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Transitioning Surface Water Collection to Surface Water Reuse Systems

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Aim of project

This project explored the potential in Scotland to capture and reuse surface water in urban areas for non-potable purposes, to help reduce both pressure on the existing sewer network and consumer demand for clean water supplies. It focused specifically on improving our understanding of

- i. potential surface water sources and place-based solutions for reuse in different urban settings;
- ii. current regulatory requirements and legislative barriers to non-potable reuse of untreated surface water in Scotland;
- iii. technical feasibility for surface water pre-treatment to widen potential non-potable reuse applications; and
- iv. environmental and socio-economic drivers, and consumer enthusiasm,

to enable a transition to widespread surface water reuse in Scotland as an integral part of water efficiency targets and incentivisation (i.e. through mitigating future increases in water charges).

Background

The Centre of Expertise for Waters (CREW) commissioned this capacity building project to support Scottish Water's *Surface Water Policy* to reduce the volumes of rainwater entering their combined sewer networks. In addition, Scottish Water's *Climate Change Adaptation Plan* describes how warmer and drier summers may increase the risk of deteriorating raw water quality,

Research questions:

1. What can be learned from examples of water reuse in surface water management networks in the wider UK and internationally?
2. What are the potential water sources and estimated volumes for reuse within Scotland's current surface water management network?
3. What are the key opportunities, limitations, challenges and practicalities of implementing surface water reuse in Scotland?
4. What are the key recommendations for next steps in the implementation of surface water reuse in Scotland?

droughts and water security issues; while more frequent and more extreme storms will disrupt Scottish Water's assets and service provision. Transitioning surface water collection and treatment systems to surface water providing systems can enable water reuse in the urban environment, with the potential to collect and reuse rainwater for non-potable uses, such as non-crop irrigation, green space cultivation, municipal cleaning activities, vehicle washing, and industrial cooling applications, supporting this ambition. This proactive approach can help reduce sewer flooding and overflows, while reducing demand for potable water supplies, and aligning with Scottish Water's *Circular Economy Approach* to reduce waste in the delivery of water and wastewater services (see Figure 1).

Key findings

The project identified a high level of knowledge and understanding of different surface water reuse technologies and methods, evidenced across UK and international examples of best practice. Clear knowledge gaps, however, remain around the lack of documented case studies in Scotland. This highlights the urgent need for pilot projects to assess opportunities and challenges around surface water reuse and identify the types of reuse schemes that should be prioritised. There is also a lack of enabling policy and legislation around water reuse in Scotland, specifically within the land use planning system and building standards. The lack of financial incentives and/or statutory water consumption targets further disincentivise developers and the public from adopting more water efficient practices.

Surface water reuse scenarios at eight sites across Dundee (i.e. residential, commercial and industrial areas; schools, universities and hospitals) demonstrate the significant potential for reuse schemes to contribute positively to reducing potable water demand (for non-potable uses) and surface water runoff entering the combined sewer network. These reuse scenarios were modelled during “wet” and “dry” years, with their feasibility considered over a range of different surface water sources and scales, including rainwater harvesting from roofs, surface water collection from paved areas, and direct abstraction from the stormwater sewer network. (See main report and Annex E for further information).

A stakeholder workshop, held as part of the overall project deliverables, indicated widespread support and enthusiasm for the adoption of surface water reuse in Scotland. Key barriers identified related to (i) strategic leadership, individual stakeholder responsibilities, and cross-sectoral engagement and collaboration (including with the public), (ii) costs vs benefits of adapting current surface water infrastructure including sustainable drainage systems (SuDS) to support water reuse, and (iii) how water quality needs and expectations can be met and monitored.

Project Recommendations

- i. To develop pilot projects that address technical challenges and innovations around water reuse, including establishing water quality and quantity protocols for non-potable uses.
- ii. To use public engagement and education to address misconceptions around water scarcity in Scotland, promoting and incentivising water efficiency, and supporting community-based activities that encourage surface water reuse for non-potable uses.
- iii. To develop guidance on the wider social and environmental benefits from blue-green infrastructure and in the adoption of surface water reuse to enhance biodiversity, nature capital and public amenity value of urban greenspaces.
- iv. To advocate for changes to existing policy and legislation that enable and incentivise the transition to greater water efficiency and surface water reuse.

Responsibility for these actions lies predominantly with the *Scottish Government* (through funding provision, policy & legislation), *Scottish Water and local authorities* (through project implementation, monitoring, community engagement). Other stakeholders such as *SEPA, NatureScot*, businesses and the general public all have crucial roles in ensuring the potential environmental and socio-economic benefits of surface water reuse in Scotland can be fully realised.

Please use the QR code provided to access the full project outputs.

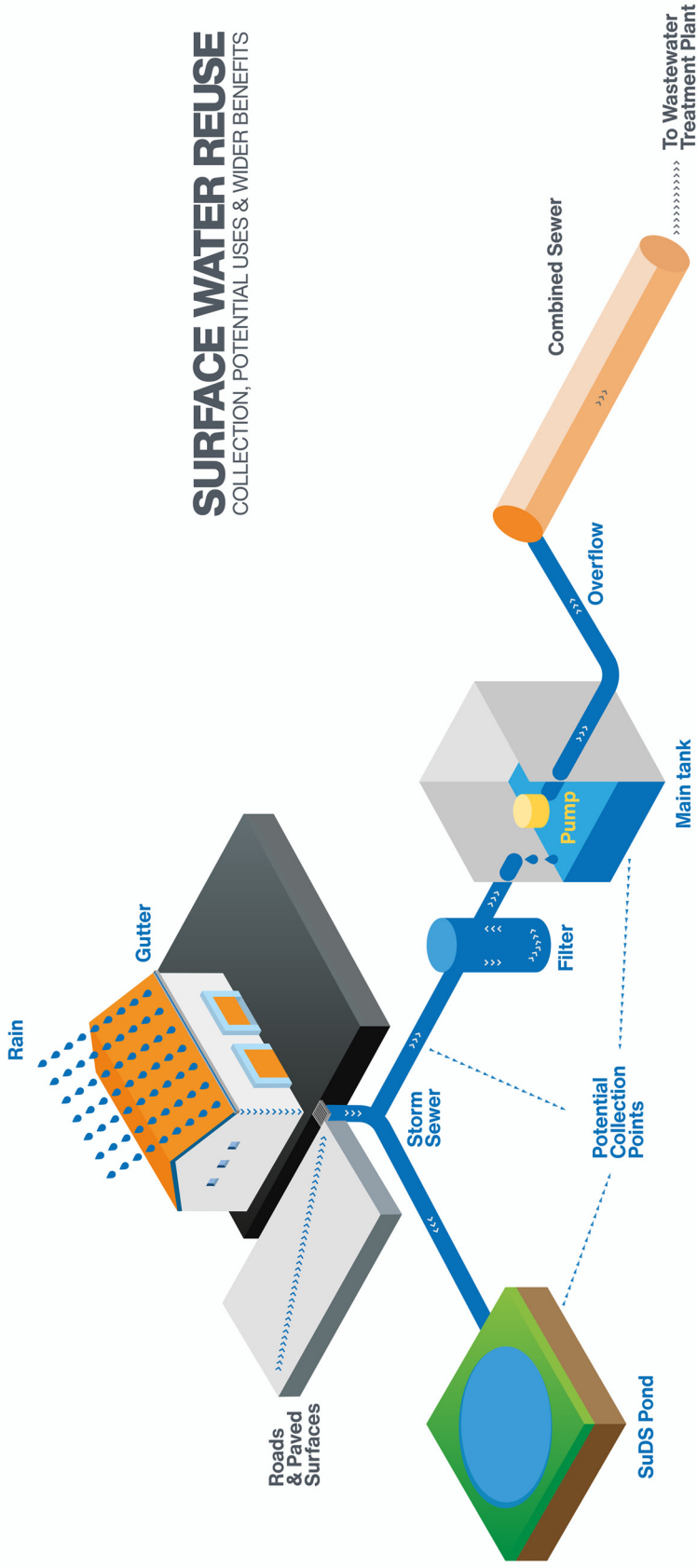
Please reference this project summary as follows: Cuthbertson A., Wade R., Black A., Duffy A., Hendry S., Leask F., Ralph E., Sezen E., Varghese A. and Ward K. (2026) *Transitioning Surface Water Collection to Surface Water Reuse Systems*. Research Summary. CRW2024_06. Scotland's Centre of Expertise for Waters (CREW).

To access the outputs for this project, please visit: <https://www.crew.ac.uk/publications/transitioning-surface-water-collection-to-surface-water-reuse-systems>. Please contact enquiries@crew.ac.uk to request report in alternative format.



SURFACE WATER REUSE

COLLECTION; POTENTIAL USES & WIDER BENEFITS



POTENTIAL REUSES

- GREENSPACE IRRIGATION & WATERING
- INDUSTRIAL PROCESSES (COOLING)
- CONSTRUCTION & FIREFIGHTING
- STREET CLEANING
- CAR WASHING
- TOILET FLUSHING
- GARDEN WATERING

WIDER BENEFITS

- REDUCE SURFACE WATER FLOODING
- REDUCE POTABLE WATER DEMAND
- REDUCE CSO (COMBINED SEWER) SPILLS
- ENHANCE CLIMATE ADAPTATION & RESILIENCE
- ENHANCE BIODIVERSITY & GREENSPACE
- ENHANCE DROUGHT RESILIENCE
- PROMOTE WATER EFFICIENCY

Figure 1. Surface Water Reuse collection, potential uses and wider benefits infographic. All stock assets courtesy of Abertay University.