Interreg North-West Europe SURICATES

European Regional Development Fund

Baseline monitoring at a pilot site for sediment reuse

Bowling, Scotland, September 2018

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Geoscience for a sustainable Earth

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An INTERREG NWE project aimed at increasing the beneficial use of dredged sediments for climate change adaptation, flood protection and coastline defence. It addresses:

European policy on Circular Economy

EU Waste strategy

Sustainable water transport

Dredged sediments are one of the biggest potential waste flows, according to regulations.

Dredged sediments over 200 Mm3/y (80 Mt dry weight) in the EU

Current practice: relocation at sea (marine sediments), **on land disposal** (inland waterways)

Sediments are part of our potential mineral resources for civil engineering (but also of our environment).

=> Sediments are eligible to circular economy thinking (SedNet, 2019)

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Which opportunities for valorisation ?
Focus on low cost, large volume solutions, to avoid market bottlenecks
Minerals for civil engineering—Reducing sand or clay extraction
Climate change, erosion and flood risk increase require greater mitigation measures (strengthening or regeneration of harbour/river banks, beach nourishment), consuming high volumes of natural resources

Bowling pilot

Clyde river bank brownfield

Bowling pilot

Clyde river bank brownfield
Former oil terminal and shipyard
Downstream older Glasgow area coal and metallurgy sites
Abandoned land with uncontrolled waste disposal

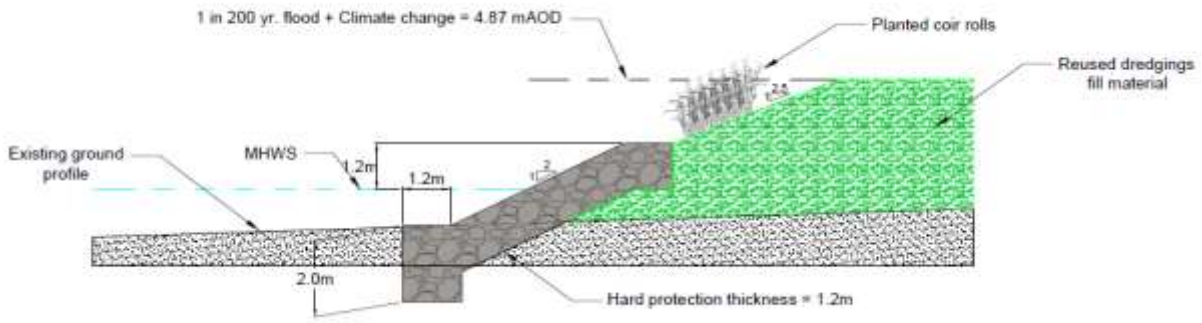
Bowling pilot

Bowling pilot

Property development, woodland, cycle path on former railway

Bowling pilot

Shoreline reinforcement, flood protection



Sediment will be applied on low-lying areas for land uplift and flood mitigation, and used to construct coastline protection

Baseline monitoring

Collecting environmental data (soil, sediment, water) at the pilot site before pilot works begin.
Data will be used as a reference for comparison during and after work

On-site pXRF monitoring

Soils over the pilot area
Beach sediments on Clyde side
Sediments to be dredged

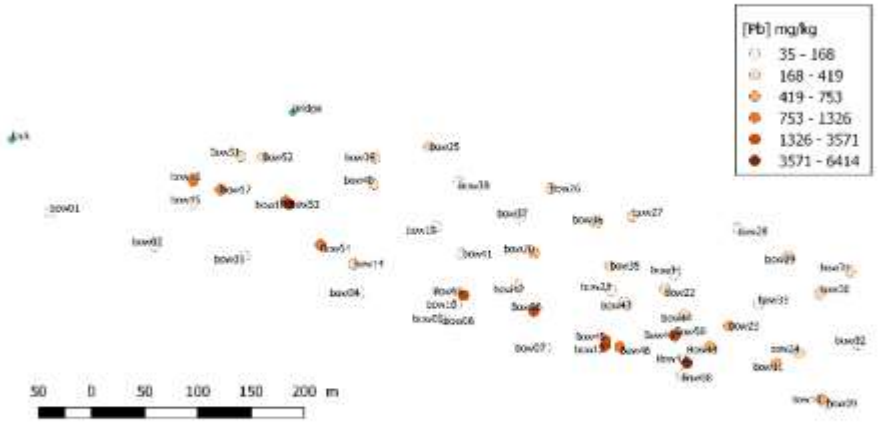
High density site mapping
Samples selection for lab analyses
Testing feasibility of the method for potential inorganic contaminants

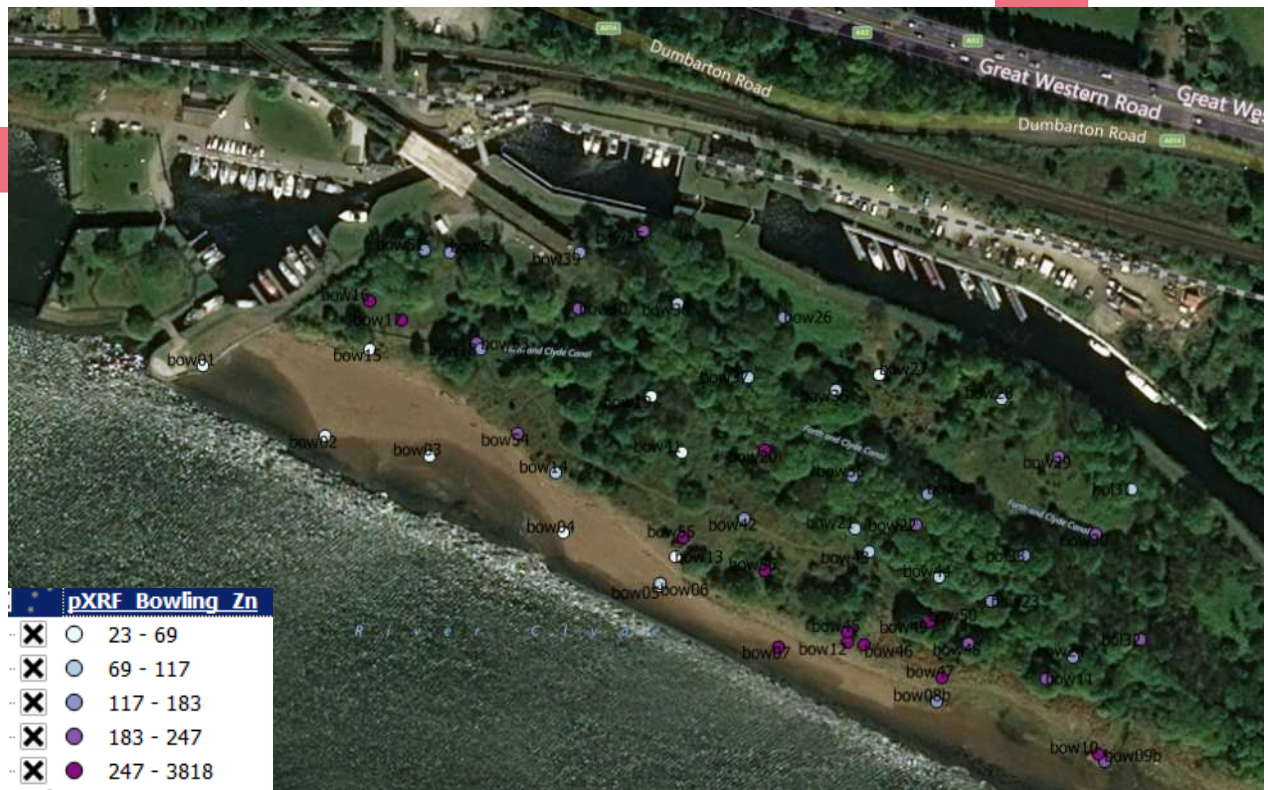
Beach sediments

pXRF direct measurement

Soils in forested area

Sieved (2 mm) and homogenised





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Element maps

Pb and Zn in mg/kg

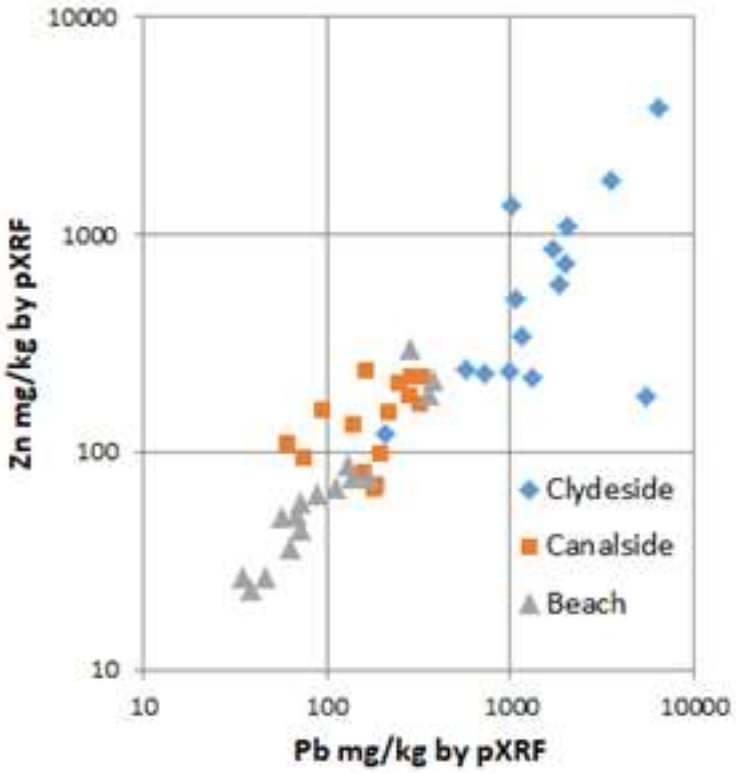
Soil and beach sediment pXRF baseline monitoring

Beach sediment

No significant contamination observed. Tidal effects cleared earlier industrial contamination, at least near the surface

Soil in forested area

Minor contamination North of the forme railway line
Significant Pb-Zn contamination betwee line and Clyde
Contaminated historic river sediments deposition
Contaminated waste disposal ?



Dredged sediment samples

On-site filter press dehydration

For pXRF measurement

Water monitoring Physicochemical logging using observation wells

Multi-parameter probe

pH, EC, DO, turbidity measurement

Shallow groundwater survey from existing observation wells (multiparametric probe profiles and adaptive water sampling).
Does not supersede the regulatory requirements, but is aimed at demonstrating how field measurements can be used at the early design stage and to facilitate effective site monitoring.

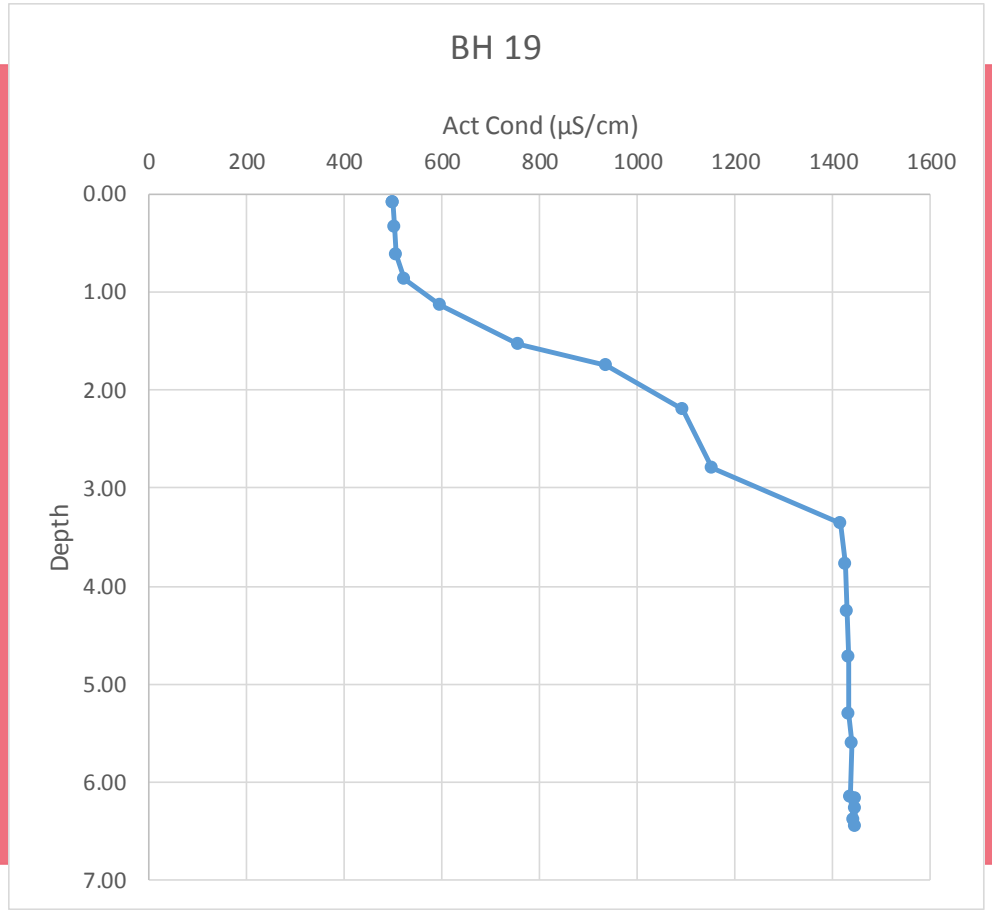
Water monitoring Physicochemical logging using observation wells

Wells in forested area

Shallow aquifer mapping

Water monitoring Physicochemical logging using observation wells

Tidal effects
Shallow aquifer stratification



Shallow groundwater baseline monitoring

On-site analyses

No pH or ORP anomaly or significant variation
Major EC/salinity variations with depth
Water level linked with tide

Laboratory analyses

Ongoing work

Applications for pilot test

Before and after pilot

High density multi-element site mapping

Make sure that site contamination is lower after sediment application

Easy communication with community

During pilot operations

Verification of sediment loads prior to application

Thank you, any questions ?