

# Research Framework – The implementation of Integrated Urban Drainage

## Report Summary SC070064/S1

Engineers and scientists working in urban flood risk management have developed a framework to direct new research, development and demonstration projects to support the effective implementation of integrated urban drainage (IUD) systems. Some urban areas in the UK may become more prone to flooding as more housing is built and climate change alters weather patterns. Drainage systems and other measures to counter and manage flooding are therefore essential to protect property and life.

The framework outlined in this report should help local authorities and other organisations to better manage urban flood risk, by helping urban areas to be drained more effectively in the future. This framework will guide investment in research and ensure that its outcomes are translated into practical tools to tackle flooding.

What is integrated urban drainage (IUD)? Draining urban areas is complex because flooding can arise from a variety of different sources (rivers, the sea, local surface water) and can be managed by a range of measures. Many different organisations are responsible for various aspects of urban drainage. These organisations need to work together to manage urban flood risk effectively in the future.

In this report, a large number of experts (practitioners, academics, scientists and engineers) were surveyed to understand what we do and don't know, can and can't do to manage urban flooding, especially in terms of managing urban drainage and the barriers to doing so.

Experts were asked about the adequacy of existing research programmes and the effectiveness of applying their findings to practical urban flood risk management. Despite a wealth of research, little appears to be targeted to IUD and much is not translated into useful guidance.

The report sets out a national programme for IUD research consisting of 75 projects to fill our current knowledge gaps in managing urban flooding.

This should produce guidance and training for those responsible for tackling flooding and ensure that research translates into useful applications. Short term outputs will provide key components to help analyse IUD flood risk focusing on urban planning and how we engage stakeholders, including the general public. One of the first steps recommended is to create a website portal of information on all work related to IUD, as a one-stop shop for practitioners to find information and record ongoing work.

In the medium term, the programme will support integrated modelling for above and below ground drainage. This will greatly enhance our capability to analyse urban flood risk and develop robust solutions. Without this programme, investment in flood risk management could be wrongly targeted. In the long term, research into rainfall and drainage area hydrology will further improve our ability to model urban drainage systems, manage risk and uncertainty, and analyse complex water systems.



**Flooding from multiple sources, courtesy of John Timms, MBE**

The framework will help to understand our greatest research needs related to IUD and the time horizon over which the research can be turned into benefits such as practical knowledge and tools.

Particular benefits will be:

- Providing practitioners with guidance, training and tools to underpin their work on IUD.
- Enabling funders to understand how they can best collaborate/contribute to the advancement of IUD.
- Encouraging researchers to develop proposals to work on IUD-related issues, particularly those that require urgent attention.
- Helping to identify how policy can be supported by underpinning research, and how it can be used to help inform and develop new policy, legislation and regulation in the future.

The research framework and programme provide an exciting opportunity for research sponsors, researchers and end users to collaborate in developing a comprehensive underpinning framework to support the effective and efficient delivery of Integrated Urban Drainage in the future.

The framework will also be central to supporting the Environment Agency in meeting its new responsibilities in the strategic overview of flood risk in England and Wales.

This summary relates to information from Evidence Directorate Project SC070064, reported in detail in the following output(s):

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Cluster	Short Term Output, 0-2 years	Medium Term Output 2-5 years	Long term output greater than 5 years
iUD Coordination	Co-ordinating and managing existing information. This will lead to improved knowledge sharing and access for stakeholders in iUD		
Rainfall		Improving our understanding of rainfall distributions and predictions. This will lead to improved flood risk management of infrastructure renewal and emergency response	
Hydrological Processes		Improving our understanding of hydrological processes across catchments of different scales. This will lead to more knowledgeable implementations of surface water management options and what their long term impact maybe	
Modelling Reviews	Assessing existing modelling approaches and software. This will lead to guidance to support iUD modellers		
Modelling development	Improving iUD modelling tools and software. This will lead to more reliable and accurate assessment of flood risk as a result of overland flow or asset deterioration		
Mapping	Developing a consistent and agreed approach to mapping flood data. This will lead to greater clarity in the presentation of data and improve efficiency		
Critical Infrastructure	Developing guidance for the flood risk assessment and management of critical infrastructure. This will enable practitioners to improve the resilience of the asset and planning for emergencies		
Integrated flood risk assessment		Developing common standards (moving from probabilistic to risk based) with the supporting tools and methodologies. This will lead to flood risk being assessed in an integrated manner with consultancy between stakeholders including the costs and benefits of impacts and mitigation strategies	
Spatial Planning to manage flooding	Developing guidance on how flood risk management can be addressed within spatial planning. This will lead to flood risk being managed more holistically		
Working with the public	Developing tools and training for stakeholder engagement in integrated urban drainage. This will lead to an improvement in how different stakeholders work together and facilitate capacity building to help deliver integrated urban drainage management approaches		
Managing flood pathways	Understanding how existing above ground infrastructure (particularly highways) can be used to manage flood pathways and providing an evidence base of the impacts supported by engagement and dissemination. This will lead to the practical application of exceedance management techniques		
Surface water management	Developing guidance which is supported by demonstration projects for surface water management techniques. This will lead to greater confidence within practitioners of how to implement such measures and their impacts		
SUDS Implementation	Providing guidance to support the implementation, construction and commissioning of SUDs. This will lead to an improved confidence within the industry for using these drainage techniques		
Low cost monitoring & just in time monitoring		Developing low cost monitoring technologies linked with tools and software for real time and just in time management of our drainage systems. This will lead to practitioners having the knowledge and capability to actively manage flood risk	
Incident Management		Developing the tools and technology to provide reliable and accurate flood warning information for all sources of flooding. This will lead to improved emergency planning and management of flooding and its impacts	
Strategy and policy	Assessing and reviewing existing strategy and policy with the development of guidance where appropriate. This will lead to an improved understanding by stakeholders of implications whilst facilitating changes in the future		
Assessing receptor impacts		Understanding social, health, safety, and pollutant impacts, with the development of predictive tools. This will lead to the improved planning and management of flooding consequences.	

**Setting the research framework for urban drainage –  
Summary of benefits in completing the research programme**