WASHOUT VULNERABILITY ASSESSMENT – ASSESSING THE RISK OF RUNOFF GENERATED DEBRIS SLIDES ON LINEAR INFRASTRUCTURE TO SUPPORT TARGETED ASSET MANAGEMENT AND EFFICIENT MAINTENANCE AND RENEWAL

ABSTRACT The Carmont train derailment in 2020 highlighted the urgent need for improved management of earthworks and drainage assets during extreme weather. These failures, often linked to weather, can occur rapidly and unpredictably. Climate change projections by asset owners and the Met Office indicate more frequent and intense weather events, increasing the likelihood of washout failures.

Given the vast number of infrastructure earthworks across the UK, efficient desk-based analysis is essential to identify critical areas for targeted maintenance and renewal. Building on research from the University of Southampton, the Washout Vulnerability Assessment tool has been developed to address this challenge. Using readily available LIDAR data and geotechnical parameters, the tool assigns risk ratings for washout failures at specific locations, enabling proactive maintenance strategies.

This paper demonstrates the tool's application to over 200km of highway and railway assets, supporting asset owners in developing geo-risk management strategies. It is the first method to quantitatively assess washout risk triggered by overland flows, enhancing prediction of rapid slope failures - even without visible signs of distress. It also evaluates increased vulnerability under future climate scenarios, which are likely to result in more frequent and intense rainfall events.

By identifying high-risk areas, the tool can help decision-makers plan, prioritise, and phase investments in adaptation solutions. Case studies with Network Rail (North West and Central region), South Wales Trunk Road Agency/Welsh Government showcase how the tool enables more targeted interventions to improve resilience, reduce restrictions, and minimise disruption—while maintaining safety.

As climate change increases the frequency and severity of extreme weather events, digital tools like this will be essential for infrastructure managers to build resilience and extend asset life. The Washout Vulnerability Assessment tool offers data-driven insights to shift from reactive to preventative maintenance, playing a key role in modern earthwork and drainage management.