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Improving resilience through a surface water flooding decision support system

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Flood Foresight is JBA's strategic flood monitoring and forecasting system, providing flood inundation and depth estimates across the UK and Ireland at 30m resolution up to 10-days ahead of fluvial flood events. It consists of Flood Monitoring (based on observed discharges from river gauge telemetry) and Flood Forecasting (based on simulated discharge from a rainfall-runoff model) modules.

Recently, Flood Foresight has been expanded to provide asset alerting around heavy rainfall and surface water (pluvial) flooding, demonstrated in a proof-of-concept system on behalf of Network Rail during a Small Business Research Initiative project funded by Department for Transport and delivered by InnovateUK.

The surface water flood forecasting system is now running in real time using high resolution ensemble rainfall forecasts from Met Eireann (IREPS). This system represents a major advance in the availability of information indicating the risk to rail infrastructure across Great Britain. Taking advantage of ensemble rainfall forecasts, it is possible to give an indication of where rain might happen and the severity of that rain (in comparison to historical rainfall amounts), and also to provide an indication of the confidence in that forecast. This concept is crucial to the handling of intense rainfall events, due to their inherent lack of predictability. The presentation of mapped likelihood information for both rainfall and surface water flooding forecasts provides users with spatial context for the asset alerts. It allows them to see the extent and uncertainty in the location of the intense rainfall event.

The system has been developed to run autonomously using rainfall forecasts as they are provided by Met Eireann, via FTP. Therefore the resulting asset alert information is always available, and always presents the most up-to-date information. This gives asset managers the ability to access the information at a time that is convenient to them, but also the system can provide alerts when assets are identified as at risk as the information becomes available.

The forecast data is available beyond 36 hours into the future, providing sufficient lead time for asset managers to coordinate responses and mobilise staff and equipment, if needed. The temporal resolution of the forecast information is high at short lead times (i.e. hourly for the first 6 hours), decreasing as lead time increases (after 24 hours the information is 6 hourly, further

reducing to 12 hourly when longer lead time forecasts are available). This decreasing temporal resolution with longer lead times allows for increased uncertainty in the timing of events further in the future to be obscured to the user, reducing confusion if the timing changes with subsequent forecasts.

The proof-of-concept system focuses on the rail industry, however it is extensible to other sectors where population, assets or infrastructure are vulnerable to surface water flooding. Flood impact data and associated alerts can be customised based on a client's asset portfolio and their incident management needs.

The presentation will explore heavy rainfall events evaluated during the proof-of-concept demonstrations, describing the information the Flood Foresight system could have provided ahead of, and during the event.