

October 2021

H2Open – Open data in the water industry: a case for change

Case study appendix

A1 Stakeholder engagement

To ensure that views from across the industry and sector were captured, we engaged with policy leads and technical specialists across the water companies, other regulators and external agencies.

Type of stakeholder	Name of stakeholder	Contact and position
Company	Anglian Water	Richard Boucher (Dir. strategic development), Tim O'Brian (Tide), Melissa Tallack (head of data and digital services).
Company	Dŵr Cymru	Kevin Parry (Head of data), Kit Wilson (Dir. operational services), Willow Smallbone (data manager), Gareth Eames-Jones (data scientist), Liam Butler (data scientist), Meg Parry (data manager), Matt Kearon (developer), Justn Doran (data governance).
Company	Northumbrian Water	Andrew Beaver (Dir. regulation), Nigel Watson (CIO ¹), Michael Hull (analytics manager).
Company	Severn Trent Water	Shane Anderson (Dir. regulation), Richard Walwyn (head of asset intelligence and information), John O'Kelly (data strategy), Malcolm Tallis (data architect), Pavan Parshad (data science), Darren Duncan (IT).
Company	South West Water	Mark Worsfold (assets), Kevin Nankivell (data science), Ben Ward (assets and innovation).
Company	Thames Water	Cathryn Ross (Dir. regulation and strategy), Warren Buckley (Dir. Retail), Jethro Yates (data scientist).
Company	United Utilities Water	James Bullock (Dir. regulation), Simon Chadwick (Dir. digital services), Heena Mistry (CDO ²), Tim Stanley (data analytics).
Company	Wessex Water	Matt Greenfield (Dir. regulation), Matt Wheeldon (Dir. strategy), Laura Mann (data marketplace), Katherine Mining (open systems).
Company	Yorkshire Water	Richard Emmott (Dir. corporate affairs).

¹ Chief Information Officer

² Chief Digital Officer

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Company	Affinity Water	Nicky Fomes (interim Director), David Victory (Head of data).
Company	Bristol Water	Iain McGuffog (Dir. regulation), Michelle Davies (Head of strategy),
Company	Portsmouth Water	Richard Barker (IT manager), Quentin Gallagher (business analyst), Steve Morley (reg. manager).
Company	South East Water	Oliver Martin (Dir. regulation), Mary Sabalis (Head of IT), Meghan Barton (asset management), Dhiraj Sood (IT specialist).
Company	South Staffs Water	Philip Saynor (Dir. regulation), Laura Morgan (retail market manager).
Company	SES Water	Paul Kerr (Dir. regulation), John Gilbert (CIO), Jeremy Heath (innovation manager), Van Dang (manager of economic regulation).
Company	Southern Water	Martin Roughead (Dir. regulation).
Independent	Open Data Institute	Lisa Allen (lead), Tara Lee (senior consultant), Ben Snaith (researcher).
Independent	Arup	Beatrice Nassi (senior consultant), Jonny Renton (consultant).
Independent	Utility Week	Denise Chevin (journalist and editor).
Department	Defra	Oscar Watkins (head of economic regulation), Kruti Patel, Bryony Thorpe (team leader).
Department	MHCLG	Kate Nicholls (senior policy manager).
Department	National Underground Asset Register (Geospatial Commission and Cabinet Office)	Holger Kessler (engagement and communications lead).
Regulator	Ofcom	Andrew Button (data innovation principal).
Regulator	Ofgem	Steven Steer (head of data).
Regulator	Energy Data Taskforce (Ofgem and BEIS)	Claudia Gibbard (energy policy advisor).
Regulator	Environment Agency	Chris Jarvis (data sharing and access manager), Stuart Homann (data and information).
Advisory body	CCWater	Mike Kiel (Dir. policy), Chris Cook (complaints analyst and insights manager).
Advisory body	British Water	Mar Batista (head of progress), Paul Dickenson (data analytics lead).

A2 Case studies from across the water industry and beyond

We have gathered several case studies evidencing open data and digital solutions from within the water sector. Many of these examples feature in the main body of our discussion document, with more detail found in this appendix. For further information, please contact the companies or organisations involved directly.

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Dŵr Cymru's automatic sewer defect detection algorithm

Dŵr Cymru are harnessing artificial intelligence (AI) and image detection techniques to automatically detect sewer defects across their networks.

The data science team actively explore new analytical approaches that can deliver business benefits, with a current area of focus in applying AI to cognitive tasks. Dŵr Cymru were already collecting hours of CCTV footage from within their sewer pipe network and manually reviewing this footage to search for defects, such as cracks or fractures in pipe walls. They saw an opportunity to harness artificial intelligence and image detection techniques to train a model that would be able to automatically review video footage and alert upon detection of a potential defect. This led to the development of their new Sewer Defect Detection Model, using complex machine learning classifiers called neural networks. In developing this model, they worked closely with a software company to identify the best cloud components and services required to support the end solution.

The first model was able to accurately detect nearly 80% of defects correctly, freeing up time previously spent by operators manually reviewing video footage and allowing them to use their skills more rewardingly to maintain the network for customers. Dŵr Cymru are now working on refining this solution to increase accuracy ahead of roll out across their operating area.

Dŵr Cymru's data and analytics strategy

Created in 2019, Dŵr Cymru's data and analytics strategy outlines a roadmap of initiatives to improve analytical capability in order to deliver improved service to customers. There are four main points of focus within this strategy: delivering digital solutions, building and maintaining organisational capability, data governance and continuous improvement.

The data science and business intelligence teams work to deliver digital solutions that can be used to make data-led decisions. These solutions include the use of AI, deep learning and operational research methods to predict and prescribe, allowing for proactive response to emergent risks.

Work to further analytical capability includes data literacy initiatives, the provision of self-service data models and the implementation of an Enterprise Data Platform, allowing colleagues to contribute to business challenges through building their own analytics solutions.

The strategy also includes data governance, which focuses on technical data management and maintaining a corporate culture that considers data as an asset.

Beyond the focus on Dŵr Cymru's internal progress, the strategy also considers sharing of knowledge and insights with other data teams across the sector to continually improve their own approach. It reinforces their commitment to open data and the potential for new initiatives in this area to stimulate innovation.

United Utilities Water's wastewater data hack

Through conducting a hackathon with external partners, United Utilities utilised open data sets from Public Health England on the location of food service establishments alongside a range of their own data. This data hack found a strong correlation between food service establishments and an increased risk of wastewater flooding, with potential to inform United Utilities' approach to targeted campaigns on how certain activities may increase the risks of wastewater flooding, creating tangible benefits for customers.

United Utilities have stretching targets on wastewater sewer flooding performance and areas of the North West experience substantial sewer flooding challenges. Performance on sewer flooding was the focus of a series of deep dives in 2020 and 2021, which led to the recommendation for the data and analytics team to drive improvements in risk analysis. A hackathon style approach to short duration problem solving was undertaken, using advanced analytics techniques to better understand flooding performance. Data scientists, wastewater subject matter experts and GIS³ specialists worked to develop four areas of investigation which were analysed over an intensive 12 week period.

Hypotheses were explored in relation to comparative flooding performance, transferred asset risk, separate and combined sewer area differences, and local variations in performance within the North West. Open data was a key input to the hackathon. A correlation was identified between flooding performance and the prevalence of food service establishments, such as restaurants and takeaways⁴. A machine learning model was created which indicated a fourfold increase in risk of internal flooding from 'other' causes (non-hydraulic inadequacy) when the number of food service establishments increased from none to five within a 100m grid square.

The North West region has one of the highest occurrences of food service establishments in England with a rate normalised for population 30% higher than the national average. The findings provide insight which may help explain relative performance differences for internal flooding by other causes and will support improved targeting of communications and operational interventions, as well as the analysis of effectiveness of current mitigation.

United Utilities Water's customer facing approach building on open banking data

United Utilities utilise open banking technologies to verify customer income in real-time, improving the accuracy and efficiency of customer affordability assessments. This enables United Utilities to streamline the process for determining customer eligibility for reduced-rate social tariffs. Traditionally, completing an assessment takes an average of 20 minutes:

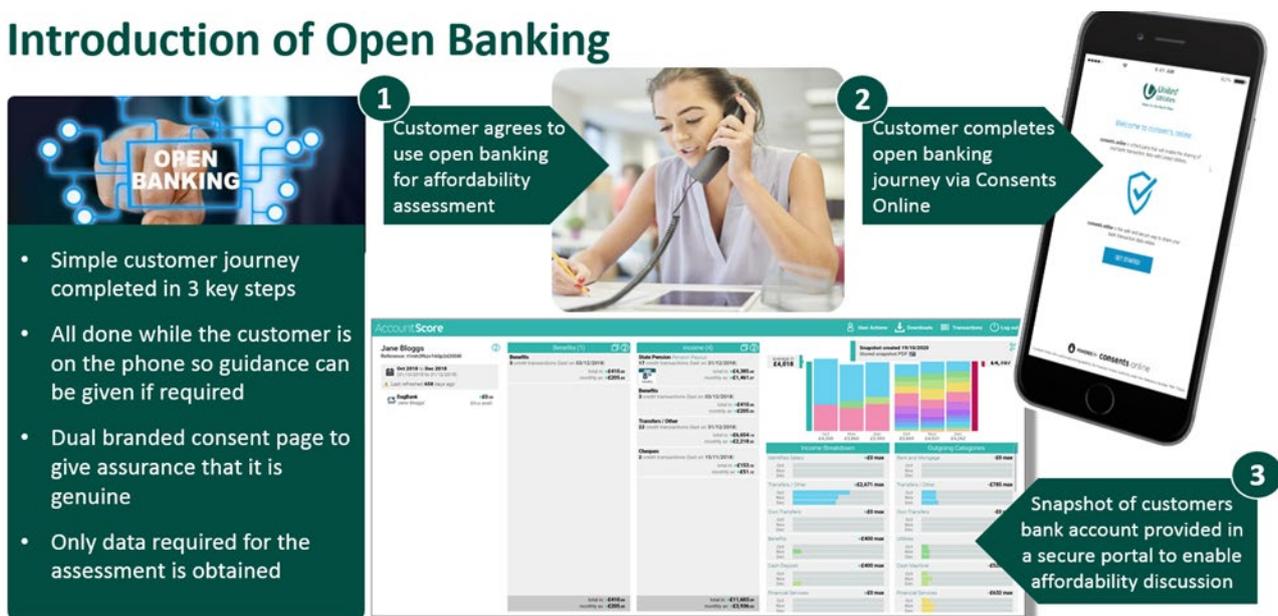
³ Geographical Information Systems

⁴ as identified from Public Health England data

using open banking reduces the amount of time taken and customer effort, whilst also increasing accuracy.

Recognition of the specific affordability challenges across the North West prompted United Utilities' work on affordable bills. 59 of the 100 most deprived neighbourhoods are in the North West, and 32% of North West households earn less than £21,000 annually. Tailoring payment plans to customer affordability is a key goal, and the advent of improved data availability from open banking stimulated an innovative method of improving customers' experience.

Introduction of Open Banking



Affinity Water's increased ability to forecast per capita consumption

Affinity Water are pioneering new AI driven data sharing to allow companies to better monitor the impacts of the weather and COVID-19 on future water demand. They have released this open data model for other interested water companies to use freely.

Per capita consumption (PCC) estimates had previously only been available for analysis every three months; through using AI, Affinity Water were able to infer the gaps in this data series. Using an AI driven system that measures in real time the water balance at a DMA (District Metered Area) level, Affinity Water's data scientists have been able to accurately predict PCC use across its network and three regions in real-time whilst also taking into account seasonal demand and weather patterns.

Inferring PCC on a monthly or daily basis has allowed for improved understanding of other interactive factors, such as significant weather events, water usage campaigns and COVID-19 outbreaks. Using these new AI systems Affinity Water data scientists were able to distinguish between previous periods of hot weather and high demand, and this year's increased high

demand for water, taking into account COVID-19. The PCC model is now being used to underpin Affinity Water's 'Save Our Streams' campaign which is designed to reduce water wastage. It allows for the rapid re-targeting and continual optimisation of the campaign to identify higher users of water.

“In the future this will allow us to plan better for other abnormal events including weather patterns and to be able to monitor the impact much more closely of our work to reduce PCC through our other campaigns”

– Andrew Morris, Chief Information Officer

“There is so much value we have already gained from data science and as we further roll out our digital twin capability Affinity Water will change the way we operate in many areas of the business and give a whole different level of insight into how we can be more effective across the water sector”

– Andrew Morris, Chief Information Officer

The open-source code and instructions for Affinity Water's PCC model can be found here: [GitHub - affinitywater/project-eddy: Extracting daily insights from water consumption](https://github.com/affinitywater/project-eddy). Please contact Affinity Water if this link is broken.

Bristol Water's data sharing with Nightingale Hospital

Bristol Water worked responsively to provide real time monitoring of water supply to the COVID-19 surge Nightingale Hospital in Bristol.

A continuous supply of water was critical to the site hygiene and operation of the temporary hospital, however there was only one point of supply into the site and no on-site storage to be utilised in the event of a supply outage. Bristol Water worked alongside innovation partners (ATI, Imperial College London, Inflowmatrix) to deploy 12 chemical and physical monitors within 36 hours of hospital establishment, to provide an early warning system for network performance issues. Constant monitoring of the availability and quality of water supply through Bristol Water's control room enabled safe and secure operation of the hospital, and this was supported by changes to physical infrastructure (new infusion points with a dedicated tanker on permanent standby, temporary overland supply).

The project built on an existing partnership. Bristol Water are now trialling the technology on a network to monitor more complex water quality issues.

South West Water's establishment of consistent data standards, analysis, and visualisation for smart meter data

South West Water have worked in partnership with the University of Exeter and water utilities in France, Greece, and the Netherlands to explore how the water sector can utilise an open IT platform for the benefit of water sector end-users and solution providers. [Fiware4Water](#) is an offshoot of the European Commission funded FIWARE platform.

The FIWARE platform is host to an ecosystem of developers, innovation centres, accelerators, cities, SMEs⁵ and start-ups. It aims to facilitate the development of innovative digital solutions across different sectors, and has been key to development of smart city initiatives. Fiware4Water seeks to connect the central platform with the water sector, to realise the benefits of open data and open IT for the water industry. As part of this initiative, South West Water have been working to establish consistent standards, analytics, and data visualisation for smart meter data, allowing for comparability across utilities and datasets. South West Water focus on deriving value from smart meters for customers in a way that links back to the FIWARE platform, therefore allowing for interoperability and data exchange across other smart meter datasets and datasets from other sectors.

Fiware4Water aims to facilitate the design and development of customer-facing applications to provide real time access to smart metering data, as well as facilitating future multi-utility and smart city data sharing.

Yorkshire Water's 'Open by Default' approach as improving public accountability through citizen regulation

As part of their 'Open by Default' approach, Yorkshire Water now publish operational datasets on storm discharges. Through opening this data, Yorkshire Water have seen a growth in citizen regulation, with customers and NGOs⁶ using data on storm discharges to press for investment and regulatory change. They see the emergence of citizen regulation as a potential growth area for customer empowerment, and this will inform their thinking for PR24.

Publishing operational data to improve trust amongst their customers is part of Yorkshire Water's 'Open by Default' approach by 2020. Starting with key areas such as leakage, this programme will extend across all operational activities relating to the 2018/19 performance review. This public reporting has opened up new ways of understanding performance, driven internal innovation and offered up opportunities to partner with external organisations on issues of shared ownership and values. Yorkshire Water has hosted public events and

⁵ Small and medium sized enterprises

⁶ Non Governmental Organisations

hackathons to encourage external engagement with these datasets, spanning topics from leakage to network resilience, river quality and flooding.

Sheffield's Narrow Band Internet of Things

Yorkshire Water taps into shared network data across Sheffield to harness collective benefits. Established by British Telecomms (BT), the [narrow-band Internet of Things](#) is a pilot collaboration between BT, Yorkshire Water and Stantec to harness existing technology for asset maintenance and operational decision making across all three networks.

The Smart Water Network pilot will produce a digital twin of Yorkshire Water's existing network, using AI to cluster data sets and remove false positives, accurately informing asset and operational decision making. The pilot will use data received at near real time from across its network, with the aim of revolutionising the way in which Yorkshire Water manages leaks and interruptions to supply in the future, therefore reducing the amount of water taken from the environment.

Wessex Water's intelligent sewer depth monitoring

Wessex Water use event duration monitor (EDM) sensors to measure the depth of sewage at storm overflows and indicate when a spill is occurring. However, as storm overflows operate in heavy rainfall, a simple threshold-based alarm management approach does not add value. Wessex Water therefore ran an open data trial, challenging companies to produce a better approach to interpreting and managing this data using AI and machine learning.

Wessex Water provided near real-time data from EDM sensors throughout their network, as well as two years of data from 89 EDM sites in Bath. The aim of this trial was to provide near real-time forecasts of storm overflows, separate expected spills from networks issues and to proactively identify changes in network behaviour to enable targeted maintenance.

From this trial, companies were able to identify issues in the sewer network that transgressed normal operating parameters for sewage depth, potentially enabling intervention before an actual issue occurred. The intelligent sewer depth monitoring also reduced unnecessary and unwanted alarms during heavy rainfall by up to 97%. The trial has led to the progression of a solution to intelligently monitor EDM across Wessex Water's sewerage network.

Wessex Water's open data marketplace can be found here: [Wessex Water Marketplace](#). Please contact Wessex Water if this link is broken.

Anglian Water's infrastructure asset information sharing

Anglian Water provide data on a range of topics openly (by request) through an online portal. This can include public requests to the location of Anglian Water assets within property boundaries, as well as New Roads and Street Works Act enquires. The data provided through this portal fulfils Anglian Water's existing statutory obligations.

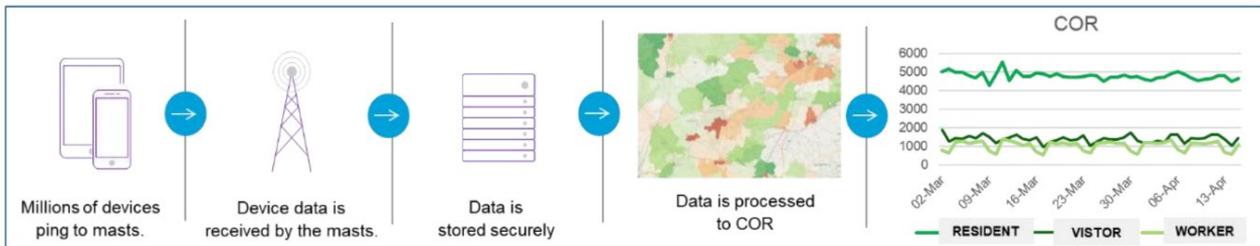
The portal is operated through digdat, which offers users unlimited access to infrastructure data at any time. This can provide users with up-to-date information linked to Anglian Water's corporate GIS and details of other utilities in the service area. As the portal data is openly available, users are able to navigate to any area of the region to self-serve the information required, increasing flexibility and reducing delays.

Use of a data portal in this way has increased internal efficiencies, as previously information requests would have required far greater resource (and in some cases a direct cost to the requestee). Allowing self-serve access and giving customers direct access on demand has reduced risk, alongside protecting assets and overheads. It also means that data is kept up to date and can be best used to inform plans. Other organisations now also use digdat, meaning that users may be able to access information from other sources all in one place.

Anglian Water's cellular occupancy rate model

Anglian Water's cellular occupancy rate (COR) model was developed in partnership with Atkins and British Telecomms (BT) to predict water consumption hotspots. Mobile phone data is transformed into insights relating to population equivalents across each District Monitored Area (DMA) over a given time period, with data backdated to 2019 and covering over 2000 DMAs within the Anglian Water region.

The creation of this model and subsequent dataset was the output of The Water Consumption Data Hackathon, hosted by Anglian Water in collaboration with Dŵr Cymru and Sutton and East Surrey Water. Atkins and BT focused on analysing Anglian Water's 'shop window' geography, and post-hackathon a project team was formed to scale this solution. Insights from this data are aggregated and anonymised, and as such cannot be used to identify individual behaviours.



The cellular occupancy rate model will provide a valuable dataset for the industry and this will be shared with interested stakeholders and external hackathon partners. Use cases include using this dataset to understand how PCC has been impacted by more people living at home during the COVID-19 pandemic, providing intelligence in terms of demand management and a new set of base data to aid in strategic planning post pandemic.

“Our dataset and knowledge can help with future population predictions and therefore be incorporated into many elements of Anglian Water’s day-to-day workstreams”

– Tom Morgan, Atkins

“BT have provided data insights across a range of industries, but are excited to be trialling this within the water industry, in partnership with Atkins to drive better decisions within Anglian”

– Nathan Watt, BT

Northumbrian Water's asset performance analytics to limit pollution

Northumbrian Water’s approach to asset performance analytics builds on collaboration from their hackathons. Using a collaborative approach to data sourcing and analysis, analytics use existing data sets to provide lead indicators for potential future asset failures.

Sharing of datasets associated with sewage pumping stations as part of the ‘Pumped’ data hackathon in 2016 helped to identify patterns and generate insights to drive a reduction in the number of failures from sewage pumping station. One approach stood out for its innovative approach to inferring asset performance from data, despite a lack of ‘ideal’ data for the solution (this ‘ideal’ data would be the measurement of flow at pumping stations, corresponding to real-time performance). Given limited coverage of flow-meter data, this metric for asset performance was instead inferred from level monitor data (a far more abundant and consistent data source). Patterns in this data were then validated as corresponding to historic asset failures, providing lead indicators for potential future failures on detection of similar patterns.

This approach was tested following the hackathon, then integrated with Northumbrian Water's existing asset monitoring platform in 2017 and has since been subject to ongoing enhancements and product development. Northumbrian Water have seen a 70% reduction in pollution originating from sewage pumping station assets from 2017 as compared to 2016, and this decrease has been sustained beyond 2017.

Severn Trent Water's energy data hackathon

Severn Trent Water hosted a hackathon sharing energy generation, import and demand data, alongside population data, flow and abstraction data. The primary objective of this hackathon was to identify savings that they could make on operational costs through energy bills. Following this event, Severn Trent received 18 business proposals, four of which they have taken further.

Severn Trent ran this hackathon from their head office in Coventry, and 15 teams spanning 51 individuals took part. Teams included participants from Shell, IBM, Jacobs, EDF, Northern Ireland Water and the Universities of Nottingham, Warwick and Coventry. Data was shared securely with participants through an eSourcing portal (Bravo). Teams presented back their findings at the end of the hackathon, with findings including: a number of different analytics models for predicting energy demand, understanding and driving consumer behaviour change to reduce demand and alternative energy generation and sourcing models. Following the event, Severn Trent also received detailed proposals for storage solutions, solar opportunities, new billing validation methods and better data visualisation. 100% of participants said that they would take part again.

Severn Trent Water's 'Measure to Manage' approach to process emissions

Severn Trent have proposed 'Measure to Manage' as a collaborative project to tackle wastewater treatment process emissions through monitoring these emissions, developing standards for data sharing and building analytics models across combined datasets. The aim is to implement an effective mitigation framework for these emissions as part of the industry's journey towards net zero.

This is part of a collaborative effort with nine of the wastewater companies in England and Wales. By 2030, wastewater treatment process emissions will be largest source of operational greenhouse gas emissions in the sector – this is a climate challenge that is not well understood and therefore world-leading research is required to develop and deploy mitigation solutions that are cost-effective for customers (both now and in the future). 'Measure to Manage' will deploy monitoring and mitigation approaches at 30 locations across England and Wales, covering most UK treatment asset types. It aims to: measure methane and nitrous oxide process emissions, targeting processes where the most mitigation can be achieved; develop a UK-specific science base on process emissions; build soft sensor models

to predict emissions using advanced data analytics; reduce emissions by changing operations and developing scalable approaches; develop an open-source UK emissions data set to drive collaboration with the supply chain and academia.

Stream

11 of the 17 companies have proposed to work collaboratively on an open data platform, governance architecture etc. Stream is a collaborative industry-wide open data initiative. 11 of the 17 main incumbent water companies have joined forces to take forward open data across the water sector, with an initial strategy exercise identifying 'critical and high value opportunities for the sector' and building an 'opportunity roadmap'.

Through working together to create a shared strategy and approach to open data, companies are 'identifying answers to the challenges of what information is shared, how it is shared, and crucially how it is kept safe'. Companies have tested three initial proofs of concepts aligned with strategic goals within the sector, spanning data housing infrastructure, novel algorithms to flag algal blooms and predictive asset alert systems.

Collaboration to solve sector-wide challenges and explore the solutions and opportunities that open data might provide indicates that the companies involved in Stream are increasing their open data maturity and are considering how the benefits offered by open data can best be unlocked.

Reference: [Northumbrian Water Limited Annual Performance Report](#) for year ended 31 March 2021. P. 40.

National Underground Assets Register

The [National Underground Assets Register](#) (NUAR) is a project run by the Geospatial Commission and Cabinet Office. It aims to realise the value of location data in improving the ways in which national infrastructure is planned, built and managed through better mapping underground assets.

NUAR is a combined digital map of existing underground asset data, indicating where electricity and phone cables, and gas and water pipes are buried. Bringing this information together in one accessible place aims to prevent both accidents and disruption to the economy (currently estimated at £2.4 billion a year). NUAR aims to improve the efficiency and safety of underground works by creating a secure, trusted and sustainable platform, providing a comprehensive, consistent, interactive digital map of asset owners' buried data – enabling enhanced communication between parties and improving data quality. Once

operational, NUAR is expected to deliver £350 million a year in benefits through avoiding accidental asset strikes.

Following [Government intention](#) to test the feasibility of a national underground assets register in 2019, the Geospatial Commission produced a business case focusing on four use cases: safe digging, on-site efficiencies, site planning and data exchange. Two pilots tested the feasibility of the project, building on existing momentum in the north east of England and London. These pilots built the creation of a North East Underground Infrastructure Hub following Northumbrian Water's 2018 Innovation Festival, and the Highways Apparatus Data Exchange System (HADES) as an early proof of concept in London in 2017. Following the [successful year-long pilot](#) in both London and Sunderland, the NUAR was found to be effective in its aims of preventing accidental strikes on underground pipes and cables. It allowed workers to view an interface of underground assets accessible via mobile phones and laptops in advance of digs. In London, work was undertaken by the Greater London Authority in partnership with infrastructure providers and local authorities, whilst in the North East the project was led by Ordnance Survey who worked alongside Northumbrian Water, Northern Gas Networks, Northern Powergrid and Openreach.

Continuing engagement beyond these pilot studies will inform the development of a national platform. The Geospatial Commission is working to build a Minimum Viable Product for the North East of England, Wales and London. The platform will then be enhanced and rolled out to the remaining regions in England and to Northern Ireland⁷. The build phase of work is expected to last three years. NUAR is a government commitment in the [UK Geospatial Strategy](#), the [National Infrastructure Strategy](#) and the [Geospatial Commission's Annual plan](#). It is also part of the Infrastructure and Projects Authority's [Transforming Infrastructure Performance: Roadmap to 2030](#).

Priority Services Registers

Priority Services Registers (PSRs) allows customers in vulnerable circumstances to record personal data with water companies, ensuring that they are offered additional support. Some other regulated sectors have similar schemes to ensure customer needs are identified and recorded. Through collating data on vulnerable customers, the PSR protects these customers groups in the event of disruption to vital services and can help them to be signposted towards additional help and support from the coordinating companies. Customers on the PSR might have extra communication, access or safety needs, including requiring help with meter readings, advance warning of supply chain interruptions, accessible communications or a dedicated hotline. Data sharing between the PSRs of water and energy companies has undergone a successful pilot (between United Utilities Water and Electricity

⁷ Scotland already benefits from a system of this kind, and the Geospatial Commission will work closely with colleagues in the Scottish Government.

North West), and there are plans for further integration. When shared, PSR data must be handled especially carefully, as it contains sensitive information about customer needs.

Data Mill North

Data Mill North is an ongoing collaboration between Leeds City Council and other stakeholders. It is a collaborative website platform, with data providers and data users, and all data hosted on Data Mill North is open data.

There are 64 data publishers, including government departments, city and borough councils, community organisations and start-ups. Yorkshire Water have published customer meter datasets, drinking water quality data and leakage data. There are currently 580 published datasets, with five of these new in 2021.

Icebreaker One's 'open energy'

Icebreaker One's 'open energy' standard won funding from the UKRI – Modernising Energy Data project. Drawing on experience from open banking, 'open energy' looks to establish guidelines for the sharing of energy data. Open energy forms part of a series of target areas that Icebreaker One are looking to open data in their journey towards net zero.

Southern Water Beachbuoy Case Study

In 2018, Southern Water responded to significant appetite from customers and recreational water users for data on potential water quality issues caused by Combined Sewer Overflows (CSO) storm releases by introducing its Beachbuoy monitoring scheme. With Event Duration Monitoring covering 98 per cent of outfalls across the company's 700 miles of coastline – an industry leading position – the scheme was an important milestone in Southern Water's commitment to transparency and meeting the needs of its customers.

The initial service covered just 13 beach areas and required human intervention at every stage. However, following a dedicated £100 million investment by Southern Water to update and bring IT services in-house in 2019, a new and more comprehensive system was made possible. Southern Water's in-house data team subsequently developed ASPIRE, an analysis system which took data from thousands of different monitoring devices to determine exactly if and when storm releases were taking place. This is a complex task as no single sensor can make a clear determination or provide an accurate picture for such a large geographical area.

In 2020 the latest iteration was launched with Southern Water introducing a web-based service providing continuous real-time information to the public (a link to this is provided below). The industry leading monitoring and alert system now covers all 83 bathing water sites and two recreational harbours popular with boaters (Chichester and Langstone Harbour) within Southern Water's operating region.

Development continues to reduce false positives and has added river CSOs to the service, helping to provide information to the growing bands of 'wild swimmers'.

Backstopping this service is the most transparent disclosure of environmental information by any water and wastewater company in the country with a web page providing detailed break downs of environmental performance.

For more information and to see this interactive tool in real-time please visit the dedicated Beachbuoy webpage on Southern Water's company [website](#).

Beachbuoy is easy to use

A coloured icon represents a designated bathing water or a recreational harbour:

-  **If a blue circle is shown:** There has been no release from a CSO in the past 72 hours.
-  **If a yellow triangle is shown:** There has been a release from a CSO in the past 72 hours.
-  **If a red square is shown:** There has been a release from a CSO in the past 24 hours.*

In addition, each of our outfalls that may affect water quality in your chosen location is also represented by a coloured icon:

-  **When a green circle is shown:** There has been no release from here in the past 72 hours.
-  **When a yellow circle is shown:** There has been a release from here in the past 72 hours.
-  **When a red circle is shown:** There has been a release from here in the past 24 hours.*

*Sometimes, a red icon may show and later be removed. This is usually because we received an unverified report of a release and, when we investigated, no release had actually occurred. On these occasions, the red icon will show until we know for sure.

*The above image is from Southern Water's Beachbuoy interactive webpage.

A3 ODI case studies

The Open Data Institute have provided several case studies which are featured in the main body of our discussion document, with more detail found in this appendix. Useful links to reports and key documents are also provided here. For further information, please contact the ODI.

Case study index

- Surfers Against Sewage ‘Safer Seas’ app
- Environment Agency dataset publication
- Passiv and Open Climate Fix data sharing
- Nationwide’s ‘Open Banking for Good’
- Assorted links

Surfers Against Sewage ‘Safer Seas’ app

Surfers Against Sewage (SAS), a campaigning marine conservation charity based in Cornwall, runs the [Safer Seas and Rivers Service](#), an app which alerts water users when bathing waters are unsafe for human use. The service uses data from the Environment Agency and eight major water companies, and is in use at nearly 400 locations across the UK.

The challenge

The organisation was established in 2011 by surfers concerned about water quality in Cornwall. The organisation has grown to 25 full-time employees, campaigning on water quality and improving ocean health - with one foot in the grassroots community and the other in parliament and local government.

The Safer Seas and Rivers Service (originally the Safer Seas Service) started as a text alert service, born out of a need for surfers and other water users to know when their bathing water was unsuitable for use. The service has since been developed into a comprehensive and user-friendly app which accurately alerts users with real-time risks for their chosen bathing sites.

How are they addressing the challenge?

The data-driven service collates data from the Environment Agency, such as the pollution risk forecast, which provides real-time modelling (accessed via [API¹](#)) at 170-180 locations based on variables including rain, wind and UV levels. The service also works with eight major water companies to receive alerts about combined sewer overflows. SAS developed an application to convert email alerts about when the overflow had started or stopped so that it would integrate with the app.

Future plans for development include collaborating with water companies and other organisations to gain access to better data for their service, such as year-round forecasts and sewage volume.

Lessons learned

- Usability: The system was overhauled to focus on making the data simple to use and understand for the audience. SAS are particularly receptive to user feedback in order to keep developing their services.
- Collaboration: It's important to work with the data providers - such as the Environment Agency and water companies - in order to improve data flows. Increased collaboration can bring better quality and more useful data for third-party use.
- Get the data right: The service requires timely and accurate data; therefore, SAS have to be confident in the data coming in from data providers, and the information they put out to users through the app is reliable.

Environment Agency dataset publication

The Environment Agency (EA) is responsible for the protection and enhancement of the environment in England. It collects, uses and shares data relating to waste, fisheries and other environmental areas. When this data is published online, it can be used by third-party organisations, such as the British Red Cross' [Emergency App](#) and the waste service [Dsposal](#).

The challenge

The EA is responsible for regulating major industries and waste, treating contaminated land, water quality and resources, fisheries, inland river, estuary and harbour navigations, and conservation and ecology. It is also responsible for managing flood risks and issuing flood warnings to the public. Data and data sharing is essential to achieving positive environmental outcomes. As well as publishing data openly for the public to access, the EA works with businesses and publishes via APIs to promote re-use of the data.

How are they addressing the challenge?

British Red Cross combines flood data provided openly via an API by the EA with data from the Met Office. Heavy rainfall and stormy weather can lead to flooding with a potentially serious threat to property and human life. The app uses data such as flood risk mapping and severe weather warnings to notify users about emergencies, helping to protect life and property.

Dsposal was established in order to improve compliance in the waste sector. Waste crime is estimated to cost the UK economy over £1billion a year, on top of the environmental impact. In order to clean up the sector, Dsposal needs access to quality data on waste, waste producers and waste managers. Dsposal's Dashboard uses data from the EA's public register to give a real-time view for waste disposal companies of the compliance status of their supply chain.

Other users include Surfers Against Sewage, Pang Valley Flood Forum (who utilise EA datasets to display live dashboards and datasets for local communities) and cross-governmental use (e.g. the NAO's flood risk data visualisation tool builds on open EA data).

Lessons learned

- Publish with a purpose: Data shouldn't be published as a one off or to meet a quota, it should be done systematically with a clear purpose and users in mind.
- Be structured: Most users of data access it through APIs, as opposed to direct downloads. Providing data through API can aid its integration into other organisation's systems. The data needs to be structured in a way to suit general users, as this will generate demand.
- Be wary of risks but don't let them hold you back: Risks and fears might not materialise, so they shouldn't define what is published. All data sharing involves some element of risk. Data should be as open as possible; data ethics and security can provide the guardrails for responsible innovation.
- Think about links and connections: Data needs to be linkable which means that data for different service needs need to have common identifiers for the same elements.

Passiv and Open Climate Fix data sharing

Passiv, an smart home technology company, is working in collaboration with Open Climate Fix, a not-for-profit research and development lab that focuses on tackling climate change, to improve forecasting for the generation of electricity from solar energy sources. Open Climate Fix specialise in 'nowcasting' (short term predictions) for solar electricity. Through this collaboration, they aim to reduce energy waste and better manage national energy storage

The challenge

Passiv is sharing data with Open Climate Fix to help tackle a major challenge in the UK energy sector around balancing the supply and demand of electricity in the face of a shift towards renewable energy.

Managing supply and demand across the UK National Grid is important but costly work. Efficient running of the grid was estimated to cost £1bn a year in 2016. The bulk of this amount is paid to power generators to increase or decrease their output at short notice. With an increasing shift to renewable energy generation, this operational cost is expected to rise to £2bn in the next five years. The energy sector needs to develop new approaches to forecasting energy demand to reduce cost and prevent stored energy from being wasted.

How are they addressing the challenge?

Passiv is responsible for monitoring the performance of a large portfolio of solar panels across the UK. It already shares data from these solar panels with a team at Sheffield University, who use the data to forecast solar electricity generation in intervals of half hours from sites across the portfolio. The insights from forecasts are publicly available.

Passiv shares data from its solar panel portfolio with Sheffield University and other partners via an API. One of these partners is Open Climate Fix, a not-for-profit organisation who are developing machine learning algorithms to make more accurate short-term predictions for solar electricity generation, termed 'nowcasting'.

Open Climate Fix aims to improve the accuracy of 'nowcasting' by training algorithms to not just consider trends in the generation of solar electricity, but also the effect of environmental conditions like cloud coverage and pollution.

Organisations with access to the API can access data about how much energy is currently being produced across the portfolio in one-minute or 30-minute timeframes. Open Climate Fix accesses anonymised data via Sheffield University, with permission from Passiv.

Lessons learned

- Better forecasting for solar energy generation would help electricity and gas utility companies like National Grid to balance the supply and demand of electricity in the UK in a more efficient, cost-effective, and environmentally friendly way.
- Improvements in forecasting will also help energy suppliers and companies like PassivSystems to provide customers with better and more affordable products and services.
- Providing third parties such as Open Climate Fix and Sheffield University with solar panel data helps them to make better predictions about the generation of solar energy. It also

benefits Passiv, as they can use the more accurate predictions to improve products and services.

Nationwide's 'Open Banking for Good'

Nationwide run 'Open Banking for Good', a challenge to bring together business, civil society and government departments to create and scale solutions around open banking that can improve financial capability in the UK. They have invested £3 million in creating useful tools and services, and partners successful in progressing through the stages of the challenge may receive access to engagement with the Nationwide membership.

The challenge

Open banking allows retail banking customers to share account and transaction data with trusted partners. When securely shared, the data can be used to build useful services. Customers can look for a mortgage more easily, banks and fintechs can find customers for new products, and businesses can share data with their accountants.

There is a risk with this innovation that people in vulnerable circumstances get left behind. For example, in the UK the Money Advice Service estimated that 8.3 million people were over-indebted, and that 22% of UK adults had less than £100 in savings. These statistics are from before the COVID-19 pandemic and may be even higher now.

Open Banking for Good (OB4G) came from a challenge to find a way to use open banking for social benefit. A fund from Nationwide was put aside and 17 charities and organisations were engaged to identify three key challenges:

- 'Income Smoothing' to help the growing number of people with unpredictable or irregular income manage their regular outgoings.
- 'Income and Expenditure' to simplify and improve the accuracy of the I&E profile that someone must complete when they seek debt help. Addressing the challenges associated with income also involved helping customers work towards their goals, based on a better understanding of their finances.
- 'Money Management and Help' to help people practice and maintain better money habits through richer, personalised services so they become more financially confident and capable.

How are they addressing the challenge?

At the crux of open banking is customer consent for data about them to be opened, but for a long time the banks have been saying 'don't share your personal data', leading to reticence from many customers. Open banking allows customers to share data safely.

Seven organisations were awarded funding by the scheme. The seven OB4G Challengers were assigned a Charity Partner and received funding and support from Nationwide to collaboratively co-design, test and potentially scale their ideas and prototypes.

Lessons learned

- Collaboration: One objective is to gather organisations that would not naturally come together to drive social good. Nationwide are working together with commercial organisations, fintechs and academic institutions such as Bristol University.
- Work closely with partners: Nationwide adapted their ways of working to align with the agile methods of the fintechs they partnered with.
- Get internal buy-in: Internally, Nationwide’s initiative is sponsored from the top. Their board, CEO and executive team have belief that the initiative is a strategic priority.

Read more in the ‘[Open Banking for Good: Making a Difference?](#)’ impact report.

Assorted links

Title	Description and embedded links
OpenActive	OpenActive encourages physical activity providers to open their opportunity data and make it more accessible to participants. An external impact assessment of the Sport England funded OpenActive initiative , estimated that the OpenActive data standards could save up to £3 million per year in health costs and generate up to a £20 million per year increase in productivity, as well as bringing benefits, such as new members, to the individual companies involved.
Open banking case study - Barclays	In the financial sector following its launch in 2018, more than 3 million people and businesses use Open Banking-enabled apps and services, with over 300 firms active in the market. This case study found that regulated data sharing often creates benefits for the organisations that share the data.
TFL	In the transport sector, Transport for London opened up access to their data via API, delivering around £130m of value to London per annum, according to a 2017 review by Deloitte .
ODI: Sharing data to create value in the private sector	ODI research into the use of private sector data also demonstrates how businesses can benefit from sharing business-held data, as well as making use of third-party data.
European Commission data economy	The European Commission has estimated that the European Union (EU) data economy was worth €300bn in 2016 and estimates that this will increase to €739bn in 2020. McKinsey has projected that data-enabled applications of artificial intelligence (AI) will generate \$13tn in new global economic activity by 2030.

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Ofwat
Centre City Tower
7 Hill Street
Birmingham B5 4UA
Phone: 0121 644 7500

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