

Trial Study

Flood Resilience

Slaithwaite

Protecting a village: delivering a local early flood warning and monitoring system to keep people, homes and businesses safe



Slaithwaite suffered extensive flood damage in 2015 when Crimble Clough, ordinary watercourse, breached its banks, demolishing the wall at the end of Clough Road, flooding the area, and causing damage and disruption.

Slaithwaite is a village within the Metropolitan Borough of Kirklees in West Yorkshire, situated in the Colne Valley five miles southwest of Huddersfield.



The devastating flood of 2015 in Slaithwaite

The 2012 Local Flood Risk Management Strategy identified that around 2,000 properties could be more likely at risk of flooding with a potential £70 million of damage.

May local authorities within West Yorkshire, have expressed an interest in a local flood warning and monitoring system to proactively respond to future flood risk from surface water and ordinary watercourses.

Kirklees Local Flood Authority

Kirklees Council is the Lead Local Flood Authority (LLFA) for the district. The LLFA manages local flood risk from surface water, groundwater and ordinary watercourses and ensures cooperation between local risk management authorities.

As part of a "SMART" monitoring project for flood risk areas, funded by Chester University, a local company worked with the LLFA team to trial a local flood alert and monitoring solution at Crimble Clough, to support them in trying to manage the risk of flooding in Slaithwaite.

The challenge

The project is designed to monitor high water levels at Crimble Clough caused by debris washed down from the upper wooded catchment and blocking the debris screen. The sensor-based system monitors the difference between water levels, via two water level sensors immediately before and after the debris screen, automatically sending alerts at pre-set trigger points, if a significant difference in water levels is detected.

No real-time information: in 2015 the Crimble Clough was overwhelmed, surface water washed down from the upper wooded catchment, with no warning system in place to alert anyone.

No strategic information: in 2015, there were many flood hotspots that needed attention with council resources stretched. With no remote monitoring system in place, it was difficult to know exactly where best to deploy support.

Extensive damage: In 2015, due to the stream backing up and demolishing the wall, causing flooding downstream from Clough Road.

Disruption: following the flood, the clear-up and restoration process for the affected area meant businesses were badly affected. The economic damage from the 2015 flood was significant with many hours of resources invested in the recovery.

With a monitoring and alert system in place, damage may have been mitigated.

The Trial

The installed flood monitoring system being trialed provides 24/7 local monitoring and alerts when the area is at risk from flooding.

The system provides real-time information on rising water levels and automatically sends out early flood warnings via a local LoRaWAN Gateway. The robust and reliable system is easy to install and set up, it tracks water levels in watercourses and other parameters for up to 15km from a gateway.

From a single water-level sensor to a catchment wide sensor network, data on water levels, soil moisture, rainfall data and water quality can be provided by systems of this type to give real-time local flood monitoring and alerts for projects of any size.

Crimble Clough at Slaithwaite showing catchment network monitoring



- LoRaWAN® gateway connects to all devices and communicates all data to a central network server
- Soil moisture
- Water level sensors
- Rain gauge sensor



The system merges collected data with other risk variables such as 3-year historical and 36-hour forecast rainfall data



Sensors and LoRaWAN® network gateway installation at Crimble Clough, Slaithwaite

Installing the monitoring system, means we have:

- A real-time local watercourse monitoring and alert system.
- A battery powered water level monitoring system at the debris screen that sends out SMS and email alerts when water levels reach critical depths.

By monitoring water levels immediately before and after the screen, sending out SMS and email alerts when the difference is significant.

- A dataset with detailed catchment data including rainfall, water levels at strategic points and soil moisture in the surrounding farmland – all helping to develop future flood risk models and flood alerts.
- Live monitoring of sensor data via a cloud-based portal with easy-to-use visualisation accessible from any device with internet connectivity.
- A system that can communicate with an unlimited number of designated users.
- Communication via a low-power, low-impact LoRaWAN® network.

Monitoring

An effective early warning system: the system issues water depths based on set threshold levels. This data is being analysed to understand what a normal flow looks like to help us to distinguish a blockage or surcharge scenario. This may prove challenging in distinguishing when action is required.

Data collection: the data will be used to understand how the Crimble Clough catchment responds to rainfall that can help develop models to predict future response.

Impact measurement: The trial is also developing a baseline to measure the effectiveness of natural flood management interventions at critical locations within the catchment.

Workshop Feedback

“Working together on the ‘buildbacktogether’ project was a pleasurable experience, it was essential to have the complimentary skills that made the outcome of the project much more effective. The support from the equipment installation team was extremely supportive and efficient with quick responses and stimulating input through the term of the project. I am keen to continue our collaboration and work with the local communities on more engagements like the Slaithwaite project.”

Chester University