

Translating research into practice

Annual Review 2024-2025



UKCRIC™

UK COLLABORATORIUM
FOR RESEARCH ON
INFRASTRUCTURE & CITIES



UKCRIC™
SERVICES



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Foreword from the Chair of the International Advisory Board

The period covered in this report has been marked by continued climate pressures and international conflict. Yet, at the same time, the political enthusiasm both at home and abroad to act against climate change feels weaker – with worrying implications for how advances in infrastructure technologies will meet this most pressing of challenges.

It serves as a reminder of the important role UKCRIC's International Advisory Board has in sharing our varied experiences and perspectives with UKCRIC's researchers. In the UK, potentially the biggest transformation to impact infrastructure is the establishment of the National Infrastructure and Service Transformation Authority (NISTA), which brought together the National Infrastructure Commission (NIC) and the Infrastructure and Projects Authority (IPA). It is to be hoped that NISTA will be successful in ensuring that the Government's strategies for infrastructure will be delivered effectively in a challenging economic environment, taking full account of new technologies and UKCRIC's powerful network of research facilities and outputs.

UKCRIC's continued engagement with the Government and influence on policy will be critical to advancing and investing in impactful research. I was pleased to see UKCRIC communicate its priorities in anticipation of the Chancellor's proposed 10-year Infrastructure Strategy. Certainly, decarbonisation, integration of AI, validating new materials, and developing the skills base to respond to these challenges remain a top priority. These are areas UKCRIC continues to champion, with the support of its International Advisory Board, which it is my continued pleasure to chair.



Lord Robert Mair

Emeritus Professor of Civil Engineering, University of Cambridge, Chair of the House of Lords Select Committee on Science and Technology, and Chair, UKCRIC International Advisory Board

Letter from the Convenor

Against a backdrop of increasing political division and shifting priorities, our work has remained focused on generating the evidence, tools, and collaborations needed to guide long-term, infrastructure resilience.

This year has been one of significant momentum for UKCRIC as we continue to strengthen the UK's capacity to understand, design, and manage the infrastructure systems that support national prosperity and societal wellbeing.

UKCRIC's role as a convenor of practitioners, scientists and policy makers has always been a critical component of our value proposition. For example, the Global Outlook Webinar Series brought international perspectives to the UK's infrastructure challenges, while our support for the iPACT showcase in January 2025 brought together coastal communities, policy makers, and researchers to disseminate knowledge and create opportunities for further project development. DAFNI's annual conference demonstrated the critical role of digital infrastructure, modelling, and data integration in shaping national infrastructure strategy.

Across our research facilities, the Soil-Foundation-Structure Interaction Laboratory (SoFSI), University of Bristol, convened a highly successful event in July 2024, bringing together researchers and practitioners to advance understanding of complex geotechnical behaviour.

At the end of 2024, the National Buried Infrastructure Facility (NBIF), University of Birmingham, received two prestigious honours — the Institution of Civil Engineers West Midlands Award and the Federation of Piling Specialists 60th Anniversary Award — a testament to the facility's world-leading contribution to underground infrastructure research. The Aston Institute of Photonic Technologies (AiPT) Workshop in June 2025 brought together UKCRIC members to identify possible research collaborations.

Following a transatlantic workshop in 2023 exploring the state of the art in urban underground infrastructure research, commissioned by UKRI and the US National Science Foundation (NSF), UKCRIC, in collaboration with George Mason University in the US, published a landmark report on transforming urban underground infrastructure.

Our continued membership of the Net Zero Infrastructure Industry Coalition (NZIIC) reflects our commitment to supporting the UK's transition to a low-carbon, climate-resilient future.

In March 2025, UKCRIC announced the establishment of the Healthy Low-carbon Transport Hub (HLTHub). Working with external project partners and engaging members of the public to co-create project deliverables, this exciting collaboration between UKCRIC member Universities of Southampton, Birmingham, Leeds, and University College London is working to maximise the health benefits of low-carbon transport. The HLTHub is a powerful testament to the value of being a UKCRIC member: identifying, and facilitating collaborative research bids.

We were also proud to see members of our community recognised for their leadership. Professor Liz Varga's sabbatical enabled new avenues of research and international engagement, and Lord Robert Mair's appointment as Chair of the House of Lords Select Committee on Science and Technology highlights the influence and expertise that UKCRIC brings to national policy discourse.

As we look ahead, UKCRIC remains committed to enabling the UK to respond confidently to the infrastructure challenges of the coming decades. We will continue to nurture the next generation of infrastructure scientists and engineers, and work with partners to ensure that evidence and innovation shape the decisions that matter most.

This report reflects the dedication of our community and the collective belief that better infrastructure research leads to better outcomes for society. I am proud of what we have achieved together and energised by the opportunities that lie ahead.



Professor William Powrie,
UKCRIC Convenor

UKCRIC Services

The ambition of UKCRIC Services (formerly UKCRIC Limited) is to become the primary research consultancy that innovates research, knowledge, and education across leading universities in the field of infrastructure and cities. This innovation is facilitated and coordinated by UKCRIC Services and delivered by the academics, researchers and technicians with the primary insights and skills.

Our niche is multi-university collaboration that brings foundational insight (low technology readiness level) into the sphere of industry and government, enabling and informing others who create commercial-ready products/solutions. The range of projects offered by UKCRIC Services includes: technical application of novel methods, standards, and approaches; robust evaluation of the use of reference data; introduction to innovative skills; engagement on collaborative, pluralistic approaches; in-depth analysis using case studies; and technical approaches to create insights and actionable interventions for organisations.

Trading since April 2022, our work has grown to reflect the breadth of unrivalled expertise available to clients. The combined independent and impartial expertise of universities and other research institutions who support UKCRIC Services provides unmatched knowledge and capability able to deliver bespoke solutions for infrastructure and urban systems practitioners across industry, government, non-profit and public sector organisations.

Though a relatively young company, our UKCRIC heritage (since 2016) is testament to our strong research ethic and professional delivery. We are delighted that many of our clients return to work with us, valuing our approach and insights to address multi-layered, complex infrastructure and city challenges. Our carbon assessment work with National Highways on the Lower Thames Crossing is a great example of a mega client you can read about in this annual review. Other clients include the Materials Processing Institute where we supported heat recovery and process efficiency optimisation, and Deep Meta on agentic plant automation.

Complementary to our client work, UKCRIC Services, as a company limited by guarantee, is proud to reinvest profits to benefit infrastructure stakeholders and to support UKCRIC's [Scientific Missions](#) on the renewal, sustainment and improvement of infrastructure and cities in the UK and elsewhere.

In May 2024, following a successful submission to the [Manchester Prize](#), UKCRIC Services received a finalist award of £100,000 to develop leading artificial intelligence (AI) methods to predict leakage in UK water distribution management. We published a study of our [pre-commercial findings](#).

With Research Technology Organisation (RTO) status, we support SMEs and micro organisations to deliver their grants using novel university research. This is enabled by UKCRIC's regional [facilities, laboratories and observatories](#).

As you read about the work of UKCRIC in this review, if you are a business or organisation seeking a solution to an infrastructure or city challenge, no matter how big or small, please don't hesitate to contact us.

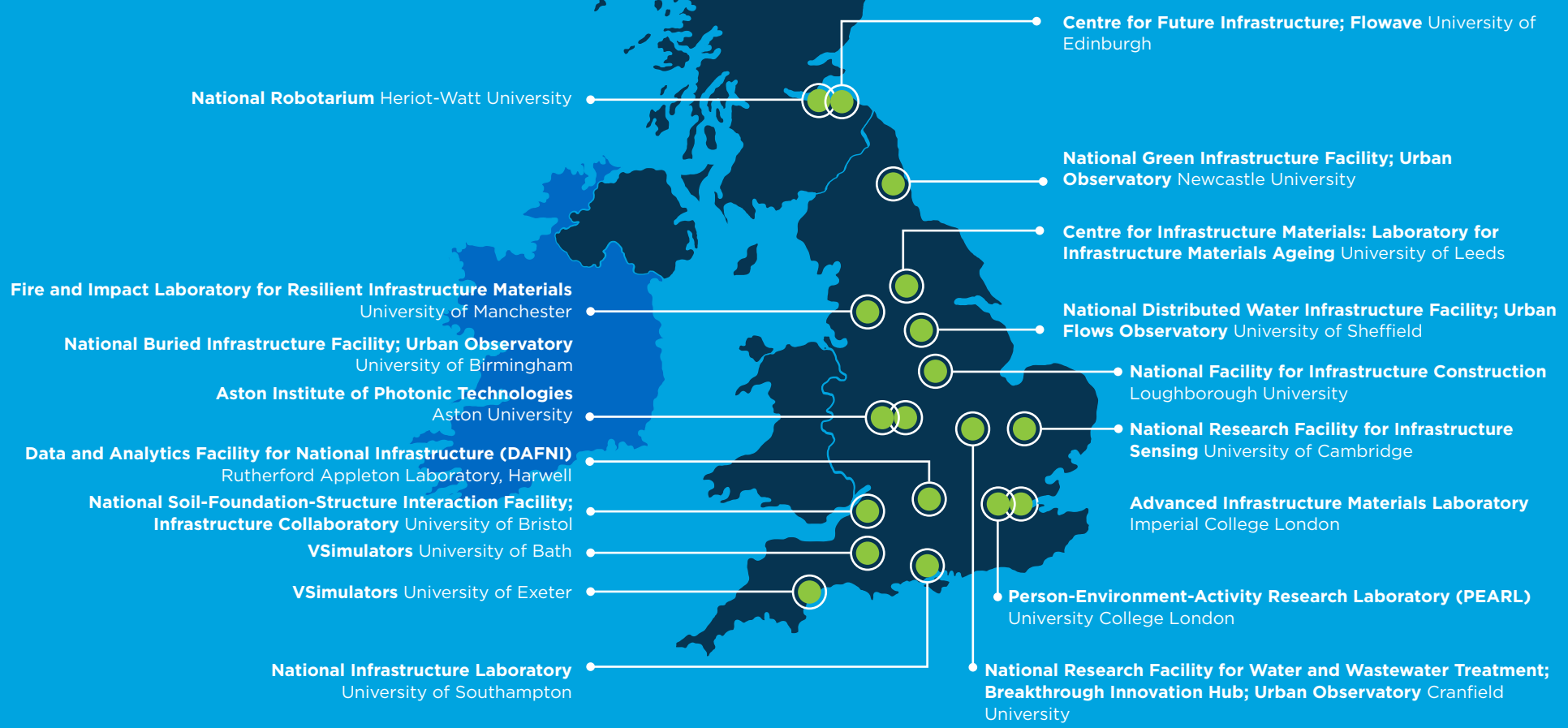


Professor Liz Varga
UKCRIC Director



Professor Sergio Cavalaro
UKCRIC Director

Facilities map



Impact 2024- 2025



* Total publications for the project to March 2025 recorded on ResearchFish

ACCELERATING DECARBONISATION

Supporting carbon neutral construction

In 2022 UKCRIC Services, UKCRIC's commercial arm for higher technology readiness collaborative projects, was appointed by National Highways to undertake an independent expert review of the Lower Thames Crossing's carbon forecast. Lower Thames Crossing continues to work with UKCRIC Services as it refines the carbon calculator tool.

The Lower Thames Crossing is National Highways's most ambitious project, designed to ease congestion on the Dartford Crossing and boost the economy by creating a new crossing that will connect Kent and Essex through a tunnel beneath the River Thames. The new crossing is being designed to be Britain's greenest road and has been designated a Pathfinder project that will explore ways to be carbon neutral in construction. It is the first major UK infrastructure project to contain a legally binding carbon limit in its Development Consent Order, putting carbon reduction at the heart of its procurement process and creating a carbon reduction of around 50% from its baseline. It has now gone a step further and set a new target to reduce its construction carbon emissions by 70%.

National Highways developed a carbon calculator to inform decisions on carbon reduction based on "PAS2080:2016 Carbon Management in Infrastructure" standards. Significant reductions in emissions from National Highways' 2020 baseline came from lower carbon designs and the use of lower carbon materials.

Andrew Kidd, Director of Environmental Sustainability, Lower Thames Crossing, National Highways, said: "UKCRIC's leading academics carry out forensic reviews. They provide confidence in the robustness of our carbon calculations, while challenging us to keep improving."

The original work carried out by the UKCRIC Services team has helped inform further iterations of Lower Thames Crossing's carbon calculator. UKCRIC Services are reviewing the third version, which incorporates an innovative etool.



“UKCRIC’s leading academics carry out forensic reviews. They provide confidence in the robustness of our carbon calculations, while challenging us to keep improving.”

Andrew Kidd, Director of Environmental Sustainability, Lower Thames Crossing, National Highways

"There's an opportunity in water distribution to reduce leakage by 20%. That would translate to a significant reduction to water bills for the consumer but also, where we have water scarcity, infrastructure won't be compromised."

Professor Liz Varga, Executive lead for the UKCRIC collaboration and Director UKCRIC Services

IMPLEMENTING ARTIFICIAL INTELLIGENCE

Leveraging advanced predictive AI technologies to reduce water leakage

In May 2024, UKCRIC Services was named as one of ten finalists in the Manchester Prize, receiving an award of £100,000 to help develop their water leakage solution called gAIIn-Water.

Water distribution systems have old, buried infrastructure prone to water leakage. In England and Wales, over 50 litres of water per person per day is lost as leakage. Leakage management is a large market, with a heavy focus on finding leaks once they have occurred. There is significant opportunity for proactive leakage management tools that will lead to efficiency improvements and greatly increase the sustainability of water supply systems. gAIIn-Water aims to revolutionize water distribution management by aligning advanced artificial intelligence with practical needs.

gAIIn-Water leverages advanced predictive AI technologies to integrate real-time sensor data from the UK's extensive water network with environmental and demographic inputs, including weather, soil conditions, pipe integrity, and population trends. This integration facilitates precise water demand forecasts, timely alerts for system failures, and identification of potential supply shortages. The system dynamically optimises water flow and maintenance schedules to significantly reduce leaks and lower energy consumption, offering measurable benefits to water utilities, governing bodies, and communities across the UK.

Professor Liz Varga, Executive Lead for the UKCRIC collaboration and Director UKCRIC Services, said: "There's an opportunity in water distribution to reduce leakage by 20%. That would translate to a significant reduction to water bills for the consumer but also, where we have water scarcity, infrastructure won't be compromised. gAIIn-Water takes real-time data from the water system and is able to provide an immediate prediction to water companies on where to focus resources for repairs."

Professor Liz Varga, Executive lead for the UKCRIC collaboration and Director UKCRIC Services

Launched in December 2023, the Manchester Prize called on innovators, academics, entrepreneurs and disruptors to submit their proposed solutions to challenges related to energy, the environment and infrastructure. It received almost 300 entries from UK-led teams, with UKCRIC Services having been chosen as one of just ten finalists.

UKCRIC Services used the funding to develop gAIIn-Water over the following eight months for the chance to win the £1 million grand prize in spring 2025. The project was also supported by a package of non-financial support, including up to £90,000 in spending on compute. Future updates aim to expand gAIIn-Water's predictive capabilities and further decrease operational costs. UKCRIC Services also aims to diversify the AI solution for leakage in other industry sectors.



"UKCRIC's unrivalled network of academics and industry stakeholders made a vital contribution to our DINI project, ensuring the workshops captured an extensive range of insights into the challenges of and opportunities for data sharing. The resulting report and its recommendations are an important resource for helping to shape how DAFNI will tackle these challenges."

Dr Brian Matthews, DAFNI Facility Lead and leader of the Open Data Systems Group, STFC Scientific Computing Department

EXPLORING DATA PRACTICES

Opportunities and barriers to data sharing identified at UKCRIC workshops

UKCRIC was invited to collaborate with DAFNI on the data sharing project 'Data Infrastructure for National Infrastructure'(DINI), along with several other organisations. This exciting programme of work, driven by the Department for Science, Innovation and Technology (DSIT) and funded by UK Research and Innovation (UKRI)'s Digital Research Infrastructure (DRI) programme, explored better and safer use of data in research. The 'DRI' is a £129m initiative aimed at developing a data sharing system that's interconnected, human, FAIR and sustainable.

UKCRIC's brief from DAFNI was to facilitate two workshops on data sharing. UKCRIC ran two workshops that addressed the challenges of and opportunities for data sharing (1) between industry and academia and (2) in urban observatory settings – paying particular attention to water, energy and transport. Both workshops focussed upon the same central question: how can the UK transform its data into research assets that can be used to benefit society? The outcomes are described in [this report](#).

Current best practice in data sharing focuses on enabling FAIR (Findable, Accessible, Interoperable, Reusable) data practices. There are many questions in play. For example, there is a seemingly ever-present discussion about the intricacies and difficulties of data sharing, such as 'Who is liable if poor-quality data results in harm?'. Other areas of regular discussion in the data sharing community include:

- If data is shared once, is the sharer committed to sharing future versions of the data?
- Can shared data be un-shared?
- What legal agreements are needed?

The workshops identified six key functionality components of a data sharing cloud:

- 1. Custodianship:** Being not simply a keeper and controller of data, but a caretaker of it.
- 2. Skills:** Highly qualified people working on signposting and curating data, including protecting against data that is poor quality, and removing data that is out-of-date.
- 3. Signposting:** Enabling services to support easier ways for users to find and access data, establish benchmarks, and conduct insights and analytics.
- 4. Horizon scanning:** Assessing future data and data needs and making missing data explicit.
- 6. Reliable and sustainable systems:** Monitoring systems run by experts to assure the quality of the processes that generate and extract data before they are sent to the data sharing cloud.

Both the industry representatives, who participated in the first workshop, and the academics, who participated in the second, face pressures that influence their ability to share data. However, they also recognise the opportunities afforded by sharing data and see the potential in taking a 'data-sharing first' approach to their work. The participants see value in establishing a national data sharing cloud and believe that the challenges to doing so are surmountable and that now is the right time to tackle them.

An important feature of a national data sharing cloud is set to be the enabling of modelling across datasets and local, national and regional scales. This will require data that is standardised and interoperable. The necessary groundwork to make data interoperable, available and knowable is fundamental to the data sharing cloud's long-term sustainability. Without it, the data within the data sharing cloud will not be sharable.

UKCRIC continues to research data sharing, further to the publication of the DAFNI-DINI report, which draws together recommendations and suggestions as to what DAFNI can do to deliver these next steps. The outcomes are described in [this report](#).



REDUCING HEALTH INEQUALITIES

Healthy Low-carbon Transport Hub to realise the health benefits of the transition to net zero

Our society must move confidently and methodically to realise the enormous potential health benefits of net zero transport measures, while avoiding strategies with negative health impacts. This is a major challenge.

Established in February 2025, the Healthy Low-carbon Transport Hub's (HLTHub) vision is to accelerate the adoption of low-carbon transport solutions that maximise health co-benefits and reduce health inequalities.

Accelerated transport decarbonisation is essential if the UK is to meet statutory greenhouse gas (CO₂e) emissions targets. Historically, CO₂e measures have not systemically considered physical and mental health impacts, or inequalities in their distribution. For example, in the UK, replacing petrol with diesel cars led to poorer air quality and health outcomes without addressing increasing levels of obesity and physical inactivity. New research aims to avoid these mistakes in future.

The potential health benefits of some forms of low-carbon transport, such as increased physical activity and cleaner air, are well documented. Mental health and wellbeing benefits are also possible but less clearly evidenced; and some forms of low-carbon travel are being promoted without full consideration of health implications. For example, increased particulate emissions from tyres and brakes from increased weight and acceleration/ deceleration of electric cars potentially lead to more severe respiratory disease and greater likelihood and more severe consequences of collisions with vulnerable road users.

Health impacts and inequalities in their distribution might also arise from other underlying trends and policy measures which reduce the need to travel, for example, through increased remote working. Attempts by transport planners, engineers, public health experts and policy makers to promote health-beneficial forms of transport have met with mixed success; for example, cycle networks and Low Traffic Neighbourhoods (LTNs) have been blocked or resisted.

The Hub is identifying barriers, incentives and accelerants to implementing healthy low-carbon transport schemes and propose and evaluate new solutions towards maximising health co-benefits and reducing health inequalities associated with low-carbon transport interventions.

HLTHub involves public health professionals, public engagement specialists, engineers, planners, geographers, social scientists, and transport and health economists from the UKCRIC member Universities of Southampton, Birmingham, Leeds, and University College London. Pilot interventions are being explored using the UKCRIC-UCL Person-Environment-Activity Research Laboratory (PEARL) and in the field, in collaboration with local authorities. The unique multiscale and multidisciplinary science carried out at PEARL will enable the Hub to assess the effectiveness of different options, and to display them to stakeholders so that they understand the implications of their infrastructure decisions on the wellbeing of people.

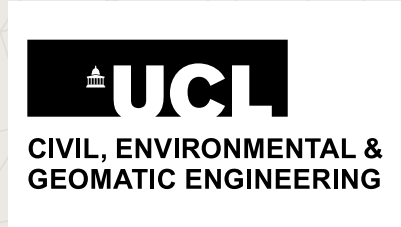
The Hub is one of seven transdisciplinary research hubs based at institutions across the UK to receive investment from The National Institute for Health and Care Research (NIHR) and UK Research and Innovation (UKRI). Health Minister Baroness Gillian Merron said: "This £42 million investment into net zero research hubs will bring together world-class researchers to boost public health and tackle inequalities. Through our Plan for Change, we will make the UK a clean energy superpower while improving health outcomes for everyone."

William Powrie, Professor of Geotechnical Engineering, University of Southampton, and HLTHub Project Lead added: "We are delighted with the funding from the UKRI and NIHR that will enable us to establish the Healthy Low-carbon Transport Hub. Our interdisciplinary research programme will deliver a multiple-outcome approach to the planning, implementation and assessment of low-carbon transport schemes, with full integration of health co-benefits and equity considerations. This is long overdue, and will bring step-change improvements in both public health and progress towards a low-carbon future."

"This £42 million investment into net zero research hubs will bring together world-class researchers to boost public health and tackle inequalities. Through our Plan for Change, we will make the UK a clean energy superpower while improving health outcomes for everyone."

Health Minister Baroness
Gillian Merron

Partners



WORK WITH US

We are actively seeking collaborative partners from the research community, industry, government, the third sector, finance, commerce and investment communities to work with us to solve the complex problems relating to infrastructure, cities and systems.

There are a number of ways of engaging with UKCRIC; through direct commissioning of a **facility or facilities**, sponsoring a research stream, and framework agreements. We also offer technical consulting services and welcome collaboration on higher TRL opportunities via the trading company of UKCRIC, **UKCRIC Services**.

If our **Scientific Missions** complement your organisation's research and innovation priorities, we'd like to hear from you.

**Contact us
to find out
how UKCRIC
is able to help.**