



December 2020



# Pitkäjärvi runoff water treatment system in Mikkeli: **a perfect environment to test and develop filtration materials**

## Distances from Mikkeli

- 1. EU–Russia border 130 km
- 2. St. Petersburg 300 km
- 3. Helsinki 230 km
- 4. Kotka (port) 160 km
- 5. Stockholm 680 km



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# Pitkäjärvi runoff water treatment system

## KEYFACTS

- Built 2019, commission completed 2020
- Purifies runoff water that comes from the Karila area (flow of runoff water is approx. 50–1,000 l/min depending on time of year)
- Five equivalent filtration wells enable monitoring of five filtration mediums in parallel
- Owner and operator of the system: City of Mikkeli
- Partner in online monitoring and measurements: XAMK University of Applied Sciences

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# Runoff water processed in the Pitkäjärvi system

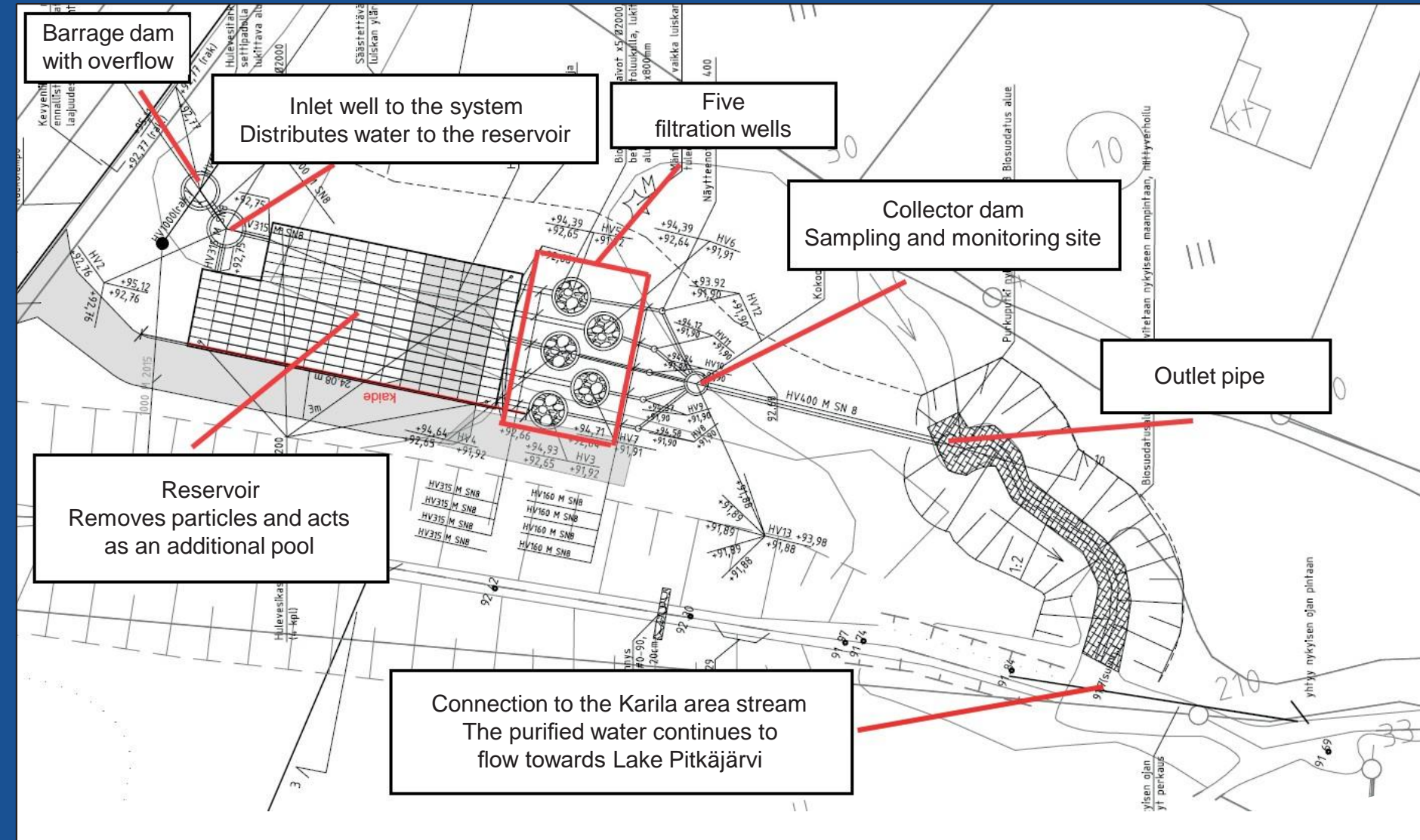
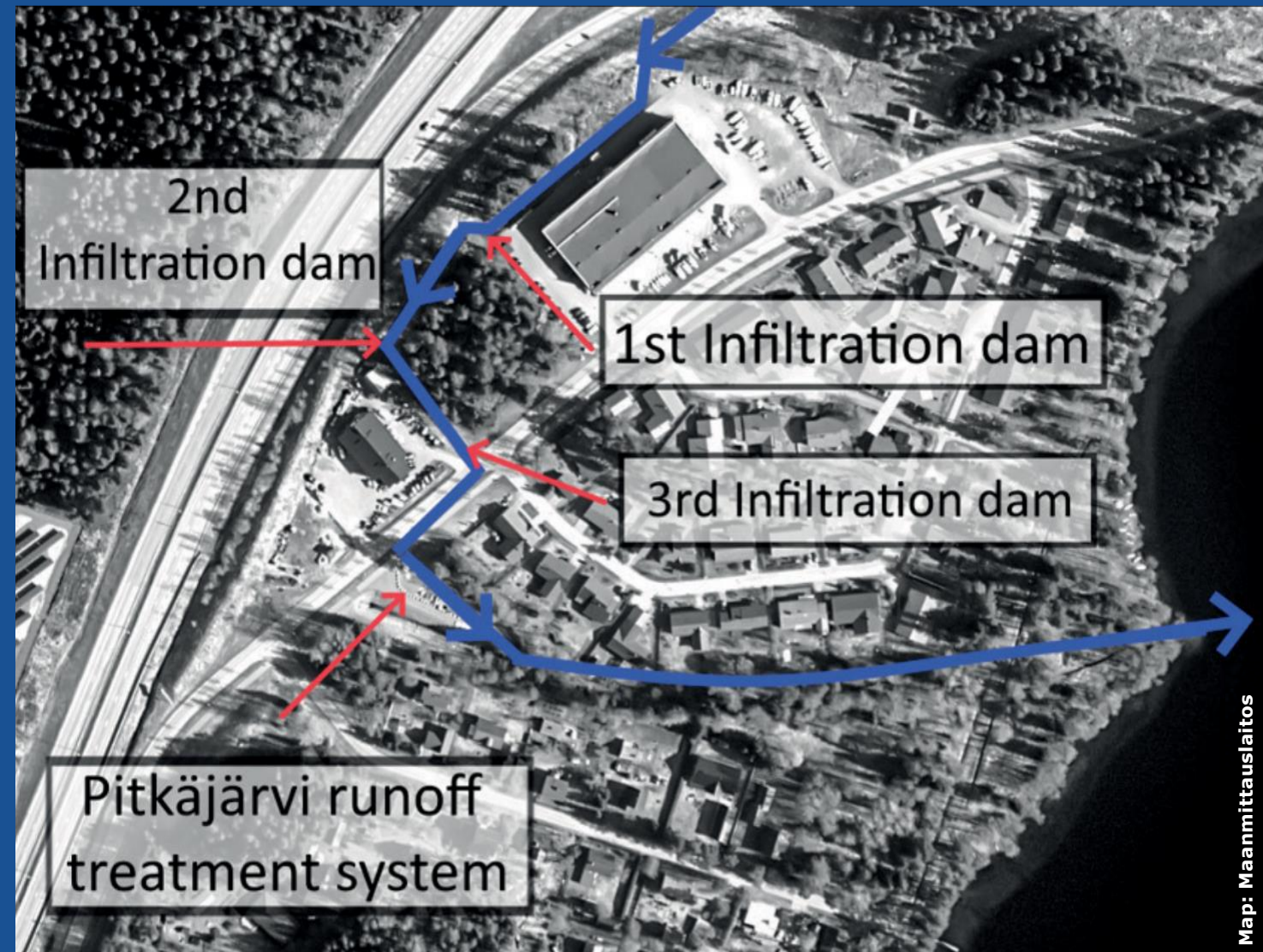
- Runoff from the Karila area. Land use of the catchment area is a mixture of urban and rural infrastructure: traffic areas, space-intensive commercial areas, local small-scale industry, other conurbation areas.
- Flow of runoff varies between 50 and 1,000 l/min
- **Key characteristics of runoff water:**
  - Turbidity 20–30 (FNU)
  - Suspended solids 15–19 mg/l (100–600 mg/l typical values)
  - Chloride up to 40 mg/l
  - Iron (Fe) 1,000–5,000 µg/l
  - Total nitrogen 800–1,900 µg/l (2,000–5,000 µg/l typical values)
  - Ammonium  $\text{NH}_4\text{-N}$  up to 200 µg/l
  - Total phosphorus up to 50 µg/l (200–600 µg/l typical values)
- Long time-series of flow, leaching and weather data available





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# Pitkäjärvi runoff water treatment system





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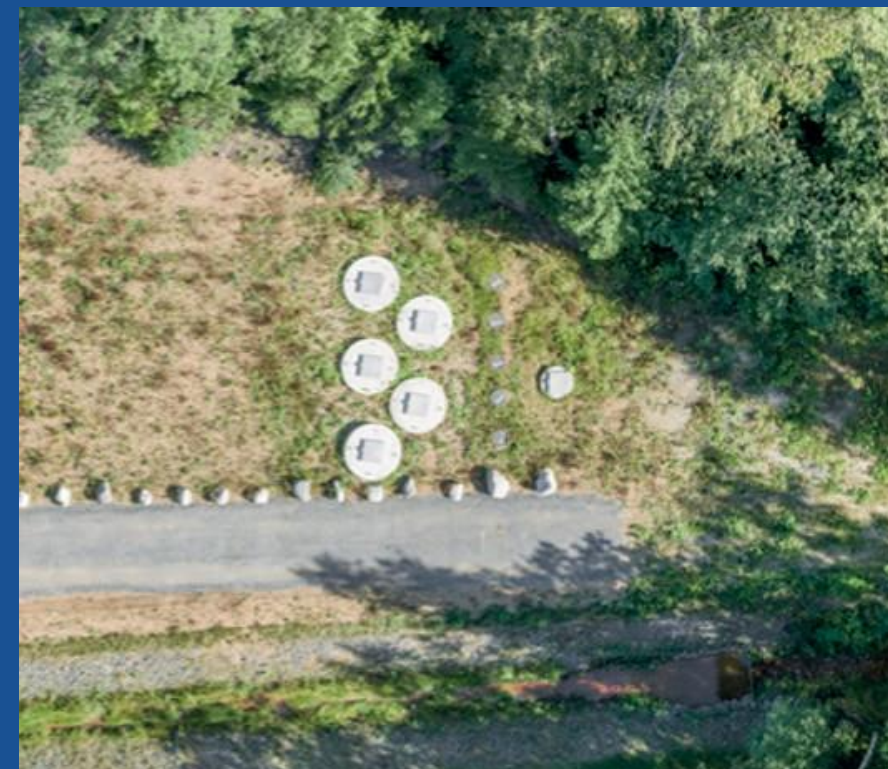
# Views of the runoff water treatment system and the surroundings



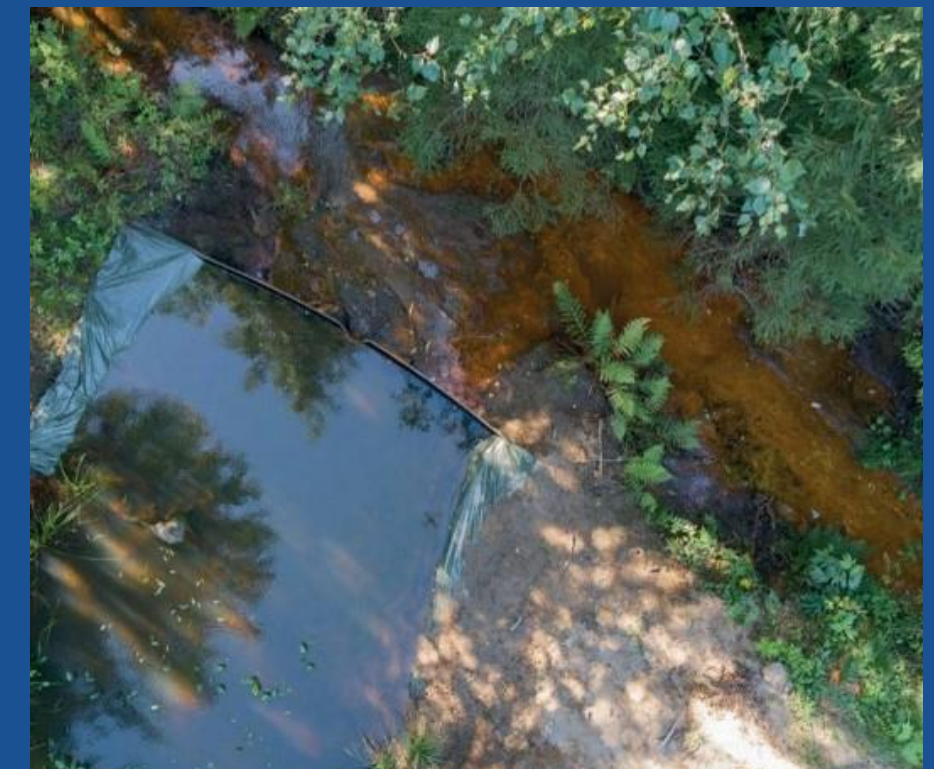
Discharge pipe



Infiltration dam



Filtration wells



Discharge flow dam



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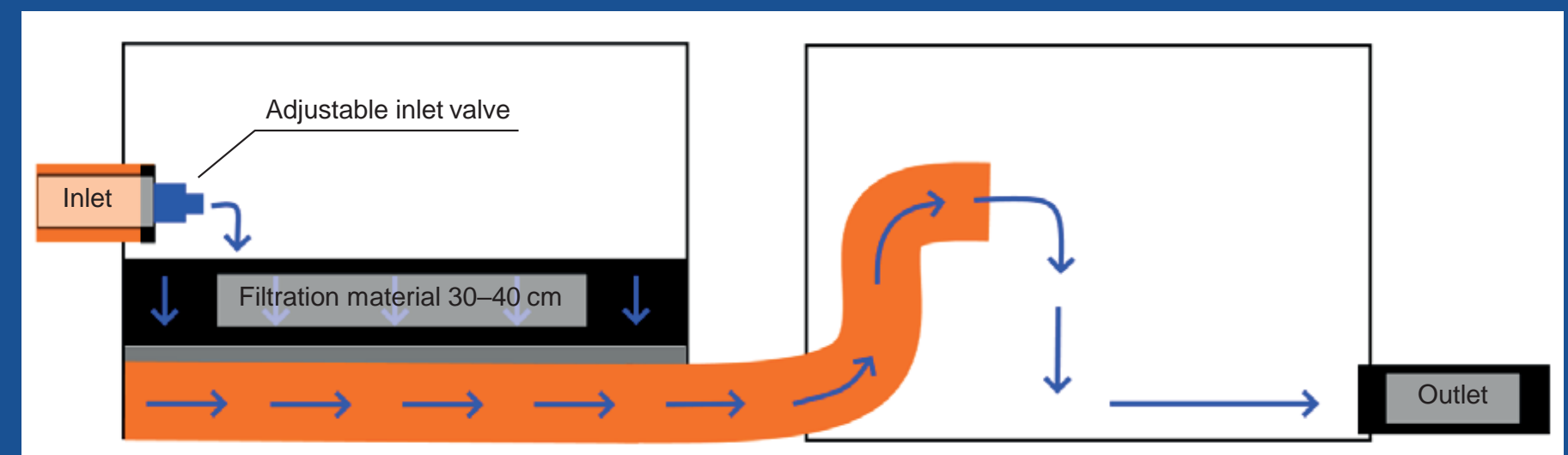
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# Filtration wells and sampling opportunities

- Five parallel filtration wells with adjustable water flow enable simultaneous monitoring of five different filtration materials
- Approximately 1.5 m<sup>3</sup> volume of filter medium per well  
(Well diameter 200 cm)
- Adjustable water flow  
3–200 l/min per filtration well  
(or up to 130 l/min per 1 m<sup>3</sup> filtration material)



Photos: Aki Mykkänen



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Huky-project photo / Photo: Manu Elomaa

## Commissioning of the system and experiences 2019-20

- Construction of the system 2019
- Commissioning of the system 2019-20
- In the commissioning phase, four types of biochar and crushed stone were used as filtration materials in the wells
- The system is available for companies and R&D organisations for testing filtration materials

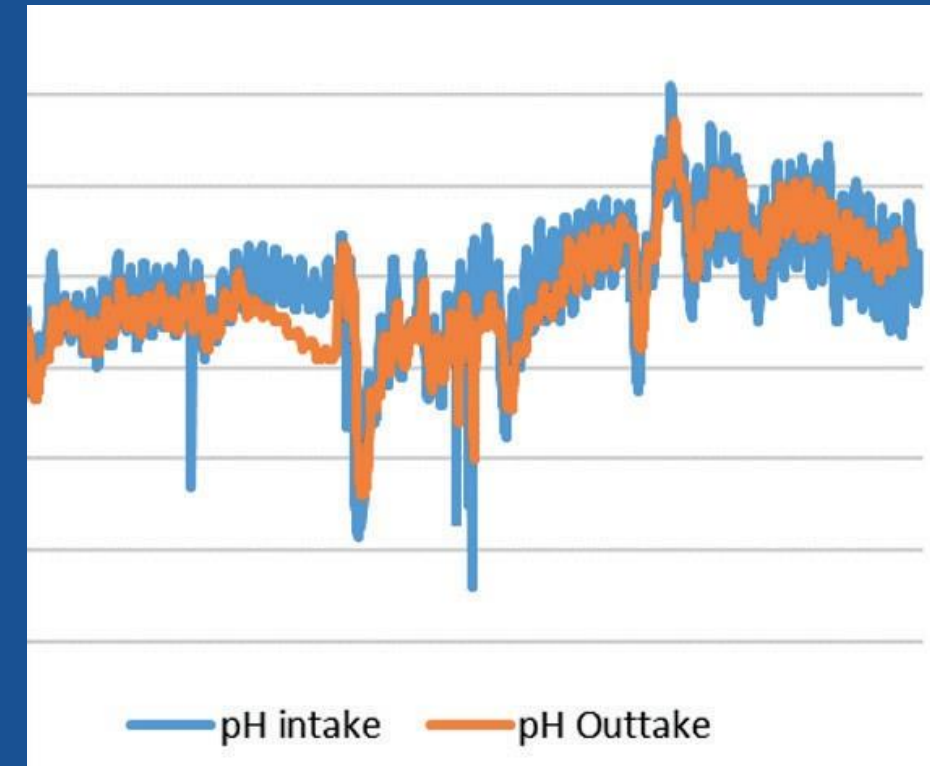
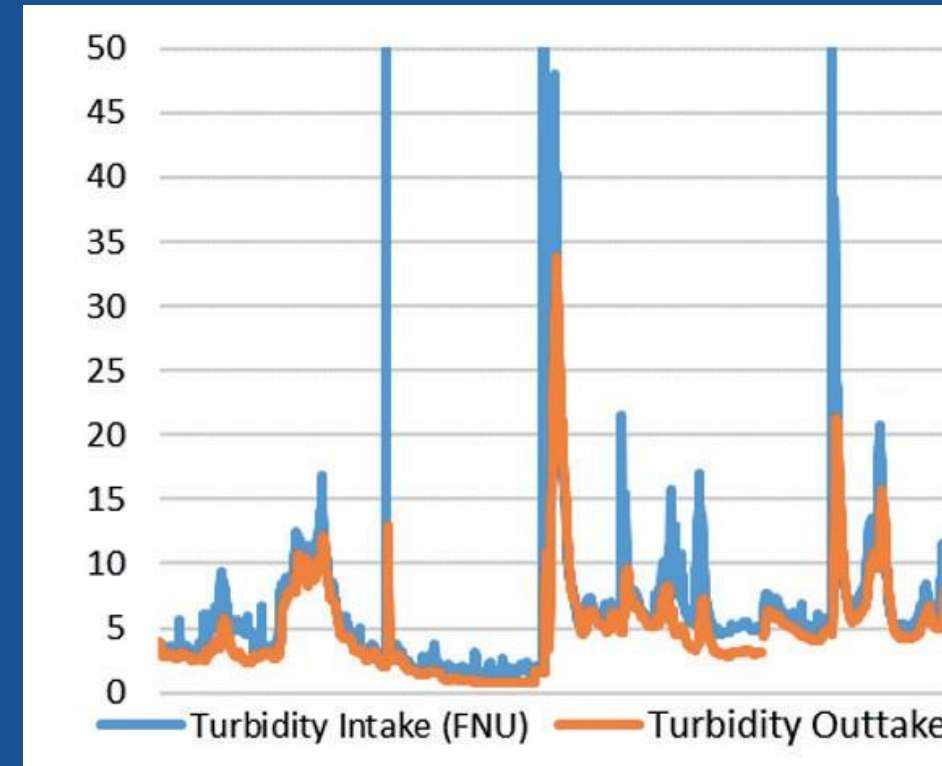
	Realised reductions* in filter wells 2019-20	
	Biochar wells	Control (crushed stone)
Turbidity (FNU)	Up to -55%	Up to -30%
Iron Fe ( $\mu\text{g/l}$ )	Up to -45%	Up to -35%
Ammonium $\text{NH}_4\text{-N}$ ( $\mu\text{g/l}$ )	Up to -65%	Up to -60%

\*Research ongoing: values are being updated constantly



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# Partner for R&D: Sampling and online monitoring available

XAMK – South-Eastern Finland University of Applied Sciences provides on-site R&D services including:

- **Sampling**
  - Sample analysis
- **Measuring and online monitoring**
  - Maintenance of equipment



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BLUE  
ECONOMY  
MIKKELI  
**BEM**

- The Pitkäjärvi runoff water treatment system is part of the Blue Economy Mikkeli (BEM) Water Hub.
- The BEM Water Hub focuses on water circularity and brings together experts from Mikkeli Waterworks, LUT University, XAMK University of Applied Sciences and a strong network of companies and RDI organisations excelling in water circularity.
- The BEM Water Hub offers research and development, testing and piloting environments and services in the laboratory, demonstration and at full scale for R&D organisations and companies.
- The BEM Water Hub offers innovation and business acceleration services and helps start-ups and SMEs to get started with new ideas.

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University



# Contact information

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European Union  
European Regional  
Development Fund

Leverage from  
the EU  
2014–2020



Centre for Economic Development,  
Transport and the Environment

This presentation has been prepared as a part of "Storm water R&D facility utilising bio-char" -ERDF project.