



# GIS HEROES

Ordinary people who made a difference during the COVID-19 lockdown



When COVID-19 threatened and disrupted lives in the UK in the Spring of 2020, organisations of all kinds found themselves facing unprecedented, urgent and colossal challenges. Police forces needed to enforce new social distancing rules in communities and secure business districts eerily deserted of commuters. Utilities needed to maintain their critical services, plus increase their support for vulnerable customers, while their employees were dispersed around the region, working from home. Emergency responders had to continue to provide an effective, rapid response to unexpected events, despite travel restrictions and staff in self-isolation.

Further challenges arose from the need to support key workers and those people who stepped forward to help others in the crisis. Organisations in the transport industry needed to make sure that services were available to enable key workers to get to their places of work, whether they travelled by bus or bike. Local authorities and other bodies needed to support huge armies of volunteers and help volunteer groups provide a safe and valuable service for people who were shielding. Teachers and parents had to deliver lessons at home and needed new materials to keep young people engaged in learning at a time when their education was significantly disrupted.

Not daunted, GIS professionals around the country responded immediately. They used their GIS skills and the Esri ArcGIS platform to create a vast array of inventive solutions that addressed the diverse and complex challenges created by COVID-19. This eBook celebrates the work of some of these GIS heroes and showcases the solutions they developed, from public health dashboards and volunteering web maps to interactive teaching materials. I hope you - like me - will feel inspired by their achievements.



Stuart Bonthrone



**STUART  
BONTHRONE**

Managing Director, Esri UK



# Conquerors of the crisis

COVID-19 is the 'unseen enemy' that has caused untold suffering, pain and loss to millions of people throughout the UK. The lockdown that started in March 2020 has also caused disruption to organisations of all types and sizes - including huge financial losses; changes in working practices; reductions in the workforce; and even the closure and disappearance of some well-known companies.

However, despite the dark clouds that have hung over the nation, there have also been many bright rays of hope. Individuals and companies have risen to the challenge and have used their skill and abilities to develop new solutions that will help to ensure that there is hope beyond the virus.

This booklet brings together nine inspirational stories of people within our GIS community. They have all made use of GIS and Esri's ArcGIS platform to make a real difference to their organisations and those they serve, alleviating suffering and transforming many difficult situations. These are just some of the many true 'GIS Heroes'.

City of London Police  
**DAN BAKER**

Sustrans  
**FLORA TILEY**

Transport for West Midlands  
**STUART LESTER**

RNLI  
**MATTHEW  
WRIGHT**

Police Rewired  
**LEWIS  
WESTBURY**

Scottish Water  
**STUART HILL**

The Rivers Trust  
**ANNEKA  
FRANCE**

Oil Spill Response Limited  
**LIAM  
HARRINGTON-  
MISSIN**

Public Health Scotland  
**ANDREW  
GASIOROWSKI**







## City of London Police **DAN BAKER**

### Keeping the City of London secure during the pandemic



“COVID-19 changed policing in the City of London overnight,” states PC Dan Baker, who was assigned to a rapidly-assembled COVID-19 command group at City of London Police as soon as the scale of the pandemic became evident.

The City of London usually attracts 500,000 workers, students and tourists every day, but when lockdown commenced, the area’s historic streets and thriving businesses emptied almost completely, creating a host of new challenges for the force. In particular, the police needed to optimise the security of business premises throughout the City of London, as quieter streets created potential opportunities for criminal activities. Like the rest of central London, the City of London has been a target for terrorist activities, serious crime and high-value burglaries in the past, so it was essential for the force to take steps to ensure that COVID-19 didn’t put people and premises at increased risk.

It was immediately apparent to PC Baker that City of London Police needed to understand who was still travelling into the City of London and where these people were working to enable the force to identify the groups and buildings that were most vulnerable in this unfamiliar and unprecedented situation. Immediately prior to the outbreak of COVID-19, PC Baker had been involved in the development of a GIS-based policing system for another command group within London. Therefore, he had some insight into the capabilities of Esri’s

ArcGIS platform, and this prior experience was enough to get him thinking.

Within days, he had come up with a vision for a new operational dashboard that would provide commanders with up-to-date data on the business premises that were closed, the workers that were still traveling into the City and estimated footfall throughout the area. “No-one asked me to create this solution, but when I presented the idea to the chief superintendents and commanders in the team they immediately said they needed it,” he recalls. “At the time, everything was unknown and we needed ‘something’.

My superiors trusted me to deliver that ‘something’ and now they can see the value that it adds.”

Not a technology expert, PC Baker turned to Esri UK’s Professional Services Group

for help to turn his vision into a reality. A team of people from Esri UK then worked with him to design, develop, test, adapt and launch a GIS solution within just a few days. PC Baker didn’t just inspire the project; he led it from the outset, liaising closely with commanders and chief superintendents to make sure that the end result met the force’s pressing needs.

The core of the solution is an Esri Operations Dashboard that displays the latest information available about footfall in the City of London and shows which business premises are open or closed on an interactive map. Police officers on the beat within the City of London use an Esri Collector

**“COVID-19 changed policing in the City of London overnight”**



app on their mobile devices to record observations about people's movements and busy areas, and this up-to-the-minute data is automatically visible on the dashboard. Senior police officers can then use the dashboard to better monitor changes and vulnerabilities and make well-informed policing decisions.

Integrated into this security dashboard is a game-changing facility for gathering up-to-date data from as many as possible of the 23,890 businesses based in the City of London, including, in particular, the 280 large businesses that together provide 50% of jobs in the City. Surveys are sent to businesses by email and responses are automatically collated and displayed. One of the first surveys conducted using the Esri solution indicated that just 3% of the City of London's usual workforce was still working in the City, based on responses from businesses with a combined workforce of 123,000 people. Use of this automated survey facility enables the police to communicate easily with HR and facilities personnel, who may be working from home outside of London, and gather a large amount of data very quickly.

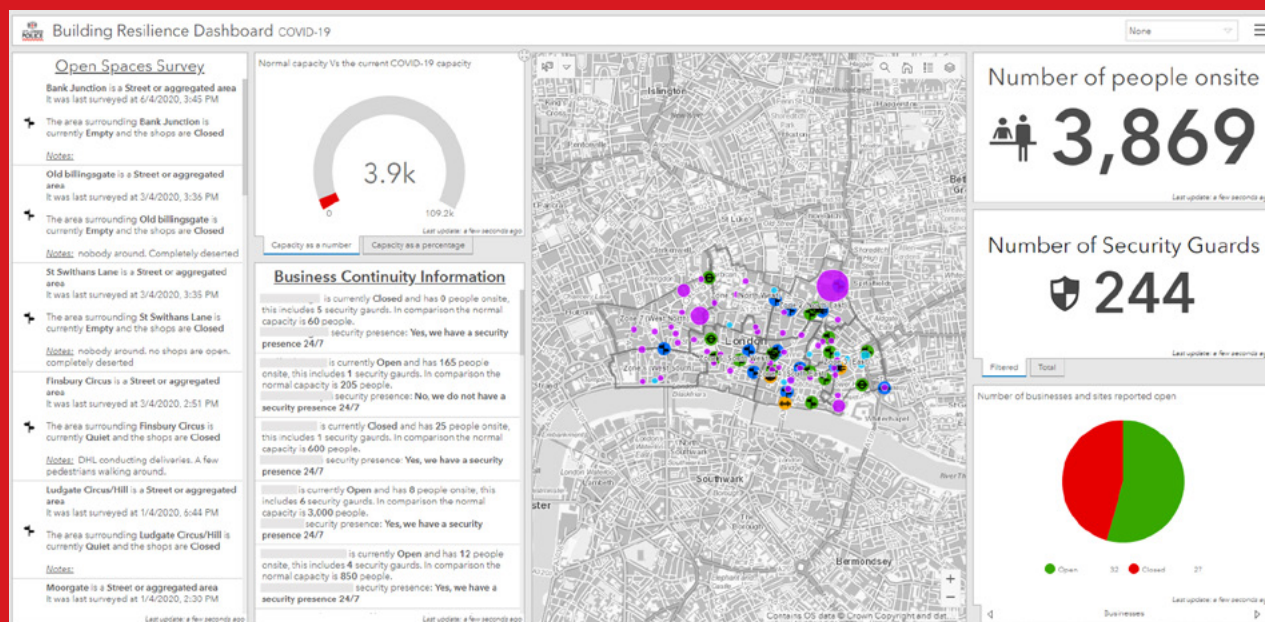
PC Baker believes that the bespoke dashboard solution is now fulfilling a vital role by helping City of London Police to optimise the allocation of police resources during the pandemic. At the start of the crisis, police numbers fell, due to illness and self-isolation, but using the security dashboard, commanders could make sure that available police officers were allocated to the best locations to protect the most vulnerable people and properties. "How can you put together an effective deployment plan, without knowing what you are deploying to?" asks PC Baker. "Our security dashboard helps us to provide a gold standard of policing in the City of London at this exceptional time, reduce crime and protect the public."

Following the success of the security dashboard during the COVID-19 crisis, PC Baker's vision has become even more far-sighted and ambitious. He believes that the dashboard and integral survey facility will continue to provide a vital role in improving the effectiveness of policing in the City of London long after lockdown measures have been relaxed. For example, he aims to send the survey to pubs, when they reopen, so that the police can identify potential issues from

over-crowding or large groups. He also plans to continue to monitor changes in footfall through the City over time, as social distancing restrictions are gradually lifted and as businesses close or opening hours change. "We are looking ahead to life beyond COVID-19," he says. "A solution that presents data on footfall and vulnerabilities will be even more useful in the future, when hundreds of thousands of people return to the City of London."

Looking further ahead, PC Baker hopes to share his experience with other police forces, so that similar security dashboards can be implemented throughout London and, eventually, throughout the UK. He says, "The end of COVID-19 isn't when the vision stops; it's when a new vision begins."

***"Our security dashboard helps us to provide a gold standard of policing in the City of London at this exceptional time, reduce crime and protect the public"***



The City of London Police security dashboard provides an up-to-date picture of the financial district in lockdown



Sustrans

## FLORA TILEY

Keeping the wheels moving for Britain's priority workforce



While many people began working from home or were furloughed at the start of the COVID-19 lock-down, millions of key workers needed to continue to work and, indeed, commute to work. Around 40% of people in the UK workforce are currently classed as key workers by the Government: not just health and social care professionals, but also those who fulfil pivotal roles in education, local and national government, food distribution, the police and utility companies. Everyone in this priority workforce suddenly needed to consider how they travelled to work, to maintain social distancing and ensure their own personal safety. As a result, many people who used to travel by public transport started to cycle to work instead.

The walking and cycling charity Sustrans quickly realised that key workers who were commuting by bike might need cycle repair services or new cycling equipment. The government had already announced that bicycle shops and service centres could stay open, but not all stores were able to maintain their usual hours due to staffing issues brought about by illness and self-isolation. Individual organisations in the cycling industry were also launching offers and discounts for key workers, but there was no single place where people could go to see what was available to them in their local areas. Sustrans' marketing team initially decided to publish a list of cycling offers and open bike shops on its website to help keep wheels moving, but a conversation with GIS Officer Flora Tiley revealed a far better approach. According to Head of Marketing,

*We've only just begun to use ArcGIS at Sustrans, and there are so many more projects that I want to deliver"*

Monica Ogden, what Tiley proposed and then subsequently delivered was "a dream solution to help key workers easily view and search for nearby businesses and schemes."

Working closely with the marketing team, Tiley used Esri's ArcGIS Online platform to create a web map, displaying more than 1,600 bike shops, repair centres and cycling industry offers for key workers, throughout the whole of the UK. Named [cycles4KeyWorkers](#), the web map allows users to zoom into their own areas and easily find their nearest open services. In the first three weeks alone, the web map received over 30,000 views from more than 19,000

unique users. 60% of these users accessed the web map from mobile phones, which suggests that they were using it to find information when they needed it most.

Tiley first discovered she had a talent for GIS at university, when she encountered the technology as part of her geography degree. Without doubt, developing the Cycles4KeyWorkers web map has been the biggest challenge of her career in GIS so far. It was quite a complex undertaking as she needed to convert data in many different formats, from multiple sources, using a range of methods and software tools. "This project is unlike anything that I have done before, but so rewarding," she admits. "Everyone wants their work to make a difference. To be able to produce something like this, very quickly, at a time of national crisis, has been a big personal achievement."





The Cycles4KeyWorkers web map

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The project clearly demonstrated to Sustrans how effective GIS can be as a marketing communications tool. The features and interactivity of the ArcGIS web map captured the attention of the media and partners, helping Sustrans to make as many key workers as possible aware of the cycling offers and services available to them. Through social media and traditional media channels, the organisation estimates that the ArcGIS web map reached an audience of more than 47 million people.

Tiley hopes that the map will encourage more people – not just key workers – to commute to work by bike and cycle as a form of exercise to help them adopt healthier lifestyles. She is continuing to update the map twice a day, to make sure that it provides accurate information about open and closed stores and facilities. “It would be great if this map could spark real change and enable something positive to emerge out of the pandemic,” she says.

Surprisingly perhaps, Sustrans is new to ArcGIS. The organisation only adopted it in the summer of 2019, after taking the decision to replace six legacy GIS-based technologies and survey methods that were used by different teams in different offices. It began its programme to roll out ‘Esri to Everyone’ in November 2019, five months before the lockdown commenced, and already nearly half of the organisation’s 600 employees are using ArcGIS desktop or mobile solutions, supported by a team of four GIS professionals. “It’s been busy,” Tiley says, with a hint of understatement.

Given Sustrans’ relative inexperience with ArcGIS, the speed at which the web map was developed is remarkable. The first germ of the marketing idea emerged one Friday afternoon, and by the end of the day on Monday, the GIS development was underway. Tiley produced a working prototype within a matter of days and, after a period of testing and further

development, the Cycles4KeyWorkers web map was launched in less than two weeks. While Tiley led the project, it was a true team effort involving Tiley’s GIS colleagues, the marketing team and an in-house graphic designer.

Being just at the start of her career in GIS, Tiley is now looking ahead keenly to the future and has several new ArcGIS projects in the pipeline. In particular, her experience with the Cycles4KeyWorkers web map has inspired her to use ArcGIS more extensively as a communications tool to support Sustrans’ future publicity campaigns. “We’ve only just begun to use ArcGIS at Sustrans, and there are so many more projects that I want to deliver,” she enthuses. “I am on the crest of a wave and excited about the future.”







# Transport for West Midlands

## STUART LESTER



### Providing essential transportation for key workers

The outbreak of COVID-19 and the social distancing measures subsequently introduced by the British Government had an immediate and grave impact on transportation services in the West Midlands. Within days of the first reported cases of the coronavirus in the region, the number of passengers on busses, trams and trains dropped by more than 90%. Transportation operators began reducing services as their revenues fell and as more and more members of staff needed to self-isolate to contain the spread of the virus. Some bus, tram and rail services were suspended indefinitely, and fears began to emerge that many key workers, including doctors, nurses, carers and supermarket staff, might not be able to get to work to provide the vital services that everyone depended upon.

As Data Insights Manager at Transport for West Midlands (TfWM), Stuart Lester was among the first to step forwards with a practical approach to addressing this urgent issue. He and his strong in-house team used Esri's ArcGIS platform to compile anonymised data on the home locations of key workers, supplied by the providers of essential services and employees themselves. They then added open source census data, showing the locations of households less likely to have access to private vehicles and plotted the locations of key workplaces like hospitals on an Essential Services Web Map. By analysing all this data with ArcGIS, the team was able to identify specific areas with clusters of key workers who are dependent on

public transport. TfWM could then work with its partners to ensure transport services were maintained in these priority areas.

When the Government announced plans to set up an emergency field hospital at the National Exhibition Centre (NEC) in Birmingham, Lester's key worker analysis became even more invaluable. Public transport services to the NEC had all but ceased following the closure of the venue, but suddenly the NEC was the focal point for a massive logistics and emergency response operation. Lester and his team were able to use the Essential Services Web

Map to identify the priority transportation services needed to get clinicians and vital support staff to the new Nightingale hospital.

The Essential Services Web Map is just one of

many different ways in which Lester and his team used ArcGIS to gain and share insight about the challenges presented by the COVID-19 crisis. Using Esri's Operations Dashboard, they developed and continue to enhance a website that gives the Mayor's office, local authorities and the police instant access to the latest data about transportation services, passenger journeys and road usage in the region. This dashboard provides emergency planning groups with the insight they need to monitor the success of the Government's 'stay at home' instruction and formulate new policies, as well as assess the impact of the crisis on the region's economy.

*"COVID-19 has demonstrated what we are capable of doing with GIS"*



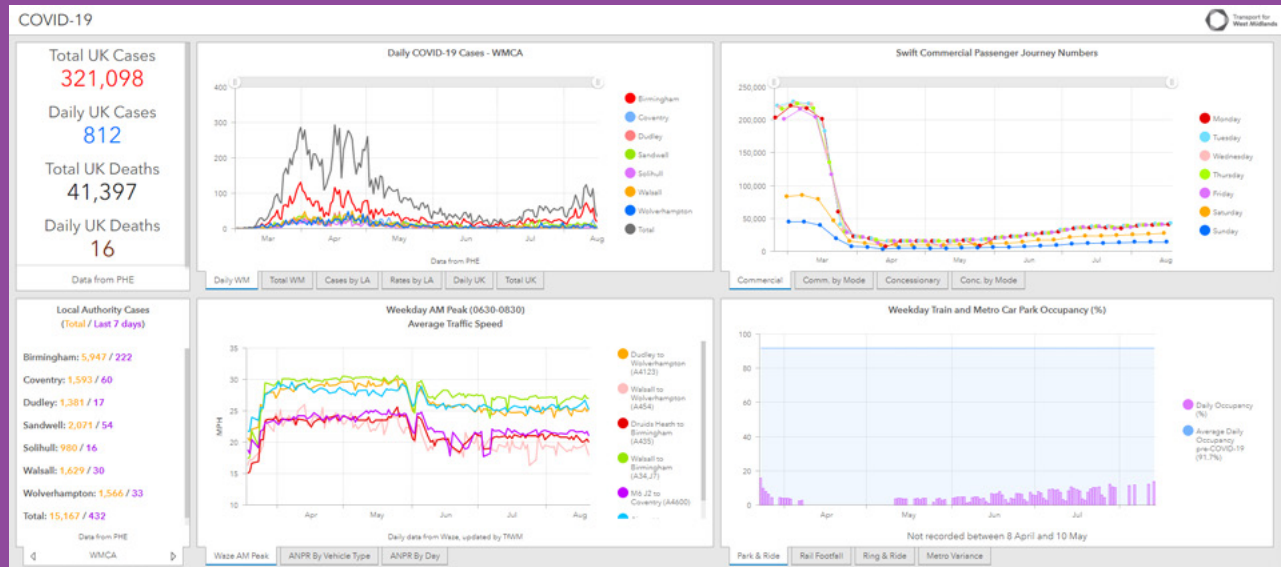


Lester sees the TfWM COVID-19 response as the validation of a strategy that was formulated four years ago. Prior to then, transport data for the West Midlands was held and managed by an external service provider. Lester advocated bringing this data in-house so that it could be used more innovatively and accessed more quickly in emergency scenarios. Neither Lester nor his colleagues could possibly have anticipated then that they would be faced with a global pandemic in just a few years' time, but their foresight has certainly paid dividends.

Over the last four years, TfWM has grown the team to ten people and invested in new technologies, including GIS, to enable the organisation to gain unprecedented insight from its data and share that insight quickly. "I have put the right team and the right tools in place to allow TfWM and its partners to manage business-as-usual and exceptional, unplanned events," Lester says. "COVID-19 has demonstrated what we are capable of doing with GIS."

Born and bred in the 'Black Country' region of the West Midlands, Lester has always been driven by the desire to help make the West Midlands the best it can be. Birmingham, the largest city in the West Midlands, is an epicentre for COVID-19 cases, and Lester feels proud to have been in a position to help people in his home area at such a worrying time. "COVID-19 may turn out to be one of the biggest global threats in our lifetime," he says. "I will always look back and feel pleased that, when the virus emerged, my team and I were able to stand up and meet the needs of our local community. This is the proudest moment I've had in my working career to date."

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RNLI

## MATTHEW WRIGHT

Maintaining a vital,  
life-saving service



Working in an organisation full of real heroes who risk their lives on the sea to save others, Matthew Wright is understandably modest about his achievements. He has, however, played a key role in helping the RNLI to maintain its vital, life-saving services during the COVID-19 pandemic, through his use of GIS.

When the pandemic first emerged and lifeboat crew members started to self-isolate, the RNLI realised that an escalation in the pandemic might impact its ability to respond to an emergency. The charity has over 8,500 operational volunteers around the UK and Ireland who are on call 24/7. It was concerned that if several people became ill or had to self-isolate in one community, at the same time, lifeboat stations might not have sufficient number of trained crew to launch a lifeboat.

As GIS Advisor to the charity, Wright used Esri's ArcGIS platform to build an interactive dashboard, using out-of-the-box tools, showing the readiness of crews at 238 lifeboat stations in the UK and Ireland. A red dot indicates that the lifeboat station has been sufficiently affected by COVID-19 that it would not be able to deploy in an emergency; an amber dot indicates that the regional manager is concerned; and a green dot illustrates that there are currently no issues and the lifeboat is able to operate as normal. The dashboard also shows a daily count of the number of crew members who have reported COVID-19 symptoms or who are required to self-isolate due to potential exposure to the virus.

Every day at 4:30pm, the map is refreshed with up-to-date data, in time to be used by senior managers in the daily

COBRA-style senior leadership meetings. The ArcGIS dashboard makes it very easy for this central team to monitor changes in the charity's operational readiness and make effective decisions based on an accurate understanding of the availability of crew. With this insight, the RNLI is better able to deploy the right crew, from the right lifeboat station, to respond to an emergency situation as effectively and quickly as possible, to help save lives.

At one point in time, the RNLI COVID-19 Status dashboard revealed that there were over 250 crew members in self-isolation and 15 crew members with COVID-19 symptoms. Despite these figures, the dashboard reassured senior managers, as it continued to illustrate visually, throughout the pandemic, that there were no significant gaps in coverage around the coast. Even when individual lifeboat stations had to suspend their activities due to crew shortages, the ArcGIS dashboard always showed there were other lifeboat stations nearby that were ready for action.

While the number of people going to the beach and engaging in leisure activities like sailing and kayaking reduced significantly during the lockdown, there was still a very real need for the RNLI to be able to fulfil its vital service. In the six week period from March 23rd, the day that the lockdown commenced in the UK, to May 4th 2020, the RNLI needed to launch its lifeboats 314 times and rescued or aided 236 people. Critically, the charity believes that at least seven people are alive today, who would have lost their lives at sea during this six-week period, if it hadn't been for the swift and courageous actions of volunteer RNLI lifeboat crews.







The RNLI COVID-19 Status dashboard provides a clear overview of the availability of RNLI lifeboat crews around the UK and Ireland during the pandemic

*“I was able to use my skills and experience with GIS to present our COVID-19 data in a visual format that enables senior managers to instantly understand the status at 238 lifeboat stations and the readiness of crews at each location”*

One evening, the RNLI rescued two teenagers, who had not only broken the lockdown restrictions by going out, but had gone to sea in a boat with a broken rudder and no sail and then lost their paddle overboard. Other call-outs involved locating windsurfers and kayakers who had been blown offshore by strong winds and rescuing walkers cut off by the tide. The RNLI also assisted a cargo ship that had run aground and assisted several amateur and professional fishermen, when their fishing boats and trawlers got into difficulties. Having the COVID-19 Status dashboard helped to give the RNLI the confidence that it had the trained crews available to respond to these and other emergencies.

Remarkably, Wright delivered the RNLI COVID-19 Status dashboard within just 72 hours, with two colleagues working on different aspects of the solution. Russell Hocken, Data Analytics Manager, devised a new approach to gathering

COVID-19 data from 48 regional managers, enabling updates to be easily uploaded to the ArcGIS Dashboard; and Lucy Dickinson, Data Scientist, developed a PDF report that could be generated automatically each day, using the same data, to show trends. “We all drew on our own areas of expertise,” says Wright. “I was able to use my skills and experience with GIS to present our COVID-19 data in a visual format that enables senior managers to instantly understand the status at 238 lifeboat stations and the readiness of crews at each location.”

While Wright has built up his GIS skills over many years, in roles at the RNLI and previously at English Heritage, he began his working life in a very different field – often a muddy one. “I trained initially as an archaeologist,” he reveals. “After 7 years though, I decided to swap my trowel for a keyboard and spend more time in a warm, comfortable office!”

Since joining RNLI, Wright has played an instrumental role in creating the charity’s Life-Saving Service Status dashboard, another GIS solution built using ArcGIS Online Web App Builder. Whereas the COVID-19 Status dashboard displays the readiness of crews, this more advanced dashboard shows the operational status of boats, including whether they have launched, whether they are undergoing maintenance or whether they are ready to respond to an emergency. Since it was introduced, the Life-Saving Service Status dashboard has become one of the main information tools used by senior managers to monitor the operational status of the lifeboat fleet. Wright anticipates that, in time, aspects of the COVID-19 Status dashboard will be subsumed into the core Life-Saving Service Status dashboard. He will then further enhance the system to provide a comprehensive, live and critical information tool for the charity, helping it to achieve its mission of saving more lives at sea.





## Police Rewired

# LEWIS WESTBURY



### Supporting the nation's new army of volunteers

When appeals were made for volunteers to come forwards to help others during the COVID-19 crisis, the enormous scale and speed of the response was profoundly moving. According to the national volunteering charity Volunteering Matters, over a million new volunteers stepped up to fulfil a variety of roles in the UK in just six weeks. Thousands of people used a volunteering app to offer support to the NHS in England; some people joined existing charities, like Age UK, helping them to scale up the services they already provided; and other people joined new local community groups that formed quickly to meet a specific need, such as delivering medications or sewing hospital gowns.

As someone who is passionate about volunteering, Lewis Westbury was amazed and heartened by the wave of people offering to support others in their communities. In his day job, he is a software developer at Government Digital Services, a branch of the Cabinet Office. However, for over nine years, he volunteered as a Special Police Constable with the Metropolitan Police and, eighteen months ago, he set up a network of volunteers, called Police Rewired, which develops free-to-use IT solutions for public safety organisations.

Westbury's experience of both volunteering and policing gave him a real insight into some of the new challenges and

opportunities that police forces all around the country faced as a result of the sudden surge in volunteering activities. He instantly recognised that police forces would need to be aware of where newly formed volunteer groups were springing up, so that they could give the coordinators advice about how to keep volunteers safe and explain what volunteers should do if they encountered people who were at risk while carrying out their volunteering activities.

With support from two Esri UK employees, Westbury used ArcGIS Online to produce a web-based dashboard displaying the locations of over 3,750 local groups providing voluntary services across the whole of the UK. Community-based police officers can select their own force area from a dropdown box on the dashboard and pan around the interactive map to view voluntary

groups in their localities and obtain contact details. With this information at their fingertips, police officers can then reach out to local groups and provide timely, relevant safety information to support the nation's new army of volunteers.

"In many respects, the dashboard is a community relations tool for the police," Westbury says. "It is available to all police forces in the UK for free and can be used to help them build strong, supportive relationships with people in the communities they serve."

***"Through the use of the Police Rewired dashboard, police forces in the UK can obtain the information they need right now to help them build positive, supportive relationships with volunteers in their areas"***





The Police Rewired dashboard draws on data from a variety of sources including COVID-19 Mutual Aid UK, Local Halo and local council hubs, crowd-sourced by another volunteer group called TheyHelpYou. Westbury invested a lot of time in cleansing this data to remove duplications and errors. He then shared his data set, called COVID-19 Combined Volunteer Groups, via the [Esri Living Atlas](#), making it available for others to use as part of their own ArcGIS projects. Using his data set, Westbury also developed a simplified web map for anyone to use, to find their nearest volunteering group. This highly intuitive, easy-to-use online tool makes it very easy for potential new volunteers to find a local group they can join or contact their local council-run volunteering hub to request help.

As Westbury doesn't use GIS technology as part of his usual job with Government Digital Services, he mastered a steep learning curve to deliver this solution. "My personal development on this project has been huge," he says, noting that he learned a lot about Python, data cleansing and data management as well as ArcGIS. "I found that ArcGIS Online offered me straight-forward map-building tools, which I could use out-of-the box to consume my data and create easy-to-use online maps."

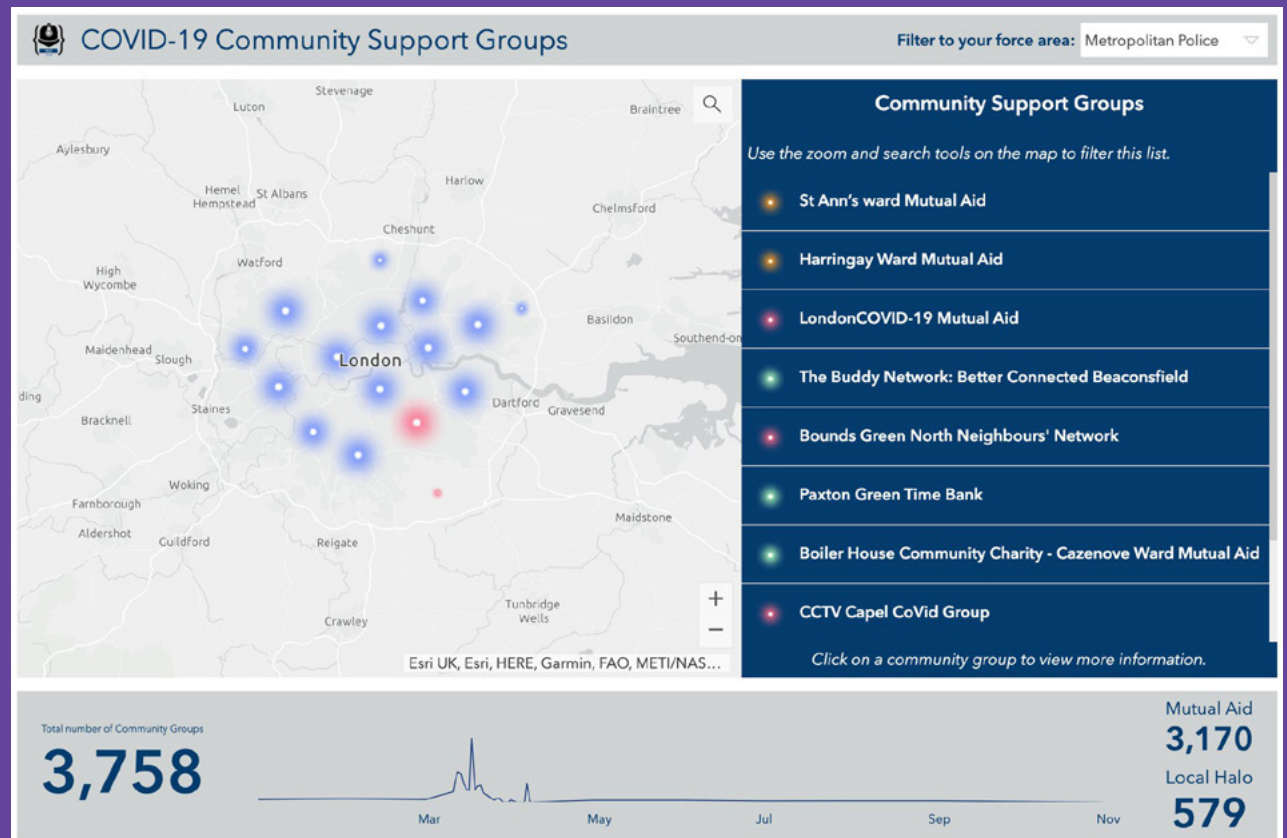
Westbury was first introduced to the capabilities of Esri's ArcGIS platform during a series of Police Rewired hackathons, in which teams of volunteers brain-stormed, built and tested potential IT solutions for the police. The most recent Police Rewired hackathon event was supported by Esri UK and attracted over 50 volunteers who shared Westbury's enthusiasm for innovating. "I love technology and have a real passion for public safety that grew from my time volunteering with the Metropolitan Police," he says. "I also really believe in volunteerism and think that people with technology skills can really add value by donating their time and expertise to the police. It can be very rewarding to take part in a hackathon and have a positive impact on the technology used for public safety."

Several of the solutions that have emerged from recent Police Rewired hackathons are based on or embed ArcGIS technology. For example, one successful innovation is an ArcGIS-based app that encourages and enables people to

play an active part in tackling quality of life issues in their areas. Called Communities Resolving Issues Together (CRITr), the solution was presented at New Scotland Yard in November 2019 and is currently being trialled in Greater Manchester.

When the COVID-19 threat lessens, a large proportion of the hastily formed COVID-19 support groups around the country will inevitably disband, and the need for the Police Rewired dashboard will diminish. However, Westbury believes that the solution will leave a legacy within communities.

"Through the use of the Police Rewired dashboard, police forces in the UK can obtain the information they need right now to help them build positive, supportive relationships with volunteers in their areas," he says. "When COVID-19 has passed, these relationships will endure and help to ensure trust between the police and the community."



The COVID-19 Dashboard created to support UK police forces. The data set was shared via the [Esri Living Atlas](#)



Scottish Water

## STUART HILL



### Reacting quickly to support vulnerable customers

Scottish Water is used to dealing rapidly with the unexpected. Pipes can burst and extreme weather events can occur at any time, with little or no notice, and the organisation needs to be able to respond quickly to help maintain the water supply, prevent pollution and safeguard natural resources. Critically, if a water outage occurs, Scottish Water has the ability to identify any vulnerable people who might be affected and, as fast as possible, deliver bottles or tanks of water to them as a priority.

Scottish Water knew that if the clean water supply were to be interrupted during the COVID-19 lockdown, it would be more important than ever to provide rapid support for vulnerable customers, such as people in care homes or hospitals and people who have registered as needing priority services. "In normal circumstances, vulnerable

people can also call upon neighbours or family members until priority services can be provided, but when they are shielding themselves and self-isolating, this isn't possible," explains Stuart Hill, Asset Inventory Lead at Scottish Water. "We had to be ready to help our vulnerable customers much more quickly than normal if an emergency water outage were to occur during the COVID-19 lockdown."

Scottish Water has tried and tested emergency procedures in place for all kinds of situations, but it was concerned that

the speed of its emergency response could potentially be impeded during the lockdown period due to the need to comply with social distancing measures. Any response to a potential emergency might also be hampered by staff being in self-isolation and teams working from home. The organisation set up a COVID-19 Incident Team and began looking for ways to accelerate its emergency response process, so that if the worst did happen during the lockdown, it could continue to react quickly to support vulnerable people.

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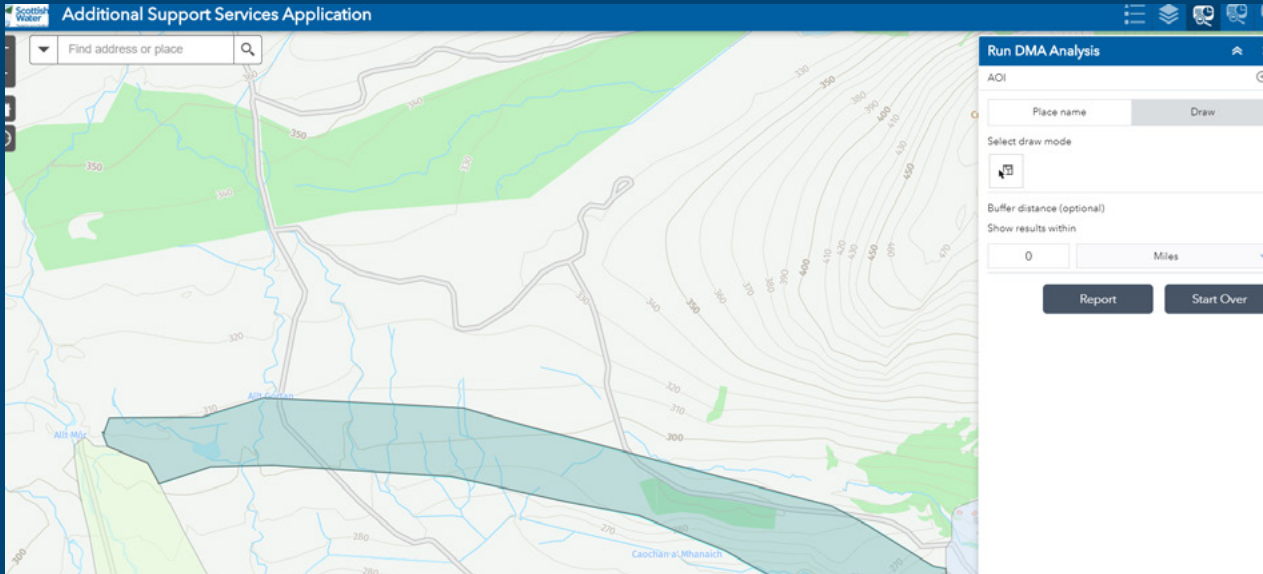
platform, he proposed a way to remove this administration time completely and give the Emergency Planning Team clear visibility of where vulnerable customers are located, in a matter of minutes. "The quicker we can understand the scale and where support is needed, the quicker Scottish Water can respond and ensure priority services for our vulnerable customers," he says.

Having come up with the initial idea, Hill contacted Esri UK for help and within three hours a prototype solution

The lockdown had only just come into operation when Hill identified a solution to the challenge. He knew that it currently took the organisation around one and a half hours to put together lists of vulnerable customers affected by a water outage. Drawing on his long experience with GIS and knowledge of the Esri ArcGIS







The ArcGIS app that helps Scottish Water identify vulnerable customers more quickly

had been built using standard tools within ArcGIS Online. Hill then liaised with directors and brought the right team of people from within Scottish Water together to turn the concept into a fully validated product within days that ensured the continued protection and privacy of data. The solution he designed is an analytical web app that enables users to highlight an area, such as a cluster of water supply zones or just a couple of streets, and immediately see the locations of vulnerable households, care homes, hospitals, prisons, schools and other vulnerable groups within this specified area. The web app can be used by anyone within the Emergency Planning Team, without the need for GIS experience, technical skills or training. "A process that used to take a GIS specialist well over an hour, can now be done in minutes by anyone with approved access," Hill says.

The development of this app means that Scottish Water is now more prepared than ever to support vulnerable customers if a water outage occurs. "A water outage is not something you wish for, but it's something you have to plan

for," Hill says. "Having this app will help us to compensate for the challenges of operating during lockdown and respond very quickly if the worst happens. It gives us a little speed advantage, helping us to deliver good customer service to the most vulnerable people, as fast as possible."

Hill believes that his inspiration for the app came from seeing presentations at Esri UK conferences. He had previously seen demonstrations of a variety of ArcGIS web apps and dashboards, created by a range of organisations, across multiple industry sectors. While these solutions mostly related to business challenges that were very different from those faced by Scottish Water, Hill had the vision to see how these cutting-edge GIS solutions could be adapted and applied to the water industry.

Surprisingly perhaps, Hill doesn't see himself as a 'GIS person'. He has worked in the water industry, in clean water and waste water operations, for 28 years. With a background as a scientist, his career began in water testing

***"Having this app will help us to compensate for the challenges of operating during lockdown and respond very quickly if the worst happens. It gives us a little speed advantage, helping us to deliver good customer service to the most vulnerable people, as fast as possible"***

laboratories and progressed from here into roles in data management, asset management, process optimisation and change management. He found himself using GIS for asset management and gradually developed both an expertise and a passion for the technology.

In 2016-17, Hill played a pivotal role in helping Scottish Water migrate from several legacy GIS systems to a single enterprise-wide GIS platform: ArcGIS. Since then, he has made it his personal mission to help Scottish Water optimise the use of this core system and he proactively seeks ways to introduce GIS into departments and business processes that haven't previously used it. Through his involvement in a number of high-level business improvement groups, he regularly finds himself enthusing about the capabilities of ArcGIS and explaining the benefits to senior directors. "GIS is so much more than mapping," he says, "and now it is getting much more airtime at a high level within Scottish Water."

Long after the COVID-19 crisis has abated, Scottish Water will be gaining value from Hill's inventiveness. The app that he devised will continue to maximise Scottish Water's business agility and enable it to locate and support vulnerable people more quickly when unexpected water outages occur. Looking ahead, the organisation also plans to extend the use of the app and start using it for maintenance activities, to make sure vulnerable people get additional support during temporary, planned interruptions to services. As Hill rightly says, "The app may be small, but it has huge potential within the business."





## The Rivers Trust

# ANNEKA FRANCE



### Helping teachers and parents deliver lessons in lockdown

COVID-19 turned millions of parents into ill-equipped, unprepared and highly reluctant teachers. Forced by the closure of schools and the lockdown restrictions to support their children's learning at home, they needed to find a daily supply of activities to educate and engage their offspring at a time when all other opportunities were very limited. At the same time, teachers were forced to adopt new ways of teaching online and needed to very quickly generate or obtain materials that pupils could use for self-directed learning.

While parents and teachers alike were desperate for help, pupils were desperate for diversity. Robbed of the stimulation of being with their classmates and participating in classroom activities, they needed more than just the same old worksheets, day after day, to keep them motivated and engaged in learning.

The registered charity, The Rivers Trust realised that it could help teachers and parents provide inspiring, interactive lessons at home during the lockdown, by providing access to its existing educational resources and by using its in-house GIS capabilities to develop new interactive, multi-media teaching resources. It knew that it could provide materials that would directly relate to the curriculum for pupils studying geography at key stage 4 and 5, and therefore help these pupils prepare for GCSE and A level exams. However, it could also provide a wide range of

valuable resources that would help to educate younger pupils about the critical importance of rivers.

"Education is one of our key charitable objectives," says Anneka France, GIS Analyst at The Rivers Trust. "Our vision is wild, healthy, natural rivers valued by all. It is therefore vital for us to make sure that young people understand what rivers are and how important they are for both people and wildlife, so that they will want to look after their local rivers in the future."

***"We saw that we could use ArcGIS Hub to make all these resources available online and provide a one-stop-shop of teaching materials and lesson ideas for teachers and parents"***

The preservation of rivers and riverside environments in the UK is an incredibly important environmental challenge, but it is often overshadowed by more prominent global issues, as France explains. "When people think of climate change and ecological damage they think of deforestation in the

Amazon, not house building in the home counties. There is a lot of damage taking place to rivers in our own local areas that people are not aware of. We aim to enable many more young people to learn about rivers and gain a greater appreciation of the importance of these ecosystems."

Prior to the COVID-19 crisis, France had been building a collaboration platform using ArcGIS Hub, to help the Rivers Trust share resources with its 60 local member trusts. She recognised that she could quickly use the ArcGIS





Hub to allow all these river-based charities to share their educational resources online. "A lot of the rivers trusts around the country already run fantastic educational programmes with local schools and have some great materials," France says. "We saw that we could use ArcGIS Hub to make all these resources available online and provide a one-stop-shop of teaching materials and lesson ideas for teachers and parents."

[The Rivers Trust Schools Hub](#) was launched very quickly, providing free access to a wide range of materials from interactive presentations to science experiments that you can do in the kitchen. For young children, there is even an online game about Tilly the Trout who needs to travel upstream overcoming obstacles on the river to reach her spawning ground. "The ArcGIS platform is ideal for spinning up new initiatives quickly," France says. "If we had tried to build a new website from scratch it might have taken weeks. Using the ArcGIS Hub and its ready-made templates, we launched the new education hub in just a few days."

Recognising that geography students would find it very hard to prepare for field trips while learning at home, The Rivers Trust used ArcGIS to create a Virtual Field Trip Story Map. Developed within days at the onset of the COVID-19 crisis, this GIS tool embeds lots of multi media and interactive tools, enabling pupils to plan a field trip, identify the best field study sites and decide which survey techniques to use. France and her colleague Lucy Butler built this Story Map in collaboration with Eden Rivers Trust and with input from a panel of teachers and the Field Studies Council, and it has been well received by geography teachers.

The Schools Hub also includes another ArcGIS Story Map, which provides an interactive exploration of the River Eden and helps pupils to learn geological vocabulary relating to river courses. France and her colleagues are currently reviewing the wealth of other GIS resources from the Rivers Trust movement that have been produced for schools to see which can be simplified and adapted to make them suitable for home-based schooling, and they hope to make many more resources available via the Schools Hub soon.

Certainly, the lockdown has been a busy period for France, who joined The Rivers Trust just over two years ago. At university, she studied both biological sciences and geography, encountering GIS in a second year module of her course. "One of the things that first interested me

about GIS was its interdisciplinary nature. As a joint honours student, working in many different areas, I could see so many different applications for the technology," she says.

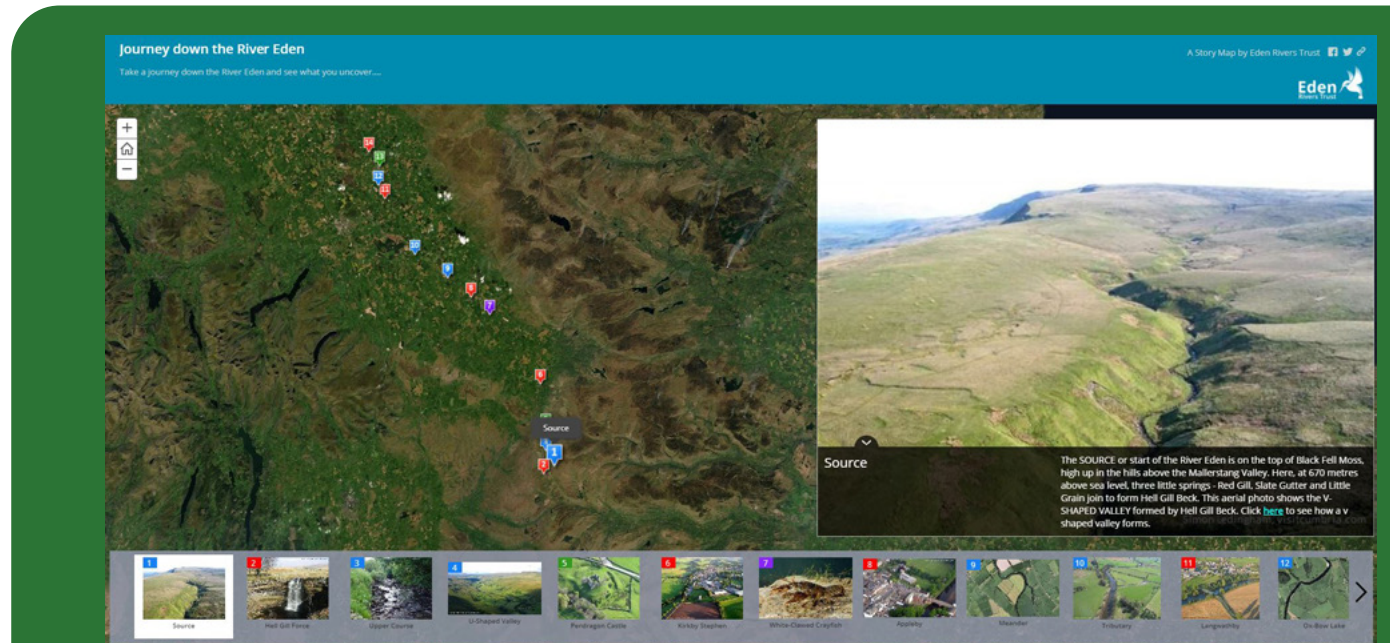
France subsequently completed a master's degree in GIS and climate change and then honed her GIS skills on the tropical island of Zanzibar, in East Africa. Here she used ArcGIS in land cover research, as well as an educational programme funded by Comic Relief. "I have been lucky," she admits. "I've had some great opportunities. There is so much variety in the work you can do with GIS."

Even just a few months ago, France could hardly have anticipated that she would have been using her GIS skills now to develop home-schooling resources. Yet, she is delighted to be rising to the challenge and helping teachers and parents while schools are closed. By building her 'one-stop-shop' for education materials and creating new multi-media resources using GIS, she is helping to ensure that pupils don't fall behind in their geography curriculums.

Equally, she is providing materials to keep younger children occupied, while all the time communicating the importance of river environments to the next generation.

Teachers, parents and indeed many pupils will no doubt be very relieved when schools reopen fully. Yet, in the meantime, while school-based education remains disrupted, France hopes that many more families will take advantage of The Rivers Trust's Schools Hub to learn about Britain's rivers.

It is, she says, so important for young people to understand just how threatened our river environments are. "People are used to hearing about plastic in the ocean, but don't know about the problems caused by plastic in rivers. When they think about endangered species they don't generally think about fish, but freshwater fish are declining in number more quickly than any other animal group. At the moment only 14% of rivers in the UK are considered to be in 'good' ecological state. Through education, hopefully all this will change."



Recognising that geography students would find it very hard to prepare for field trips while learning at home, The Rivers Trust used ArcGIS to create a Virtual Field Trip Story Map



## Oil Spill Response Limited

# LIAM HARRINGTON- MISSIN

### Deploying a global response team amid global travel restrictions



The first five days following an oil spill are absolutely critical in preventing an incident from becoming a major ecological and socio-economic disaster. If spills are not responded to rapidly and effectively within this short period of time, the oil could spread further, be more costly to clean up and cause greater damage to the environment.

The specialist organisation Oil Spill Response Limited (OSRL) is poised to provide a rapid response in the event of an oil spill emergency, anywhere in the world. When a spill occurs, it needs to be able to deploy the right personnel and equipment, from any of its twelve global locations, to the right place, within a matter of hours. This challenge is enormous at any time - but at the start of the global COVID-19 pandemic, it was immense.

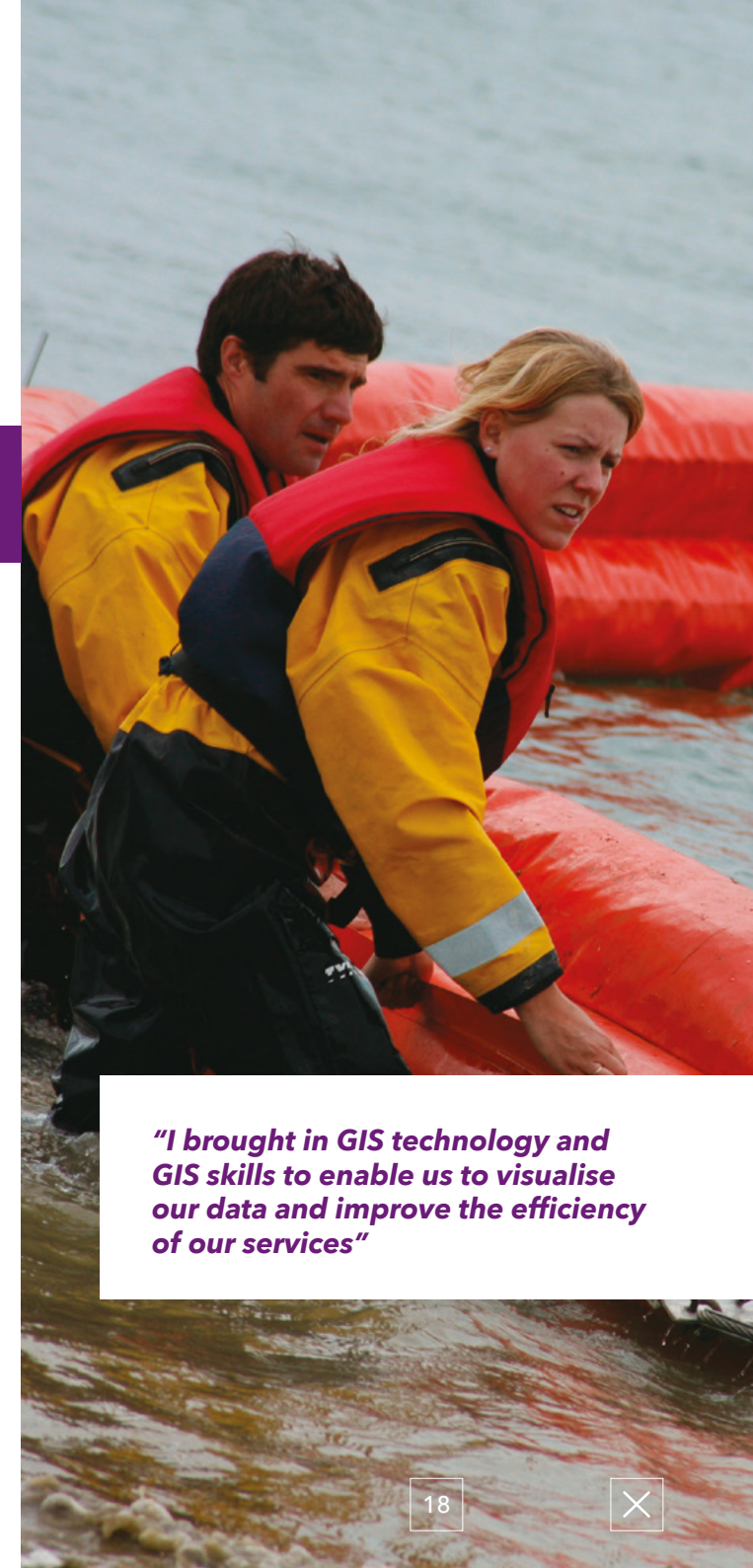
"We needed to plan how to transport people and equipment to countries that had suspended commercial flights, closed their airports and ports and prohibited travel across their borders," says Liam Harrington-Missin, Technology and Innovation Lead at OSRL. "We also needed to communicate how we would operate safely if a spill occurred during the global COVID-19 crisis."

As the coronavirus spread around the world, governments in different countries introduced, adapted and then relaxed varying levels of restrictions on travel and shipments. Consequently, the transportation and logistics options available to OSRL were continually changing. OSRL's Members, who collectively represent over two thirds of the world's oil producers, needed to know how OSRL's services

were affected by COVID-19 and if its specialist personnel and equipment were still available in the event of an emergency. "I started hearing the same questions over and over again," says Harrington-Missin. "It wasn't that we didn't have the answers, but we weren't communicating those answers out to a big enough audience efficiently enough."

Thinking on his feet, Harrington-Missin took a prototype Esri dashboard that he had been building for another project, repurposed it and launched it in less than two days as a way to communicate information to a lot of people in an efficient way. On the first of its three screens, the dashboard provides a graphical overview of OSRL's readiness to respond to an emergency. In a very visual way, it provides reassurance to the organisation's international members, that OSRL's response teams, equipment and aviation services are 'ready to deploy' if needed. The second dashboard screen provides easy access to logistics information about OSRL's key locations and access via nearby ports and airports.

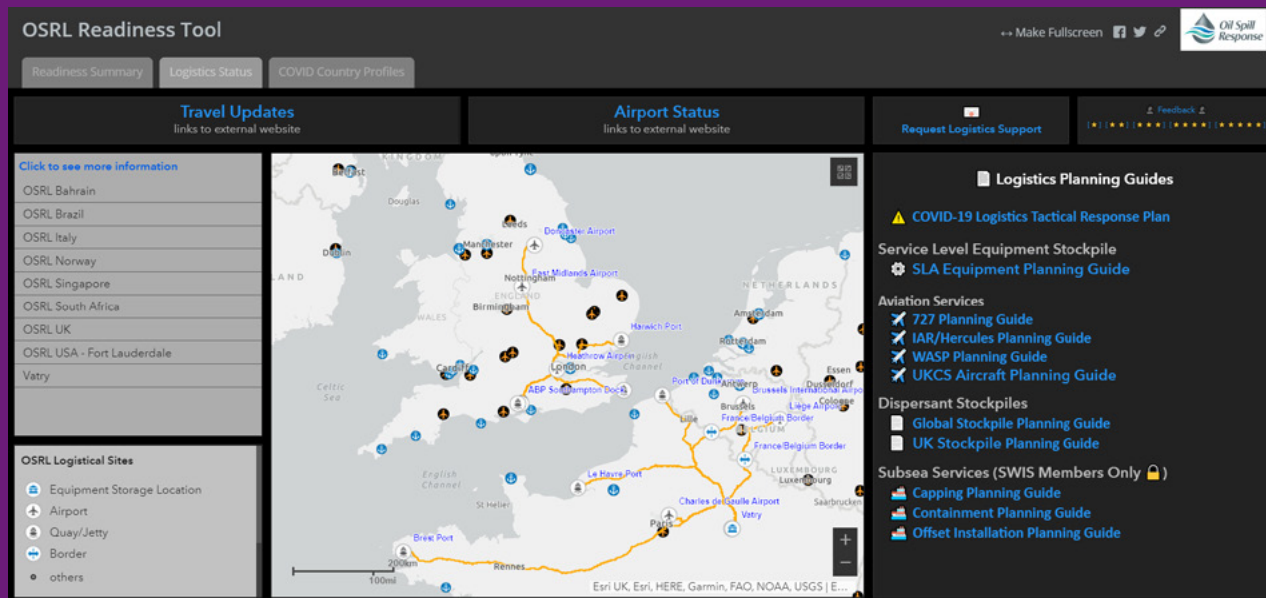
The third screen on the dashboard features an interactive world map that people can click on to access country-specific COVID-19 response plans. These detailed contingency plans explain any temporary travel and logistics restrictions that are in place and set out how OSRL would adapt its usual operating plans in the event of an incident in the country. The dashboard clearly shows profiles that are completed and others in development. It also includes a facility allowing people to vote for the countries they would like OSRL to create COVID-19 response plans for.



***"I brought in GIS technology and GIS skills to enable us to visualise our data and improve the efficiency of our services"***







An Esri dashboard shows that OSRL is ready to deploy to an oil spill emergency during the COVID-19 pandemic

“It was previously very hard to share readiness information; now it is just there,” Harrington-Missin says. “If a Member has a spill, it is very easy for them to see that OSRL is ready to respond, how our logistics will work and what challenges we expect to encounter for each country.”

Harrington-Missin has received very positive feedback on the dashboard from his colleagues at OSRL and Member organisations. During a period of unprecedented uncertainty and change in the global transportation and logistics sectors, the solution gives everyone greater clarity about how OSRL will overcome any travel and logistics challenges, on a country-by-country basis, to deliver a rapid response to any emergency. “We are getting a pretty constant stream of clicks on the dashboards,” he says. “The dashboard readiness tool gives everybody one place to go, reduces the number of emails and minimises duplicated effort. It makes us much more efficient at communicating with Members at a very stressful time and alleviates some of the challenges we have during COVID-19.”

The Esri dashboard has also contributed to improved collaboration with Members, according to Harrington-Missin. He explains: “Members who are in-country have used the dashboard to review the plans and have fed back enhancements based on their local knowledge, so we have been able to improve our contingency planning in a partnership way.”

Innovating and delivering new solutions like the Esri dashboard are very much part of Harrington-Missin’s day-to-day life. He sees it as his role within the organisation to discover new technologies and champion new ways of using existing technologies to improve the speed and effectiveness of OSRL’s response to oil spills. GIS is one of the technologies that he is championing, because, in his view, “GIS is no longer a specialist technology, but an enterprise-wide tool that can be used by lots of people, at different technical levels in all parts of the organisation. I truly believe it can be transformative for oil spill response globally.”

Harrington-Missin joined OSRL in 2012 as an Oceanographer, not long after the Macondo Well Incident, publicly known as the Deepwater Horizon disaster, that claimed the lives of eleven people and put oil spills at the forefront of global attention. His remit was to model oil spills, but he soon began to think more broadly than this, gradually expanding his team, bringing in people with GIS skills and acquiring Esri’s ArcGIS technology a few years later. He has since developed a range of ArcGIS mobile apps that make it easier and faster for response personnel to collect incident data, from the shore and from surveillance flights. “I saw that GIS was hardly used at all in oil spill response and wanted to change that,” he recalls. “I brought in GIS technology and GIS skills to enable us to visualise our data and improve the efficiency of our services.”

Harrington-Missin now plans to further develop the dashboard so that it can continue to add value for Members when global transportation and logistics networks readjust and gradually return to normal. “The dashboard is a foundation for greater efficiency across OSRL and its Members as well,” he says. “Long after the COVID-19 crisis, it will continue to provide OSRL and Members with an instant overview of the equipment that is available and the teams that are ready to respond.”

Critically, the Esri dashboard is expected to save time in the vital early hours after an oil spill, by supporting faster decision making and enabling OSRL to deploy people and equipment rapidly. “When an incident occurs, the organisation concerned will be able to use the dashboard to get to the information it needs intuitively using the Esri dashboard,” Harrington-Missin explains. “The faster that we can work together, the faster we can react to prevent the spread of oil and avert a major disaster.”

Fortunately, large oil spills are rare, but being prepared to respond quickly and effectively at all times is essential. It is estimated that the Macondo Well Incident killed 51,600 to 84,500 birds, over 4,900 large sea turtles and more than 56,000 small sea turtles, as well as billions of fish and shellfish. The disaster also contributed to a significant decline in the populations of marine mammals including whales and dolphins. No-one wants to see an incident of this scale again, but if a serious oil escape does occur in the ocean in the future, OSRL is ready.





## Public Health Scotland

# ANDREW GASIOROWSKI



### Communicating clearly in a public health crisis

There are not many GIS professionals who have a background in psychology. Yet Andrew Gasiorowski's experience of studying the mind and human behaviour has proven invaluable in his role as Principal Information Development Manager and GIS Lead at Public Health Scotland. His scientific insight into how people communicate and respond to information has helped him understand how GIS systems can be used to convey information effectively to large numbers of people - especially in a public health crisis.

When news of a possible global pandemic first emerged in early 2020, Gasiorowski knew just how important public communications were going to be. He began thinking about how he could combine his GIS skills, his understanding of people and Esri's ArcGIS technology to make accurate information available to the general public in a clear and simple format. His foresight was accompanied by speed. Before any cases of COVID-19 had even been recorded in Scotland, or indeed anywhere in the UK, he had developed a prototype dashboard for displaying live information about the numbers of cases and deaths in Scotland.

"I knew that communicating with the public was going to be critical," he says. "Scotland was in a state of alert and Public

Health Scotland needed to be ready."

Public Health Scotland published the COVID-19 dashboard on its website at the height of the coronavirus crisis from April to June 2020, providing the general public with an accurate picture of the spread of COVID-19 both within the community and in hospitals. People could easily see an overview of daily cases and daily deaths for Scotland. In addition, they could use the embedded interactive ArcGIS maps to zoom into specific regions and see the cumulative number of cases by local authority area.

Gasiorowski believes that the map formed a very important element of the Public Health Scotland COVID-19 dashboard, because it aided understanding. "Displaying

information on a map helps people to understand it without large amounts of explanation," he says. "People could use the maps on the dashboard to understand the implications of the virus in their own localities and see differences between local authority areas in Scotland."

During the crisis, especially in the early weeks of the pandemic, there was an overwhelming amount of information in the media, coupled with false news, and it was easy for people to become confused and worried.

***"Displaying information on a map helps people to understand it without large amounts of explanation"***





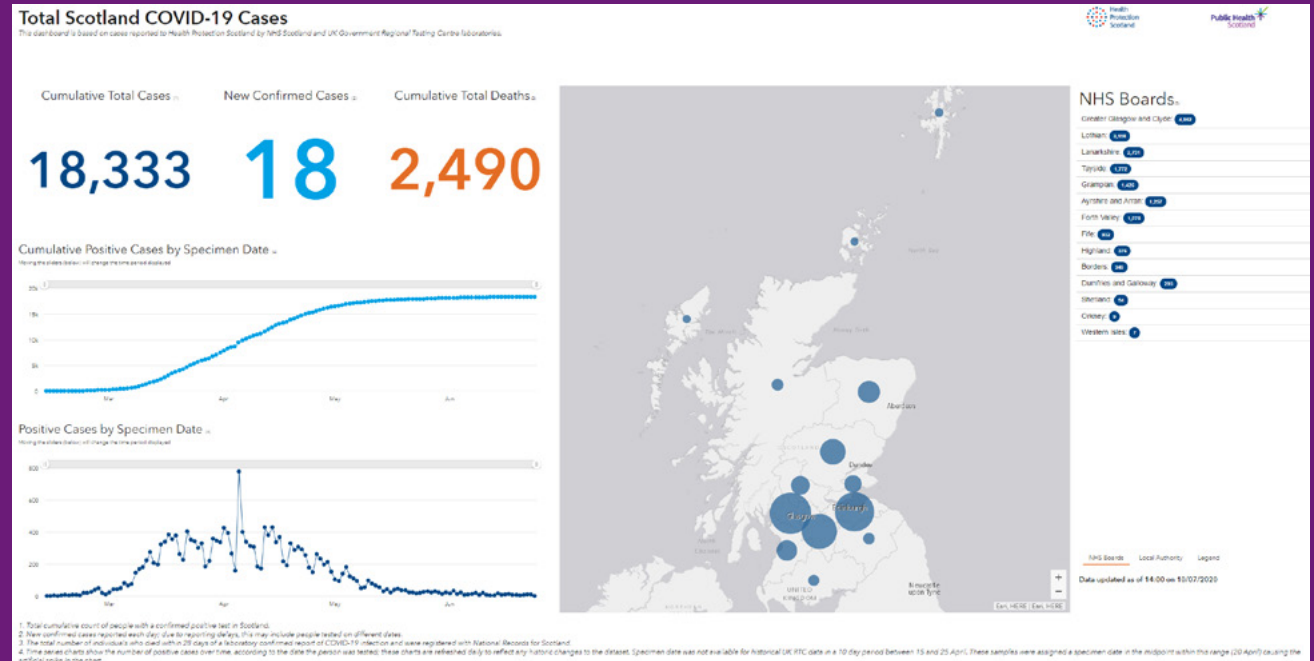
***“The Esri dashboard enabled us to communicate a high level overview of what was happening in the country and provide information that people could trust”***

“There was so much coming at people all the time, from so many directions, Public Health Scotland needed to be really clear,” Gasiorowski notes. “The Esri dashboard enabled us to communicate a high level overview of what was happening in the country and provide information that people could trust.”

All the data displayed on the Public Health Scotland COVID-19 dashboard was based on positive test results, so the data was highly authoritative. When using the dashboard, the general public was viewing the same data that was used by Scotland’s First Minister in her daily briefings and published in government reports.

Gasiorowski recognises that GIS has a key role to play in improving awareness of a wide range of public health issues in Scotland. He was recently involved in a GIS project that analysed the locations of secondary schools and fast food outlets and revealed that a shockingly large proportion of pupils are just a five minute walk away from an unhealthy meal after school. This research is now being used to inform strategies to promote healthier lifestyles and address childhood obesity.

Even decisions about the best locations for NHS services are now increasingly being made with reference to GIS analysis. Gasiorowski explains, “We use ArcGIS to analyse data on medical conditions, healthcare services and facilities going



Public Health Scotland published the COVID-19 dashboard on its website at the height of the coronavirus crisis from April to June 2020, providing the general public with an accurate picture of the spread of COVID-19

back as far as 1922. We can then use this insight to help NHS Scotland make informed decisions about where to base new services to meet patient demand and deliver better outcomes.”

Gasiorowski has been very busy in recent months and he doesn’t expect much let-up in his schedule. Indeed, he believes that as the coronavirus threat moves into a new phase, demand for GIS solutions within Public Health Scotland could surge. “The COVID-19 pandemic has highlighted that there is a real need for public health information to be communicated spatially,” he says. “Especially with track and trace, we need to be able to see not only what is happening, but where it is happening. More than ever before, understanding location is going to be the key to protecting public health.”

***“Especially with track and trace, we need to be able to see not only what is happening, but where it is happening. More than ever before, understanding location is going to be the key to protecting public health”***



## Help Esri to help others

Customers with an ArcGIS Online account can access Esri's ArcGIS Living Atlas of the World and can also contribute to it, by publishing their own maps via this public portal.

Go to [www.esriuk.com/arcgis-content](http://www.esriuk.com/arcgis-content) to find out more or contact [datacurator@esriuk.com](mailto:datacurator@esriuk.com) with your questions.

Meanwhile, to discover more about the potential uses of ArcGIS for your organisation, why not take a look at our resources, including our podcasts and blogs?

[Find out more](#)