April 2025 – Project Monitoring Updates

This document contains the updates provided by each project from the April 2025 monitoring cycle. Innovation Fund projects have now moved to a bi-annual monitoring cycle, so any projects not featured here might not have been required to submit a monitoring form this cycle, or might not be included for the following reasons:

- reached completion of their project
- not yet started the project
- not provided an update this quarter.

Contents

Innovation in Water Challenge (2021)

No project updates this quarter.

Breakthrough 1 (2021)

FAIR Water

The project has progressed with several elements.

1. By December '24 installation of sensors in fifty-five households was completed. Households were installed with 159 point-of-use water sensors; 54 shower sensors; smart plugs on 44 washing machines and 30 dishwashers. For houses installed in May '24, we have 10+ months of water use data, and approaching 4 months of data for the latest Dec '24 installs. Data from the first months in each house provides a baseline, with which the effect of the interventions from January '25 onwards can be compared.

2. Overall household water use data is obtained from smart water meters fitted in 44 houses. This required installation of a completely new low-power radio-based communications system, as the dedicated smart water meter system is not yet installed in the region. This new system was successfully installed by a subcontractor over the period Dec '24 to Feb '25.

3. Water-use data collection and analysis systems are implemented, with digital processing and visualization tools/dashboards now available in the consortium.

4. Interventions, in effect experiments, began in households in January '25, starting with the clothes washing task, with dish washing in Mar '25, followed by showering and toilets in summer '25.

Project Zero

Following the implementation of our smart solution at Bidwell, we have undertaken API integration into IWNL systems giving them access to the site data to support their customers. We are at a stage of testing the consumer app, with upcoming consumer tests to follow in housing testing. We have reviewed our data strategy and working with a mix of internal and external stakeholders to maximise our analysis of the smart data from Bidwell and site 1. We will be looking to share the

outputs over the coming quarter and beyond for Bidwell through the creation of the site monitoring dashboard. We continue to take our learnings from Project Zero and share with a variety of stakeholders, including a recent knowledge share at the British Water 'Creating a More Sustainable Water Sector' Conference.

Safe Smart Systems

Our solution concept continues to be iteratively developed based on ongoing user testing and feedback. Within our innovation area, we expect our first operational users to be provided with enhanced insight on system performance, notified when there are anomalies on the network and be advised on recommended response options to resolve detected issues quicker and more effectively. Users will also have the capability to implement certain response options remotely.

Sustainable Phosphorus Recovery (SuPR Loofah)

Commissioning of field test complete – a couple of issues with heater and pumps became apparent but have been fixed and we expect to start getting results in the coming weeks.

Triple Carbon Reduction

The Triple Carbon Reduction demonstration plant construction completion is currently in progress. The MABR is operational and different trial conditions are being explored to stabilise the process and prepare it for integration with the electrolyser, which is due for start-up in early June 25.

Breakthrough 2 (Catalyst) (2021/2022)

Catalysing a Net-Zero Future

The modifications to the Microvi Pilot plant are well underway, we are hoping to take delivery of it at our Innovation Centre by the end of April, where its assembly and commissioning will start straight away. Following successful commissioning we will start our 7-month trial.

Tap Water Forensics

Phase 2 – Sampling and data generation. All samples have now been completed, and these are currently being genomic sequenced by CEH with a target completion date of mid-April 2025. Once completed the data will be analysed using the working data science analytical model the project has developed to identify abnormalities from samples taken at a range of points through the water

treatment process. We have also undertaken experiments to simulate the impact of ingress on the genomic sequence of water in the distribution system.

Breakthrough 2 (Transform) (2021/2022)

Managing Background Leakage

The Phase A desk study exercise is complete, and a report is publicly available. Surveys of the 10 Phase B DMAs are complete, and the data has been analysed which shows significant variations in the level of customer night use, customer side leakage and network leakage. Customer side points of interest have been passed to the 5 water companies to be followed up. In two of the DMAs the network modeling and acoustic data has highlighted areas of interest for network side leakage an these areas have been re-surveyed using a different approach. In one of them a number of leaks have been found. In the other some potential points of usage have been found and the area will be e-modelled. Surveys of the 15 Phase C DMAs are in progress and are expected to be completed in June 2025. Phase D, the uncertainty analysis, has started but has been delayed although it is still expected to report by November.

National Leakage Research & Test Centre (NLRTC)

The detailed design is now substantially complete, and the construction contract is currently out for competitive tender with three perspective contractors. The construction cost and programme will be known at this time. Planning work is almost complete with the final archaeological work being undertaken. The planning application is to be submitted W/C 5th May 2025. Ongoing discussions with both Northumbrian Water and HR Wallingford relating to the formation of the special purpose vehicle to ensure the long-term operating model is in line with the original Ofwat bid intention and therefore protecting the long-term investment

Breakthrough 3 (Catalyst) (2022/2023)

Artificial Intelligence for Algal Monitoring

The first two years of the project have been focused on building a training data set. Bristol University has been manually undertaking microscopy and annotating the images with the correct taxonomy to the genus level, and further where they can. They have also been working on convolutional neural network production that's training the machine learning models firstly to detect algal cells within images and then to classify them. They mainly spent time working on existing models and existing data sets not on freshwater micrography.

Cardiff University's project will continue doing community-based analysis using the eDNA data itself; Bristol's project will pivot into a benchmarking step next year, with their final stage being to

undertake some high-resolution modelling using the hybrid. During January and February, Cardiff University were optimising how they use the microscopy samples Bristol have been looking at under a microscope. Recently, Cardiff University were faced with the challenge of how to identify 900+ samples, and finding a method that would both scale well and be robust. The team changed the DNA extraction method that they were using, which worked well.

Using science and nature to end sewer misery

Root Defender is still making excellent progress. The project solution is in place for application into the demonstrators. NWL operations team have allocated a representative from operations team, the representative is very experienced in the industry and is keen to be involved.

Breakthrough 3 (Transform) (2022/2023)

Net Zero Hub

Actilayer: Construction is complete. The Actilayer membrane and structures are installed on all lanes. ASP5, which is a control lane does not have the membrane fitted, his will be installed in June 2025. Commissioning activities are in progress as per the planned sequence. The impact of the Actilayer is being measured through the emissions monitoring plan, and substantial work has been undertaken since the last submittal with UV efficacy testing also ongoing. Training and handover discussions for operational teams have taken place, and snagging works are substantially complete. The draft design manual for the retrofitting of these technologies is under review. Digital Twin has been able to run a full end to end simulation of Strongford with positive results. The project is extending its site based activities through to 31st July to include more data from recent sensor installations to improve model accuracy and validate the digital twins predictions with a further 2 months of monitoring.

Stream 2

We're live with our open data platform and continuing to work on publishing data and building our ecosystem of users. The last 6 months has seen us go live with the National Storm Overflow Hub in conjunction with Water UK. This brings together near real-time discharge data for all the storm overflows in England in one interactive map for the first time in the world. We have also run a series of hackathons for Open Data Day in March in collaboration with a number of UK Universities, which got students hands on with the data we're publishing related to river water quality and catchments. We also won an award in December – Open UK award for Open Data sponsored by the ODI – awarded at the gala event at the House of Lords.

Breakthrough 4 Catalyst (2023/2024)

ALL-Streams HTO

Between October 2024 and March 2025, the project team recruited 2 experienced candidates to operate the pilot plant that is composed of an HTO process & downstream ammonia, phosphorus and organic compounds recovery processes. The team also completed procurement of the HTO unit selecting a nominated supplier – Scientific Medical – from an initial list of 8 candidate suppliers. The pilot plant, currently under construction at Cranfield University's pilot hall, is due to be operational in August 2025, where the HTO integration trials will be conducted between August 2025 and April 2026.

METREAU - Microbial Electrochemical Technologies for REsource recovery And Utilisation

The METREAU project has now commenced following the formal agreement by all parties. Governance cadences have been established, including bi-weekly delivery team meetings and monthly steering group reviews to monitor progress. A high-level project plan has been finalised, with timelines agreed upon by the delivery team. Ahead of the conceptual design phase, a techno-economic assessment (TEA) workshop is being planned to evaluate solution use cases, define success criteria, and inform key design parameters. This structured approach ensures alignment on technical, economic, and operational objectives while keeping the project on track. Next steps include finalizing the TEA workshop agenda and engaging stakeholders for input.

PFAS - A whole system approach to an impossible problem

Since the baseline report update, the project has focused on identifying potential technologies and suppliers which we want to consider for phase 1 trial of the project for Workstream 1: Liquid and solid waste streams. As part of this process, we have undertaken an extensive horizon scan of both PFAS removal and destruction technologies. This has enabled us to understand the characteristics of the waste streams generated by the PFAS removal technologies likely to be used by the water industry. We have met with 18 different PFAS destruction technology suppliers and have ranked them according to the success criteria we have developed with Cranfield University. We have reached out to 6 suppliers to request bench scale systems, 1 of which has declined and 5 are working on quotes. We are now recruiting two post-doctoral researchers who will undertake the work in Phase 1 and have conducted 12 interviews to recruit the two positions for the project and have offered the positions to two candidates. We are waiting to hear back with regards acceptance. We have commenced work on the identification of key PFAS compounds to target and possible by-products and this will be formalised once the post-doctoral researchers are in post.

Pipebot Patrol

The Pipebot project continues to make strong progress as we explore innovative ways to improve the inspection and maintenance of underground wastewater networks. We are currently focused on the integration of sensing technologies with a Raspberry Pi-based control system, supported by a microcontroller unit (MCU), to enable real-time data collection, processing, and wireless communication. This setup allows for efficient identification of structural defects. Working collaboratively with EMS, Minicam, and the University of Sheffield, we are trialing a suite of sensors to support navigation and defect detection in confined pipe environments. Recent efforts have also focused on refining data transmission, ensuring robust operation in low-access areas. Looking ahead, we are planning field trials to assess long-term performance and maintenance needs. Our aim is to develop a cost-effective, autonomous solution that reduces the need for disruptive excavation and provides proactive maintenance insights for water utilities.

Pipebots for Rising Mains – Technology Development Phase 2

The Pipebots for Rising Mains Technology Development Project Phase 2 is progressing to plan. A workshop meeting held at Synthotech's headquarters in October enabled all the project partners to meet to discuss the needs and challenges of a rising main inspection system. From the meeting, baseline technical requirements of the survey tool were established. In November, Synthotech circulated detailed questionnaires to the project partners. Feedback captured information on rising main operational practices, asset data and storage. This led to the submission of the Optimisation Report in December. This output defined the preferred pipe access requirements, survey technique, key sub systems for development and testing. Work is currently continuing to plan and build the test rig, sensor testing and prototype systems for trial. The next scheduled output is the Integrated System Design Document, due at the end of April. Later in the project, on completion of thorough rig testing, trials within live rising mains will be undertaken. The capability to inspect the internal condition of live rising mains and measure deterioration will enable asset planners to target pipe replacement, to ultimately reduce incidents of failure and pollution.

SuDS iQ - A National SuDS Collaboration & Evaluation Platform

A project start up meeting was held in February 2025 and as such HR Wallingford and CIWEM have undertaken some tasks associated with Phase 1 Platform co-creation. These include: developing a living Impact & Engagement Plan; engaging with water company partners to help establish the regional collaboration groups; develop and promote an online survey to obtain input on existing and future SuDS collaboration requirements (which to date has 120 responses); co-creation workshops to explore the survey findings in more detail and obtain feedback on direction of travel have been planned for mid to late May. HR Wallingford has also started producing design documents in preparation for the upcoming co-creation workshops where input from future users of SuDS-iQ will

be gathered. These documents include user-stories, mock-ups, workflows and specifications and will help explain the SUDS-iQ concepts and ideas in a visual way.

Support for All 2

The project to create a national platform capable of securely sharing the service needs of customers in vulnerable circumstances is on track. Governance and reporting is agreed, in place and the project delivery plan has been finalised with dependencies and gateways outlined. Security and infrastructure documents have been shared by the technology partner Avanade whose team is resourced and operational. The build of the system on scalable architecture for the agreed design spec is well underway which includes essential changes to functionality and improved performance from the pilot. Build has been completed of the platform for partner API customer registrations and serviced properties as well as bulk upload of data, with an automation process in place to build, test and deploy. A series of design workshops have finalised reporting and dashboarding, address deletion/changes of address, data matching and how to handle data outside water and energy. Alongside the technology build, a Data Protection Team was mobilised, procured for and led by an external lawyer and have produced collective data sharing agreements, along with data sharing protocols which cover different section data sharing. Standard operating procedures and data protection impact assessments have also been completed.

Tapping into Sewer Heat

Severn Trent have engaged with their Design & Build Contractor to design & plan the heat exchanger installation. The contractor is working with the heat exchanger supplier in Germany. The collaboration agreement is expected to be signed off in the next few weeks. HORIBA MIRA and E.On are refining costs for the installation of the energy centre, including the trenching for utilities and the connection pipes between the heat exchanger and the heat pumps. E.On have also been working with the supplier in Germany to ensure the heat exchanger and energy centre designs are compatible.

Breakthrough 4 Transform (2023/2024)

Proving the concept of sewage sludge pyrolysis

The project is currently in the procurement phase, as we seek an appropriate OEM and delivery partner to supply, install, and commission the pyrolysis pilot plant. Together, we're setting a new standard for resource recovery and driving innovation across the water industry.

Sewage Sludge Gasification

The necessary upgrades and modifications to the gasification plant have been successfully implemented and the plant configured and fully commissioned ready to perform the operational sludge testing program to be executed in Phase 2. Some dried sewage sludge has been successfully gasified and this has been carried out within Environmental Permit limits. Preparatory work commenced in August and has focused primarily on the Gasification unit with several significant upgrades to the core reactor, control system and emissions measurement and monitoring system being implemented. Work on the sludge reception and drying facility has been completed and providers of expert services have been brought in to support the recommissioning and condition surveys undertaken. Scope and costs have been agreed with the Carbon Trust for the development of a full carbon assessment model for the end-to-end process. Scope and costs have also been agreed with WSP to provide insightful reporting of project outcomes. Scottish Water have been providing dried sludge for the commissioning phase of the project and will continue to do so during Phase 2. The project is liaising with the CIP4 project to ensure that sampling and analysis aligns with the work being carried out as part of the CIP4 initiative.