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An Adler & Allan company

CASE STUDY

Monitoring for Confidence:

Supporting SuDS Validation in Mansfield

Mansfield

Severn Trent Water

University of Liverpool | Severn Trent | University of Sheffield

Overview

The Mansfield Sustainable Flood Resilience programme is the UK's largest town-wide retrofit of Sustainable Drainage Systems (SuDS). Designed to reduce surface water flooding and improve climate resilience for over 90,000 residents, the scheme is led by Severn Trent Water in partnership with Mansfield District Council and Nottinghamshire County Council. It includes hundreds of nature-based interventions such as rain gardens, permeable paving, and detention basins.

To understand how this variety of systems perform in real-world conditions, Dr Simon De-Ville of the University of Liverpool, supported by Prof. Virginia Stovin of the University of Sheffield, is running a comprehensive hydraulic monitoring programme. Detectronic was commissioned by the unviersities to supply and support sensor technology that helps capture the data needed to evaluate the scheme's effectiveness.

Academic Oversight and Objectives

The universities are leading the technical evaluation of the SuDS installations. Their work focuses on testing a range of sensor types and technologies side by side, building and refining hydraulic models using real-world data, and capturing seasonal variation in storm events to understand how SuDS respond across summer and winter conditions.

This research is helping build a clearer picture of how SuDS behave in practice and is expected to inform future design standards and planning guidance.

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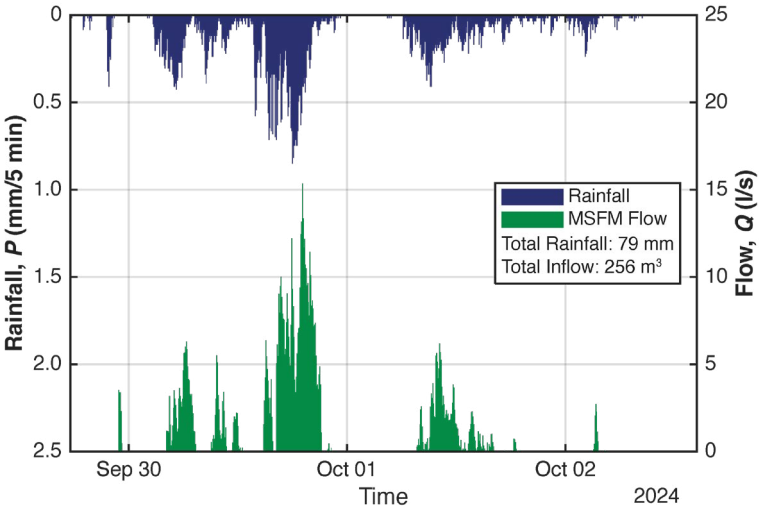
Detectronic's Contribution

Detectronic's monitoring equipment has been deployed across several key SuDS features. MSFM flow monitors are installed in all of the scheme's detention basins, which account for nearly two thirds of the total programme's design capacity. MSFM units are also deployed at key locations within Seven Trent's combined sewer network to identify the hydraulic impacts of SuDS at a sub-catchment scale.

Racecourse detention basin data from September 29th to October 2nd during a 62 hour, 79mm rainfall event (1 in 20 year return period). The MSFM unit has captured the variation in basin inflow rates in response to the observed rainfall. A total of 256m^3 of stormwater was directed into the basin, helping to prevent downstream flooding and reduce the impact of CSO activations.



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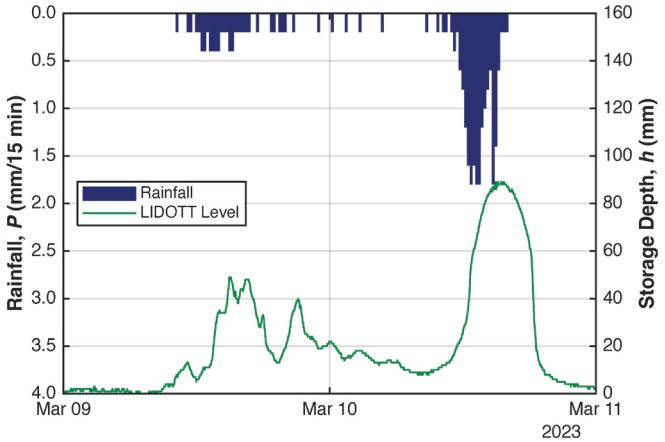
LIDoTT® Smart Sensors are placed in permeable pavements and the Mansfield Courthouse rain garden to measure water levels and flow dynamics.

Courthouse raingarden data from March 9th to the 11th 2023 during a 30 hour, 29mm rainfall event (less than 1 in 1 year return period). The LIDOTT unit tracked the depth of water behind the 10 mm orifice control, demonstrating the controlled release of stormwater held in the storage layer of the raingarden back to the sewer network.



Together, the MSFM and LIDoTT® Smart sensors are helping the research team collect high-resolution data that feeds directly into model validation and performance analysis.

What We're Learning

The project has offered valuable insights into how different sensor technologies perform in SuDS environments.

LIDoTT® Smart Sensors use both ultrasonic and pressure measurements, which has proven more reliable than single-sensor setups. Pressure sensors continue to deliver data even when submerged, which is crucial during ponded water conditions of rain gardens and bioswales. Other monitoring solutions deployed in Mansfield's SuDS lack this capability, particularly when mounted below surface level chamber lids.

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Ultrasonic sensors have outperformed radar in shallow chambers, where radar beam spread struggled with benching. The LIDoTT® Smart's ultrasonic technology allows for a narrower installation footprint, reducing the size of physical monitoring infrastructure and making it easier to deploy in constrained spaces.

During an extended O_2 network outage, Detectronic's sensors allowed the team to access data directly from the devices on-site. While other sensors also retained their data, it wasn't available until the network connection was restored. For a project that relies on close, real-time monitoring, having immediate access to data—even during connectivity issues—proved to be a real advantage.

The universities are using this data to validate their models and better understand how SuDS installations behave under different conditions. Because monitoring began early in the scheme, the team has been able to adapt and refine their approach as new data comes in.

Looking Ahead

Monitoring will continue until the end of 2027, capturing a wide range of storm events across different seasons. This long-term dataset will improve confidence in SuDS performance, support more accurate modelling and simulation, and help shape future flood resilience strategies across the UK.

Conclusion

Detectronic is proud to support the University of Liverpool and University of Sheffield in their work to evaluate and improve sustainable drainage.
By providing reliable, high-quality data, our sensors are helping researchers understand what works, where, and why—laying the groundwork for smarter, greener urban water management.

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