



December 2020



Photo: Juha Vihavainen

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



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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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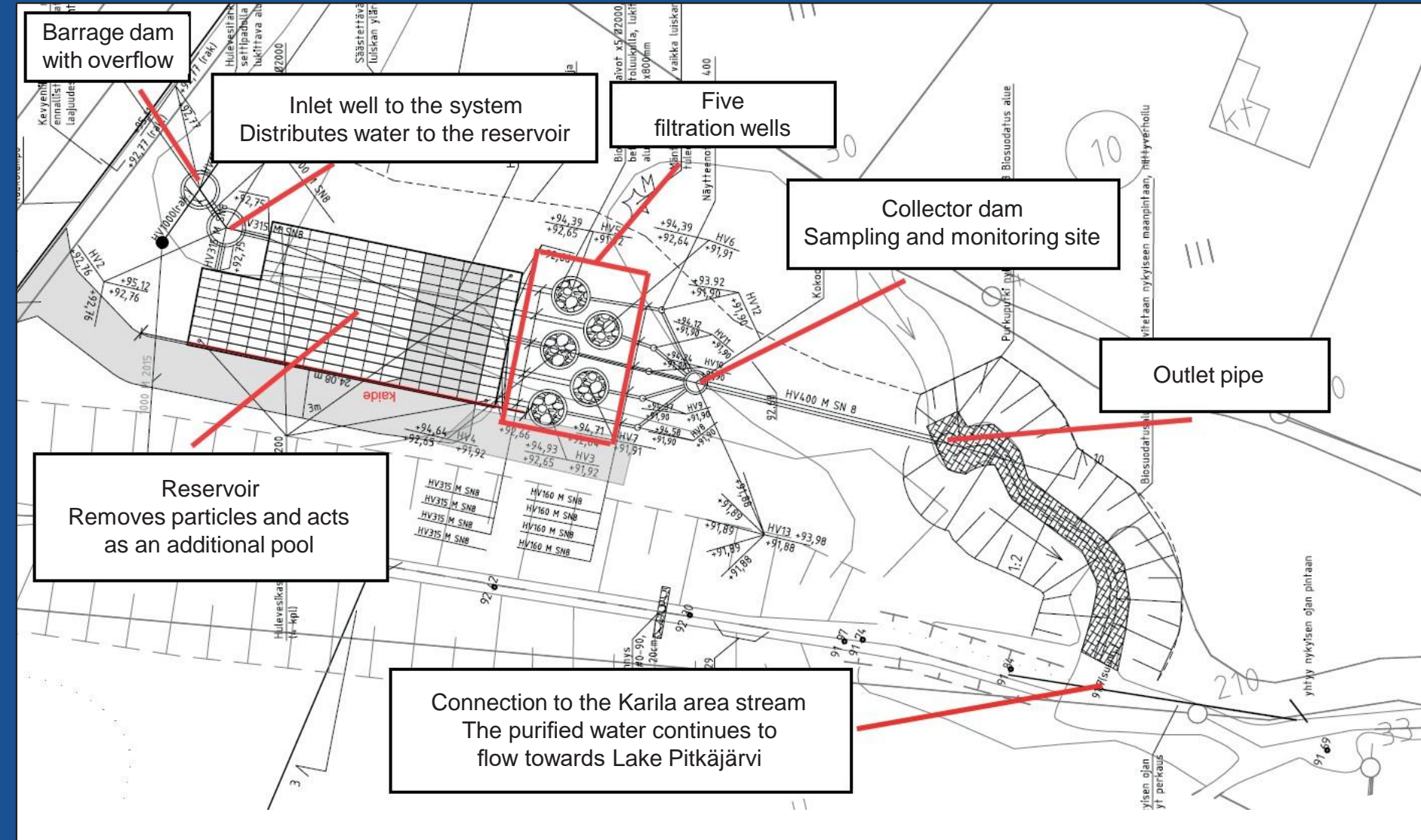
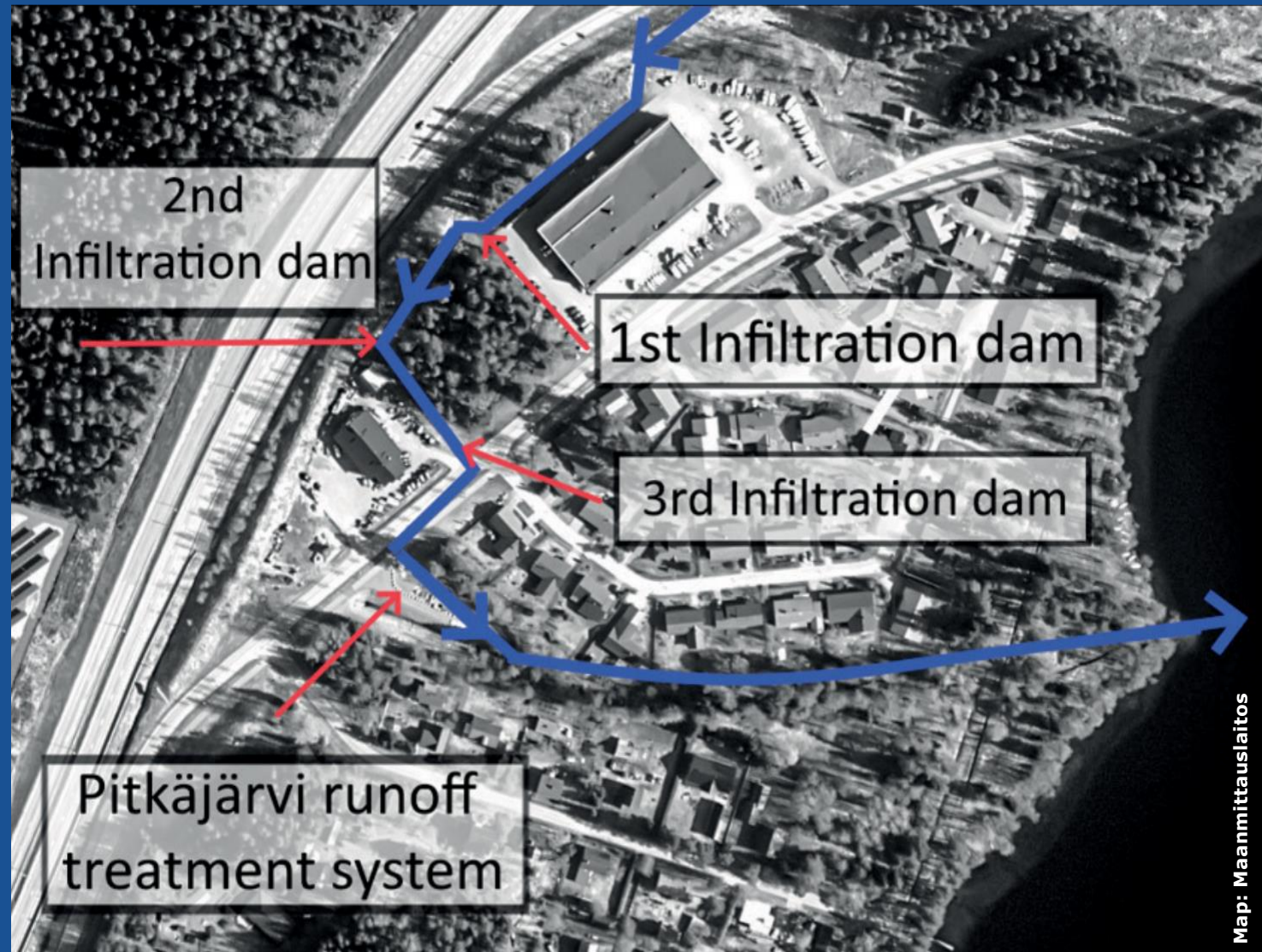
Runoff water processed in the Pitkäjärvi system

- 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 NH₄-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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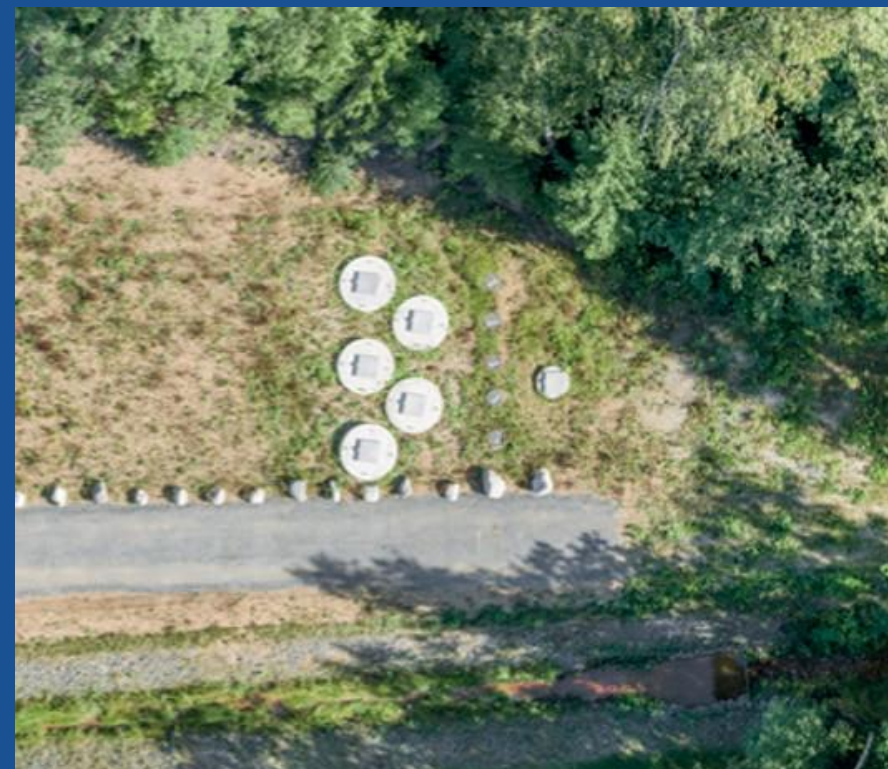
Views of the runoff water treatment system and the surroundings



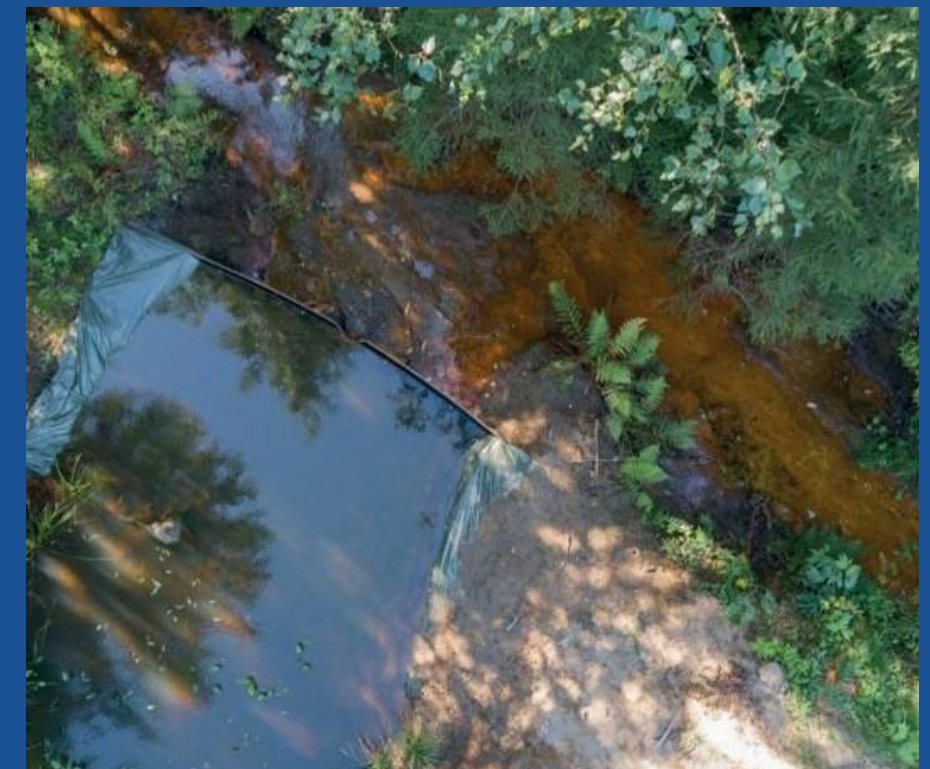
Discharge pipe



Infiltration dam



Filtration wells



Discharge flow dam

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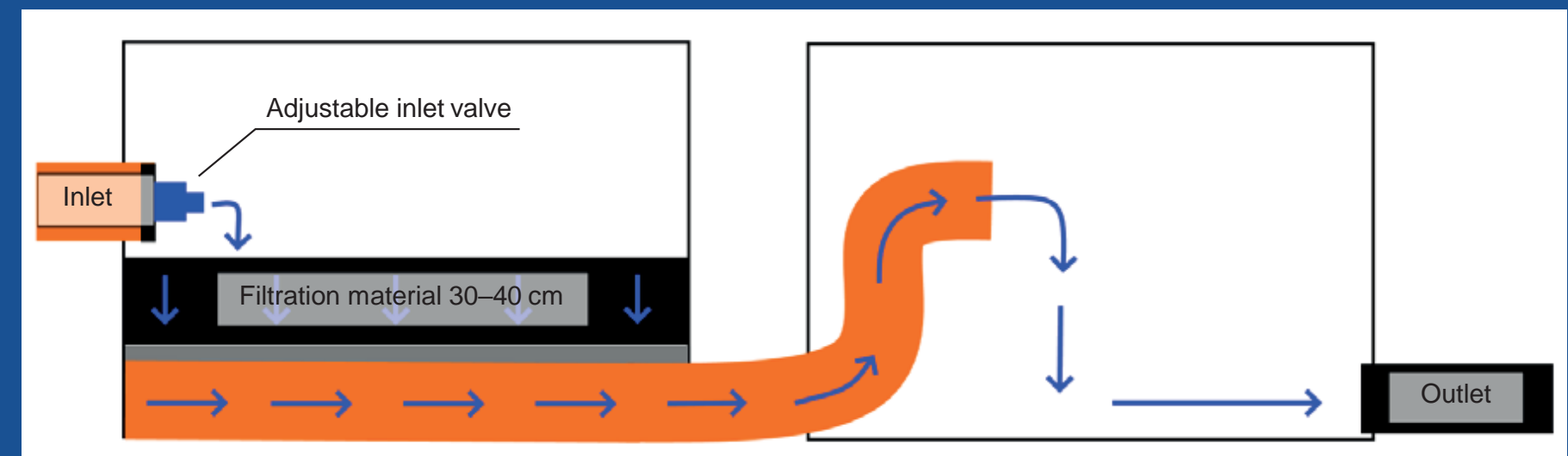
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Filtration wells and sampling opportunities

- Five parallel filtration wells with adjustable water flow enable simultaneous monitoring of five different filtration materials
- Approximately 1.5 m³ 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 m³ filtration material)



Photos: Aki Mykkänen





Huky-project photo / Photo: Manu Elomaa

Commissioning of the system and experiences 2019-20

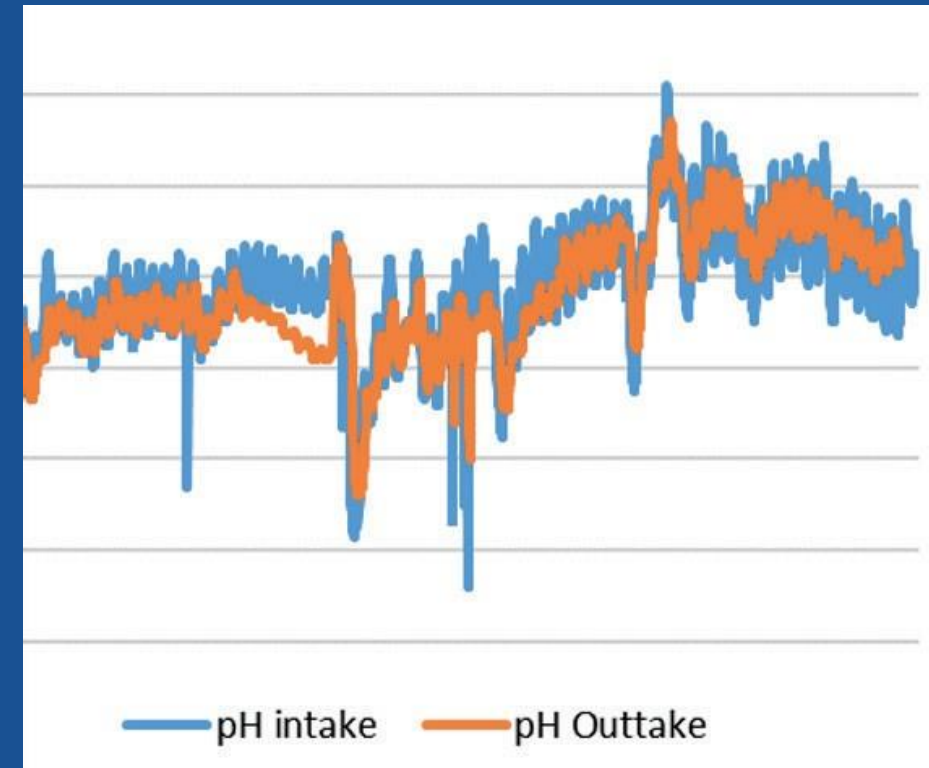
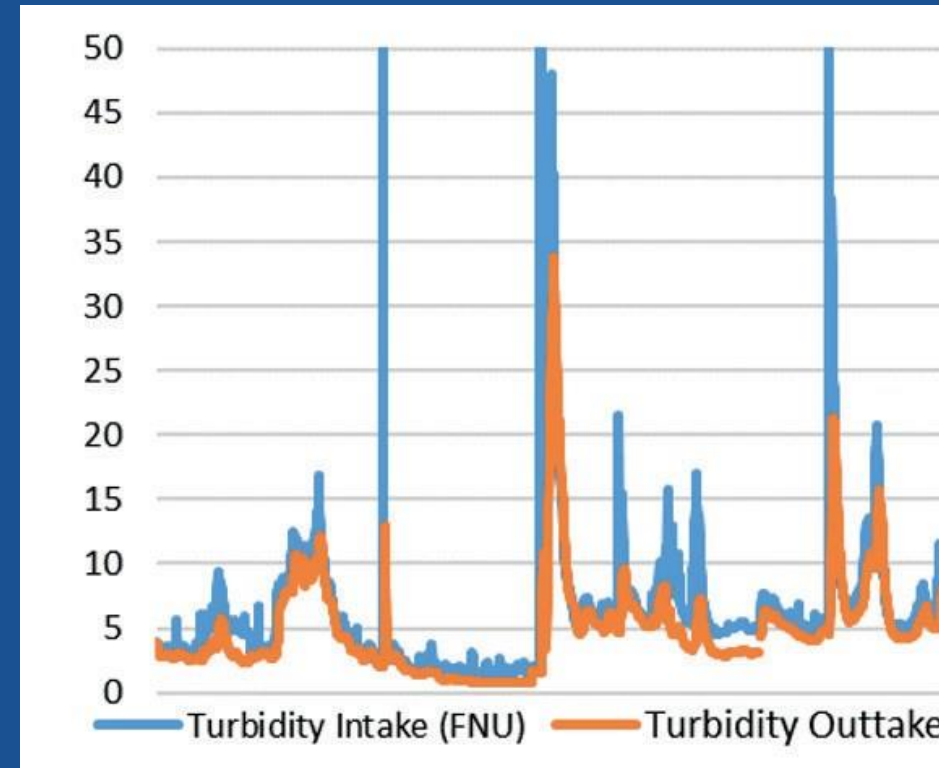
- Construction of the system 2019
- Commissioning of the system 2019-20
- In the commissioning phase, four types of biochar and crushed stone were used as filtration materials in the wells
- The system is available for companies and R&D organisations for testing filtration materials

	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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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.