Interreg

Co-funded by the European Union

Central Baltic Programme

MUSTBE

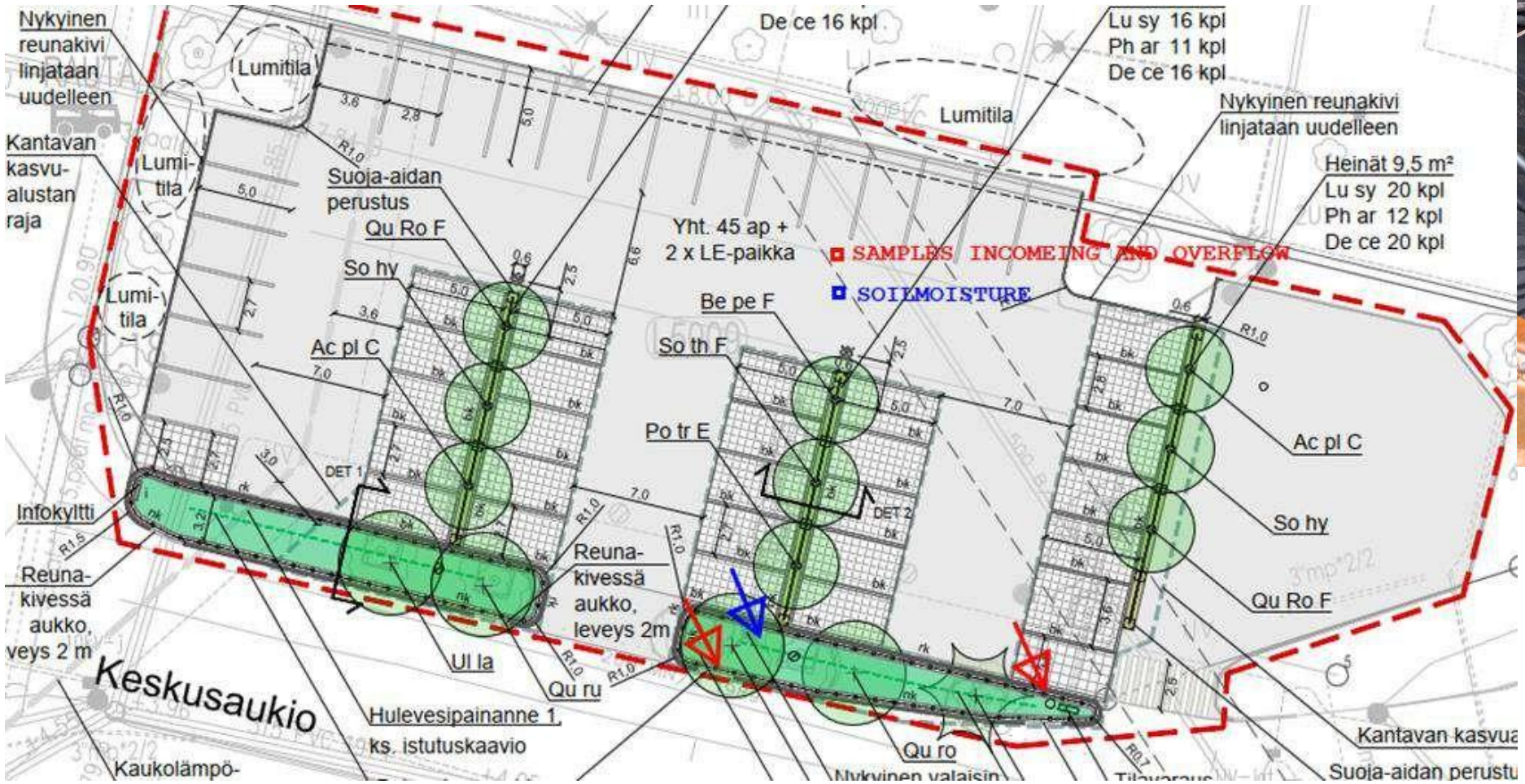
Multidimensional storm water treatment in urban areas for cleaner Baltic Sea

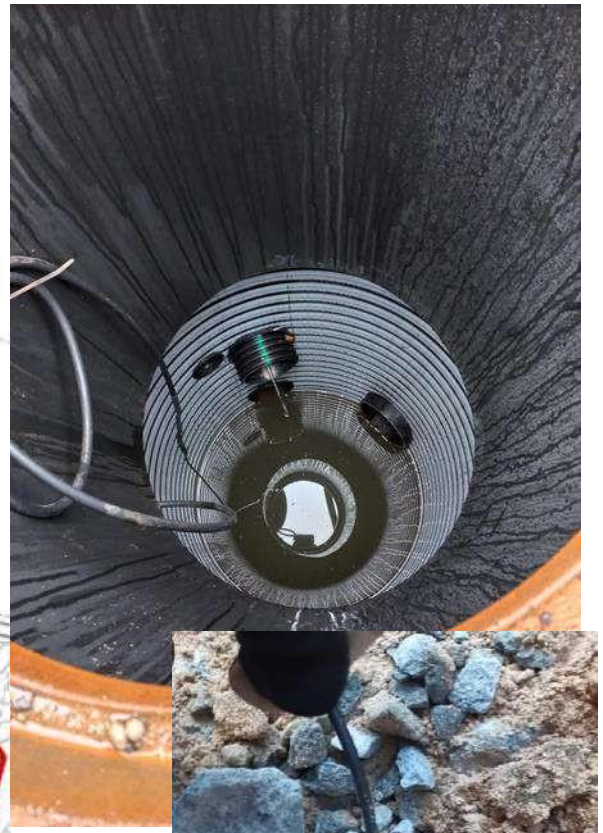
MUSTBE partner meeting
Söderhamn

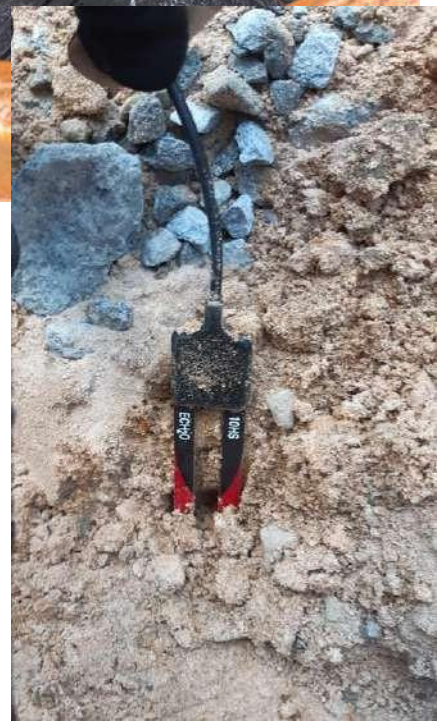
April 2025

City of Pori, Aleksi Siirtola and Marjatta Halme

Design plan of Keskusaukio parking place pilot site







Pilot Keskusaukio parking place, monitoring

Water quantities to be measured at the site (continuous)

- Soil moisture
- Depth to groundwater (one time)
- Precipitation (FMI weather station)
- Flowrate total volume (water that flows to pipe network)

Water quality analyses from samples at rain events

- N total nitrogen
- P total phosphorus
- SS suspended solids in stormwater
- Heavy metalls (liquid and solid),
- Conductivity
- Hydrocarbons

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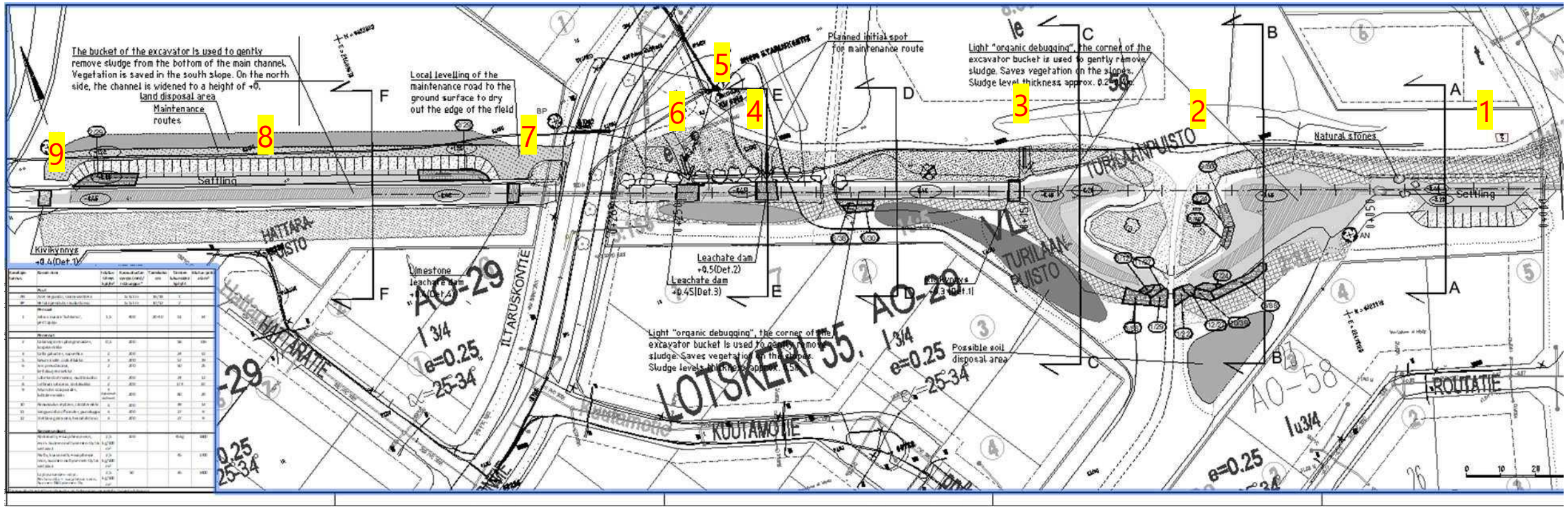
Wetland pilot at Lotskeri

Our targets: Reduce Suspended soils, increase pH so that flocculation starts at second Retention basin



Water flows from right to left (height difference is very small)

1. Retention basin 2. Wetland 3. Stone dam 4. Biochar filterdam 5. Pumping station for residental areas stormwaters and subsurface drain waters, 6. Second biochar filterdam 7. Hollowstone/limestone filterdam 8. Retention basin 9. stone dam

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Mesurements from Lotskeri wetland

The wetland has **two pH meters and a flow meter**. There have been done studies to determine which filter materials would precipitate dissolved/soluble metals best. We chose **pumice** (hollow stone) **and limestone as neutralizing material.** Biochar has already proven to be an effective neutralizer of acidic water in other dams we have.

Weather station nearby so that we can monitor the water volume

Measurements are online can be read from server and are in **real-time**

We are measuring pH *2, the volume of water discharging, perched ground water level, amount of rain, temperature of water and air and total rainfall. Some extra too.

we are allowed to dump the dredged material in the area around the wetland after neutralizing them

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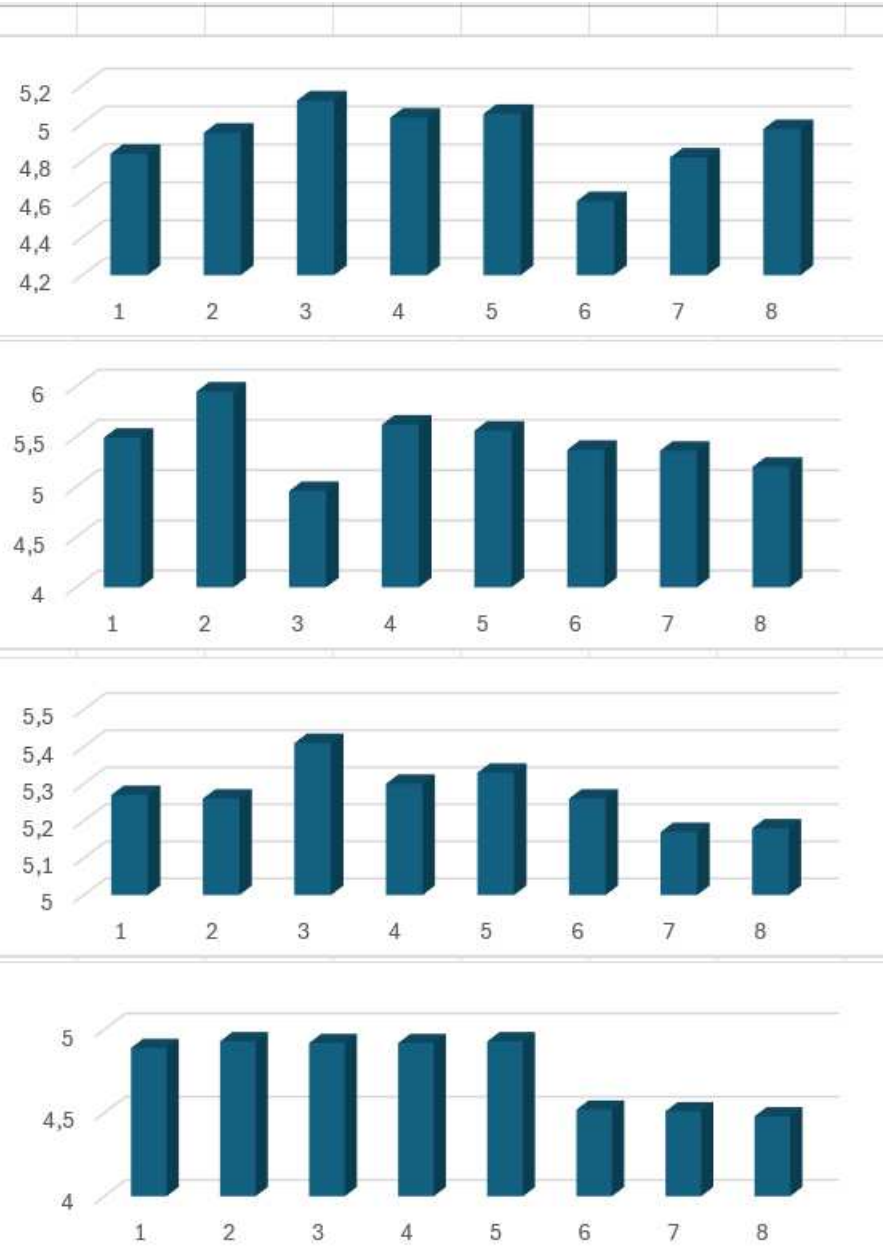
pH-measurements 2024-2025 at wetland

Date	place	pH käsimittari	°C water
8.10.2024	1	4,84	7,1°C
8.10.2024	2	4,95	7,5°C
8.10.2024	3	5,12	7,4°C
8.10.2024	4	5,03	7,7°C
8.10.2024	5	5,05	7,6°C
8.10.2024	6	4,59	9,0°C
8.10.2024	7	4,82	8,9°C
8.10.2024	8	4,97	8,0°C
10.3.2025	1	5,49	1,3
10.3.2025	2	5,95	1,4
10.3.2025	3	4,96	0,5
10.3.2025	4	5,62	1,7
10.3.2025	5	5,56	1,7
10.3.2025	6	5,37	3,1
10.3.2025	7	5,36	2,6
10.3.2025	8	5,2	3,9
1.4.2025	1	5,27	4,1
1.4.2025	2	5,26	4,7
1.4.2025	3	5,41	5,5
1.4.2025	4	5,3	5
1.4.2025	5	5,33	5,3
1.4.2025	6	5,26	5,5
1.4.2025	7	5,17	5,2
1.4.2025	8	5,18	5,2
10.4.2025	1	4,89	4,2
10.4.2025	2	4,93	3,5
10.4.2025	3	4,92	5,3
10.4.2025	4	4,92	5
10.4.2025	5	4,93	5
10.4.2025	6	4,52	5,6
10.4.2025	7	4,51	5,1
10.4.2025	8	4,48	4,8



Havaintopaikka		MUSTBE-Baseline	MUSTBE Wetland	MUSTBE after wetland
Ottopäivämäärä		10.3.2025 10:15	10.3.2025 10:15	10.3.2025 10:15
Näytteen lisätietoja		clear water	clear water	some metallic water surface
Lämpötila	°C	3,0	3,0	3,0
Nitric acid treatment, Typpihappohajotus		done	done	done
As soluble, Arseeni, liukoinen (0,45 µm)	µg/l	0,41	0,4	0,45
Cd soluble, Kadmium liukoinen (0,45 µm)	µg/l	0,62	0,54	0,6
Cr soluble, Kromi, liukoinen (0,45 µm)	µg/l	< 1	< 1	< 1
Cu soluble, Kupari, liukoinen (0,45 µm)	µg/l	4,4	5,8	5,7
Ni soluble, Nikkeli,liukoinen (0,45 µm)	µg/l	58	54	60
Zn solub.e, Sinkki, liukoinen (0,45 µm)	µg/l	130	130	150
Al soluble, Alumiini, liukoinen (0,45 µm)	µg/l	2400	2100	2000
Mn soluble, Mangaani, liukoinen (0,45 µm)	µg/l	1600	1500	1500
Fe soluble, Rauta, liukoinen (0,45 µm)	µg/l	260	3200	2100
As toltal, Arseeni (kokonais)	µg/l	0,29	0,34	0,28
Cd total, Kadmium (kokonais)	µg/l	0,76	0,68	0,76
Cr total, Kromi (kokonais)	µg/l	< 1	< 1	< 1
Cu total, Kupari (kokonais)	µg/l	6,3	7,5	7,0
Ni total,	µg/l	62	59	63
Zn total, Sinkki (kokonais)	µg/l	150	150	160
Al total, Alumiini (kokonais)	µg/l	5000	4000	3900
Mn total, Mangaani (kokonais)	µg/l	1900	1800	1900
Fe total, Rauta (kokonais)	µg/l	1200	4700	3400
Alkaliniteetti	mmol/l	0,073	0,032	0,035
P total, Fosfori, kokonainen	µg/l	47	17	14
TSS Total Suspended Solids 1,2µm (GF/C)	mg/l	15	10	8,3
pH		5,2	5,0	5,0
Sähkönjohtavuus	mS/m	85,9	80,3	83,0
Typpi, kokonainen	µg/l	4600	4900	4800
Sulfaatti	mg/l	310	290	300

despite challenging circumstances,
there is still some life ☺

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THANK YOU!

Aleksi Siirtola and Marjatta Halme, City of Pori