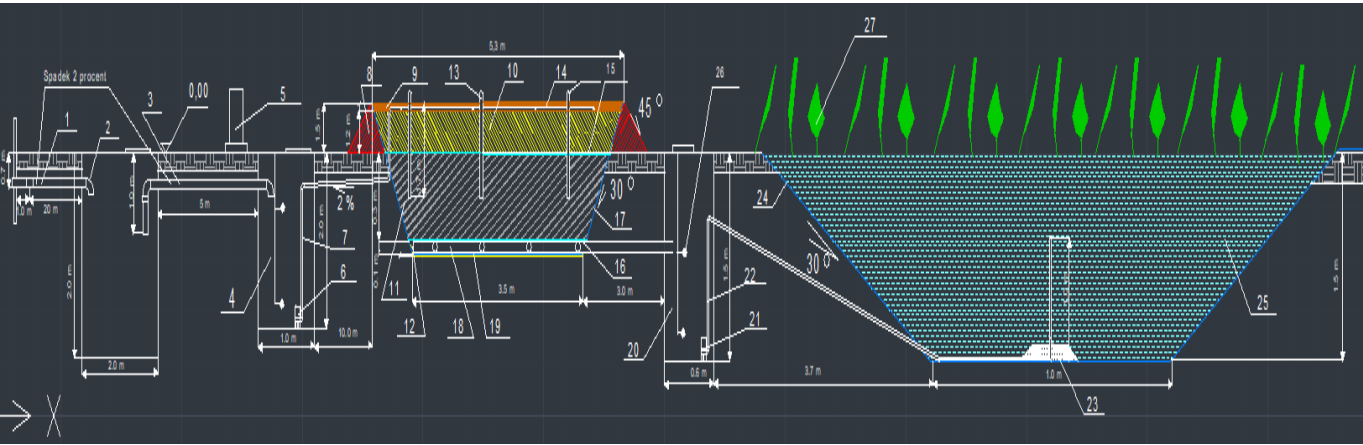


Place to build the best-fitting wastewater treatment plant at the school in the village of Bruszewo in Sokoły municipality.

Pilot evaluation in Poland

Individual wastewater treatment plant for a single household in Sokoły municipality

What is the new technology (2)?



28	Johwyt z kołkiem (kapłur)	6	fi 110 mm
27	Roślinność stawowa		
26	Płytki sterujące	2 kmpł	Sterowanie pracą pomp
25	Zbiornik stabilizacyjny	H = 1,5 m, D = 3,0 m	
24	Folia izolacyjna	F = 20 m ²	# 1 mm mat. PEHD
23	Kruciec fontanny	fi = 32 mm	mat. stal nierdzewna
22	Rurociąg przelewowy	L = 6,5 m, fi = 32 mm	mat. PEHD
21	Pompa	1	32 PZM / Z-2 0,55 kW
20	Pompownia	H = 1,5 m, D = 0,8 m	mat. beton
19	Podsypka piaskowa	V = 0,35 m ³	piasek drobnoziarnisty
18	Rurociągi zbierające	fi = 0,1 m	rur. drenarski mat. PVC
17	Folia izolacyjna	F = 44 m ²	mat. PEHD, # 1 mm
16	Geowłóknina	kml	F = 8 m ²
15	Geowłóknina	kml	F = 10 m ²
14	Rurociągi rozpraszające	kml	fi = 50 mm, mat. PVC
13	Rurociągi nadsieniające	szt. 8	L = 2,0 m, fi 110 mm, mat. PVC
12	Zwir	V = 0,7 m ³	mat. Zwir, ziarna 3 - 7 mm
11	Opoka	V = 1,8 m ³	mat. Opoka kalcynowana, granulowana
10	Warstwa piaskowa	V = 19,5 m ³	mat. piasek gruboziarnisty płuk.
9	Warstwa wierzchnia	V = 4,5 m ³	humus
8	Skarpa	V = 28 m ³	Grunt rodzimy
7	Rurociąg tłoczny	1	mat. PEHD, fi = 5/4"
6	Pompa do ścieków	1	OR KA-N(T) 5/4"
5	Skrzynka sterownicza	1	dla 2 pomp
4	Przepompownia	1	mat. beton, h = 2,0 m, fi = 1,0 m
3	Rurociąg przelewowy	1	mat. PVC, fi 160 mm
2	Zbiornik sedimentacyjny	1	mat. beton, h = 2,0 m, fi = 2,0 m
1	Rurociąg PVC fi 160 mm	1	
L.p.	Nazwa	Sztuk	Opis
Zakład Systemów Infrastruktury Technicznej Wsi			
Instytut Technologiczno-Przyrodniczy	Projektował	A. Eymontt	Data 21.09.2017
	Rysował	A. Eymontt	
	Sprawdził	K. Wierzbicki	
	Zatwierdził	K. Wierzbicki	
Skala J.	Temat	Interreg Village Waters	
	Nazwa	Oczyszczalnia ścieków - przekrój	

The project of the new installation for the school in Bruszewo was designed in the Institute of Technology and Life Sciences (ITLS) by Mr. Andrzej Eymontt.

The new installation is composed of 5 elements:

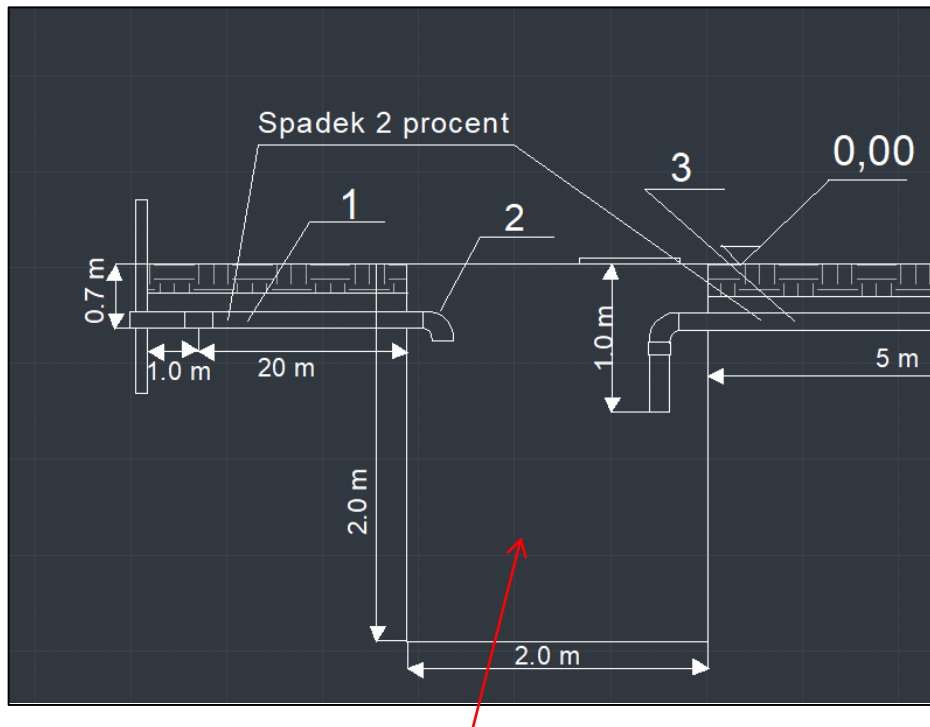
- sedimentation tank,
- pumping station,
- vertical plant filter,
- pumping station,
- denitrification pond.



VillageWaters

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What is the new technology (3)?



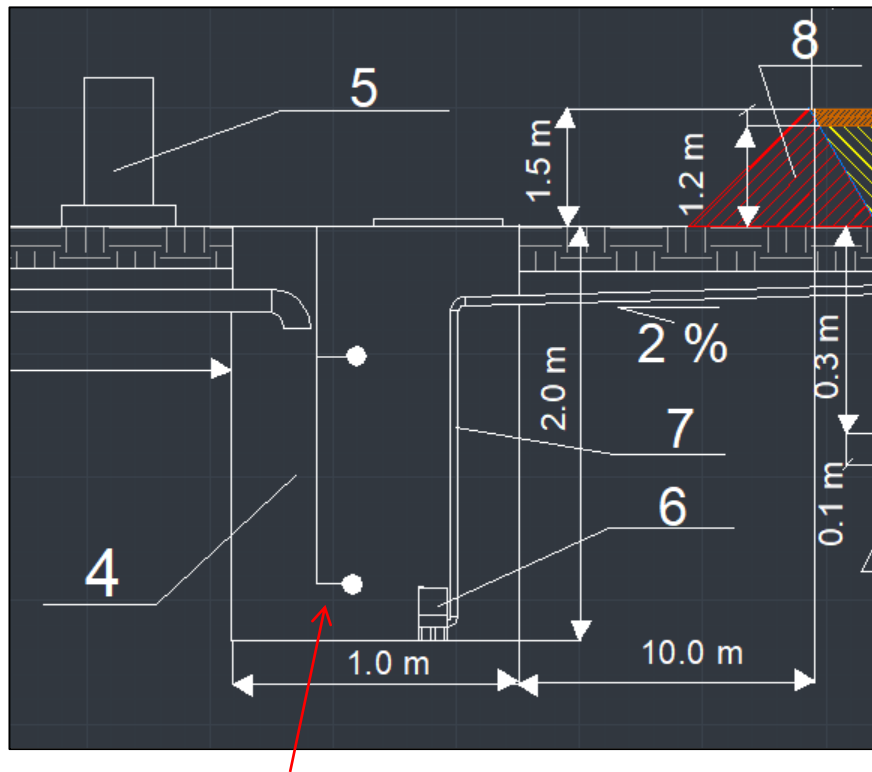
sedimentation tank

Sedimentation tank

- Is made of concrete.
- The depth of the tank is 2 meters and the diameter is also 2 meters.
- Sewage from the school flows gravitationally to the tank.

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What is the new technology (4)?



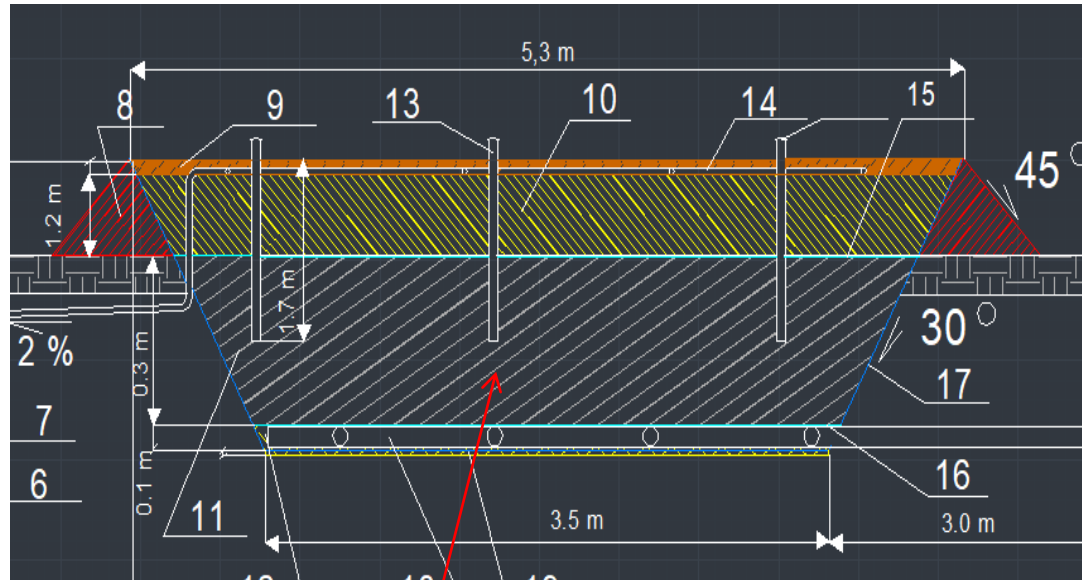
pumping station

Pumping station

- Is made of concrete.
- The depth of the pumping station is 2 meters and the diameter is 1 meter.
- In the pumping station there is a pump that is pumping sewage onto the vertical plant filter.

Individual wastewater treatment plant for a single household in Sokoły municipality

What is the new technology (5)?



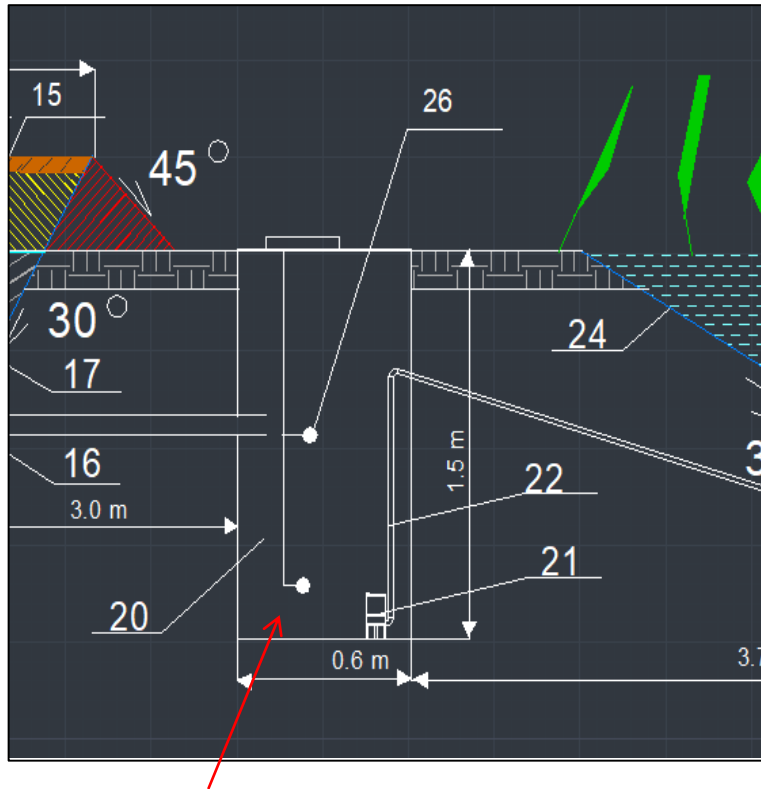
Vertical plant filter

Vertical plant filter is composed of the following layers (from the bottom):

- Sand \varnothing 0,5-2 mm, a layer of 2 cm,
- Geomembrane (PEHD foli) : thickness 1 mm,
- Gravel \varnothing 4-16 mm : a layer of 75 cm,
- Drainage pipelines in the layer of gravel,
- Geotextile,
- Calcined marl \varnothing 3-5 mm, a layer of 30 cm,
- Sand and gravel \varnothing 8-16 mm, : a layer of 120 cm,
- Hummus: a layer of 20 cm.

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What is the new technology (6)?



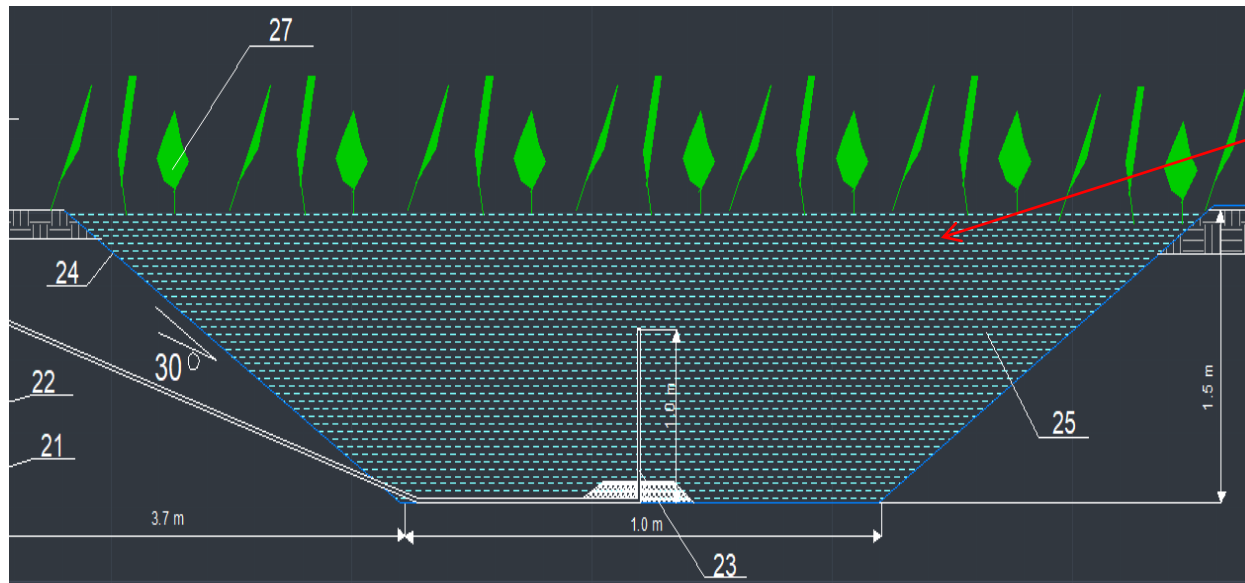
pumping station

2nd Pumping station

- Is made of concrete.
- The depth of the pumping station is 1,5 meters and the diameter is 0,6 meter.
- In the pumping station there is a pump that is pumping sewage into the denitrification pond.

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What is the new technology (7)?



denitrification pond

Denitrification pond:

it is the last element of the wastewater treatment plant and contains special plant species, which clean the water

Individual wastewater treatment plant for a single household in Sokoły municipality

How contracting processes were organized and implemented?

Steps that need to be taken to complete the building process of the Bruszewo treatment plant:

1. The Sokoły commune decides to build a sewage treatment plant in the primary school in Bruszewo.
2. Sokoły commune and Institute of Technology and Life Sciences make arrangements for building a treatment plant.
3. and Institute of Technology and Life Sciences designs the treatment plant for the school in the Sokoły commune.
4. The project of the sewage treatment plant made by ITLS is subject to analysis in terms of investment implementation.
5. The project of the sewage treatment plant with an application form is submitted to the district office in Wysokie Mazowieckie, to the building department (an installation with a flow lower than 7,5 m³/d does not necessitate a building permit).
6. The district office in Wysokie Mazowieckie has 21 days to object the building process. If they do not, Sokoły commune may begin the building process.
7. After the 21 days period the Sokoły commune announces a tender for the construction implementation of the treatment plant.
8. After contractor selection by Sokoły commune and contract signing, investment process begins. A deadline is set for around 14 days. ITLS supervises the whole process.
9. After the building process completion, the post-construction commissioning follows, with a start up.
10. During the whole process a documentation will be made in form of a movie and pictures.

Individual wastewater treatment plant for a single household in Sokoły municipality

Preliminary environmental, social and economic impacts of the pilot

We have different situation then other countries, because we do not change the pilot which we test for a single household (in Idźki-Wykno village) but we design and build a new installation for the school (in Bruszewo village).

That is why we decided to make **Life Cycle Assessment (LCA)** for two installations in the school according to training guidelines received in Helsinki:

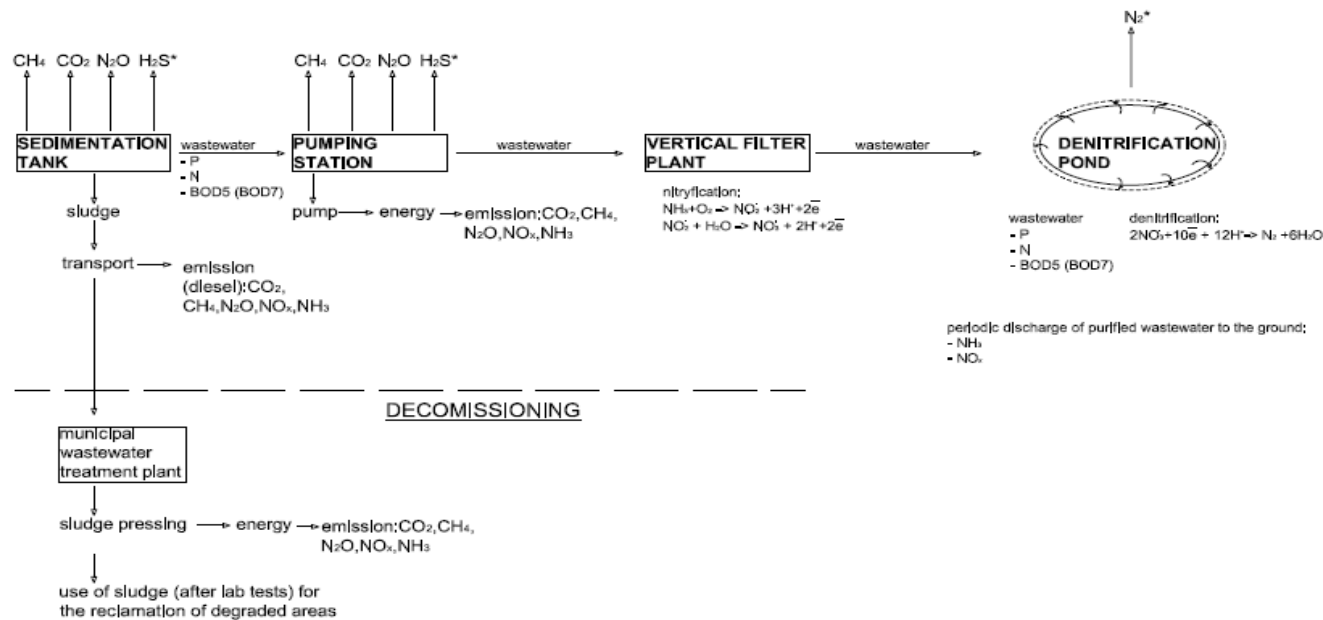
- 1) The old one – septic tanks
- 2) The new one – wastewater treatment plant designed by Institute of Technology and Life Sciences and built by Sokoły municipality

Individual wastewater treatment plant for a single household in Sokoły municipality

Preliminary environmental, social and economic impacts of the pilot

LIFE CYCLE ASSESMENT - USE PHASE

Pilot wastewater treatment plant in Sokoły municipality



* H₂S, N₂ - there are not a greenhouse gas

Individual wastewater treatment plant for a single household in Sokoły municipality

Overall conclusions

- 1) The best-fitting wastewater treatment technology for a single household and other buildings in Sokoły municipality is a wastewater treatment plant with a soil-plant bed and a denitrification pond.
- 2) The school in Bruszewo village doesn't have any wastewater treatment plant and the sewage is collected in old and leaky septic tanks.
- 3) The new wastewater treatment system for the school in Bruszewo village is based on the technology used in our pilot which we test for a single household in Idźki-Wykno village. It was designed by Institute of Technology and Life Sciences and Sokoły municipality will build this installation.
- 4) We are going to make Life Cycle Assessment (LCA) for the old and for the new installation in the school in Bruszewo village.

Thank you for attention !



 **Interreg**
Baltic Sea Region



EUROPEAN UNION

EUROPEAN
REGIONAL
DEVELOPMENT
FUND

VillageWaters

Institute of Technology and Life Sciences

Poland

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