Chipping Sodbury Flood Monitoring Solution

Network Rail Wales & Western Engineering & Asset Management

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📄 OVERVIEW

During a series of flooding incidents, SiYtE proved invaluable in helping asset engineers identify how complex drainage and pumping systems interlinked resulting in the early development of mitigation strategies.

By integrating real-time and historical data, the platform has provided evidence to ensure mitigation efforts won't impact river levels and enables ongoing monitoring to assure this.

The solution enhances decision-making, shifts responses from reactive to proactive, and builds confidence among stakeholders, reducing reliance on manual inspections and train driver reports.

🚆 THE CHALLENGE

Flooding at Chipping Sodbury, on the high-speed route between Swindon and Bristol, is both a frequent and costly event. Closing the line causes extensive delays, with significant resultant cost impact.

In 2018, an 11 million litre lagoon was constructed which stores water during storm events to limit flooding on the railway line. Whilst this had a positive impact, this location continued to flood, and a lack of remote visibility of site data made evaluating how flooding develops in real-time challenging.

Before this solution, Network Rail had to rely on train driver reports and then send an engineer to site to assess what operational restrictions, if any, were required. This caused delays in decision-making, and with a complex flood management system spread over a mile, it was difficult to understand and optimise the site.

💡 THE SOLUTION

Network Rail's Wales and Western Region have an objective to drastically reduce delay minutes due to flooding within the current Control Period and beyond at Chipping Sodbury.

It was clear that improved remote monitoring was required to reduce delays and improve passenger experience. Before Purple Transform and Central Alliance got involved, sensors to monitor flooding were already installed but, as George Barratt from the Asset Strategy & Planning team attested, data was not easy to obtain, interpret and understand in a timely manner.

George also said, "It became apparent just how complex the operation of the Chipping Sodbury site was: we needed to build an understanding of the whole system and how different assets were interlinked, to improve performance now and into the future. Having all the monitoring data in one, simple-to-understand, user interface was key to this.". This is why the Asset Strategy & Planning team chose the SiYtE Environmental and Situational Awareness platform from Purple Transform.

🤝 THE OUTCOME

On 6th January, flooding on the line through Chipping Sodbury caused the railway to be closed for 6 hours. This was the first time SiYtE could be used in anger. Engineers were able to determine how different drainage systems interlinked and electrical pumps performed during these events, allowing for a more thorough understanding. By comparing historical water level data across different sections of the site, they could also prove that the site did not have adverse effects on surrounding river levels.

While the increased monitoring helps to provide more information and understanding, feeding into long term solutions, it also supports maintenance and operational teams, allowing them to make quicker and safer decisions remotely without the immediate requirement to attend site.

🤝 WORKING IN PARTNERSHIP

When asked about his experience of working with Purple Transform and Central Alliance, George said, "It has been excellent. The whole solution, from initial contact to on site deployment and dashboard set-up, took 8 weeks. The speed with which this was delivered was incredible and any questions were always answered promptly and in detail."

Purple Transform and their lead delivery partner, Central Alliance, pulled out all the stops to deliver a working solution in time for a Department for Transport (DfT) inspection at the Chipping Sodbury site. This was a highlight for George and the team – the data they could show DfT inspectors developed trust in their ability to understand and optimise flood management at Chipping Sodbury.

This collaborative effort showcases the strength of combining advanced technology with expert delivery to meet critical deadlines and ensure compliance.

SiYtE FOR CHIPPING SODBURY

## Data Aggregation & Open Integration

SiYtE is aggregating data from cameras & sensors, both already in place and installed by the project:

o   New CCTV monitoring pumps, lagoon & stream

o   Existing solar powered cameras

o   New LoRaWAN pump, water level, weather sensors

o   Existing flow sensors (accessed via an API)

Enhanced Insights, Contextual Alerts

The Chipping Sodbury dashboard is visualising all data for the 'whole system' in one intuitive web & mobile interface, displaying both real-time and historical analysis for improved decision-making.

Teams can be alerted to issues based on any combination of events, with both sensor data and associated camera views provided in alerts.
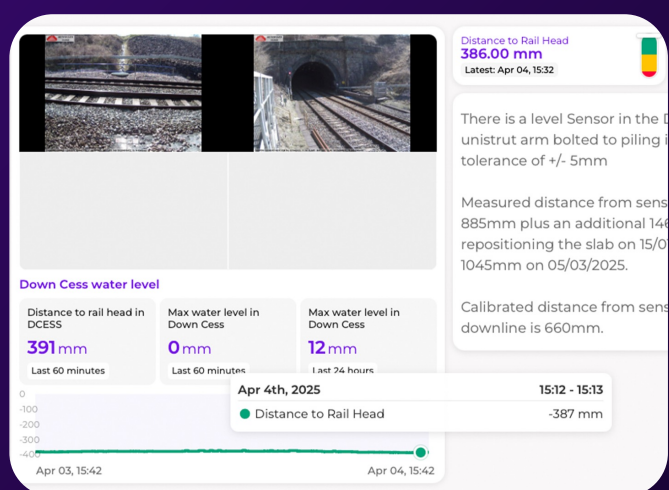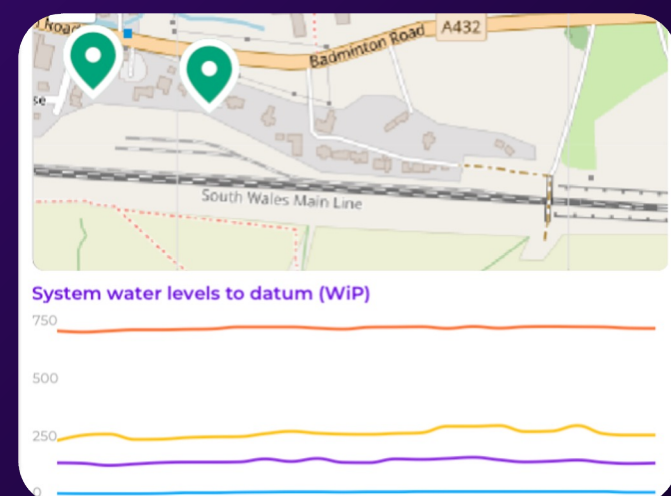
⌂ THE FUTURE

More sites are set to onboard onto SiYtE, which will provide a simplified dashboard and alerts for Route Control. Its integration of cameras and monitoring systems into one interface empowers staff to make effective decisions.

George's view of the future is to have all different environmental monitoring systems accessible through one platform, enabling remote and effective management of sites. Eventually he anticipates that remote monitoring won't only provide insight into what is happening on site but by harnessing machine learning and AI, monitoring equipment will be able to control hardware at site, such as opening and closing sluice gates, without human intervention.

Effective use of monitoring data is essential for the planning and prioritisation of projects for flooding mitigation. This enables proactive identification and prioritisation of sites that could be at future risk of flooding, informing plans and budgets for the next Control Period and beyond.