

# Triton Norway: A solution to improve the railways resilience from heavy rain

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Two independent task forces are working to help Network Rail better manage its massive earthworks portfolio and its understanding and response to severe weather events.

It follows the tragic events in Carmont near Stonehaven last month, where a train derailment led to driver Brett McCullough, conductor Donald Dinnie and passenger Christopher Stuchbury sadly losing their lives.

Network Rail's investment in its earthworks and drainage portfolio has increased significantly from £952 million from 2014 to 2019, to a budget of £1.3 billion from 2019 to 2024.

Triton Norway believes it has a solution to help with the railways' resilience with its Water Extraction and Transfer system (WET).

Phil Downes, from the company, has written an article for [railbusinessdaily.com](https://railbusinessdaily.com) about its approach which he believes could provide an interim measure.

"The UK rail network has a massive portfolio of earthworks the majority of which were constructed in the

Victorian era. These have served well over time but now with climate change affecting weather and increasing water table they are more susceptible to failure.

We have developed a new innovative approach to actively manage slopes through controlling the water content of these structures with the WET system.

Under wet conditions the system forces the moisture down, effectively acting as a non-permeable barrier holding the water table back and pushing moisture away from the upper surfaces. This enables the moisture content to be controlled at the desired level dictated by the engineer. This effect is akin to wringing out a wet sponge enabling the structure to remain stable, absorb higher levels of rainfall and avoiding runoff. The system can even dry out the structure allowing greater absorption during times of prolonged torrential rain.

Conversely in dry conditions the system works in reverse and pulls the water table up to again maintain the desired level of moisture and eradicate desiccation, another effect which causes detriment to earthwork structures.

This innovative approach is an extension to Triton's AOP (Advanced Osmotic Pulse) technology which is implemented around the world to manage water ingress in underground structures. This has already been successfully deployed in the dewatering of mine tailings and a successful trial of irrigation in Africa.

Whilst these two approaches have the opposite effect by combining this technology with a closed loop control mechanism utilising standard earthwork monitoring techniques results in an active management solution which can continue for tens of years. This basically provides a reverse effect of climate change and rising water tables to take the structures back to the conditions which they have survived in for over a hundred years.

The WET system comprises of a series of embedded anodes and cathodes (Probes) powered by an extra low voltage current. These active electrodes will be controlled by control system in order to actively manage water content and ensure the geotechnical mechanisms are kept within the safe parameters at the target areas by 'pushing' or 'pulling' the water content of the structure.

In addition to the automatic proactive controlling mechanism, the system will also be remotely monitored via sensors to provide a continuous available state and demonstrate time lapse changes. The WET system will use this feedback to further adjust electric current flow which in turn will control the water content/pore pressure to safe/desired levels.

This innovative and novel application provides the opportunity to restore equilibrium to earth structures and therefore deliver a step change to UK rail assets ensuring safe operations and reduced costs associated with failures.

I believe WET provides an interim measure providing a cost-effective fix which can provide improved stability and management that can be deployed in emergency situations as stabilisation management for weeks or even years."

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