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Investigation into Stonehaven tragedy reveals train derailed after colliding with stones washed out onto the track

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An interim report by the Rail Accident Investigation Branch (RAIB) into the Stonehaven tragedy has revealed the train derailed after colliding with stones washed out onto the track from the gravel-filled crest drain and from the adjacent ground.

The ScotRail service derailed following heavy rainfall on August 12 last year, with the devastating loss of three lives – driver Brett McCullough, conductor Donald Dinnie and passenger Christopher Stuchbury. Six other people were injured.

The report says: “Post-accident surveys of the track found no evidence suggesting derailment occurred on the approach to the debris on the track, and verified pre-accident inspections which had found no track defects in this area. RAIB has not found any evidence of a train fault that could have played a part in its derailment.

“The first evidence that train wheels had deviated from the rails was identified less than one metre beyond

the point where the left-hand rail emerged from beneath the debris. The top surface was scored by the flange of the leading left-hand wheel as it started to derail."

The tragedy followed intense rain in which 51.1mm of rain fell on August 11 and 12 at the accident site – almost 75 per cent of the total monthly rainfall for Aberdeenshire in an average August. It caused significant flooding in the surrounding areas.

In its report, RAIB says the crest drainage system was completed in 2012, but only the section closest to the track, from catchpit 18 to the outfall, was listed on Network Rai's drain maintenance database at the time of the accident. RAIB says it had found no evidence that the drain upslope of catchpit 18 was inspected between its construction and the accident.

The report said: "The washout was caused by unusually heavy rain which washed stone from the gravel-filled crest drain near catchpit 18, and from surrounding ground, onto the adjacent track leaving the perforated drainage pipe exposed.

"Local ground topography directed large amounts of surface water onto the steeply sloping drain in the area from which gravel was washed. Although surface water flow alone can dislodge gravel, and stones of other sizes, RAIB is continuing to investigate whether other factors, such as the drainage system's design or the quality of installation, contributed to the displacement of material.

"It is possible that surface water flows, before the day of the accident, had been sufficient to dislodge gravel from small areas of the gravel-filled drain, sufficient to be seen in the area affected, but with insufficient material washed down for this to be apparent at track level.

"The lack of an effective drainage inspection regime meant that any such indications of future problems upslope of catchpit 18 would not have been detected."

In response to the report, Andrew Haines, Network Rail chief executive, said: "We remain absolutely committed to learning lessons from the tragedy last summer that cost the lives of Brett McCullough, Christopher Stuchbury and Donald Dinnie. We welcome RAIB's interim report and we continue to cooperate with all ongoing investigations as we seek to understand what happened.

"We are being led by world-renowned experts as we tackle one of our biggest challenges, adapting our transport system to cope with the long-term changes in weather in the face of a rapidly changing climate."

Last month, Network Rail published two independent reviews that look at how the railway can better cope with extreme weather. The organisation commissioned the taskforces immediately following the tragic accident near Stonehaven.

Network Rail pledged to learn lessons from the tragedy and tasked world-renowned experts Lord Robert Mair and Dame Julia Slingo to provide engineering and scientific oversight and recommendations to help tackle the challenge of managing rail infrastructure in the face of more frequent bouts of extreme weather.

Transport Secretary Grant Shapps also called for a network-wide review of the impact of climate change on

the resilience and safe performance of the railway, and in particular how earthworks – the slopes alongside the tracks – are managed. An initial report was provided in the weeks following the accident and an update was delivered last month, along with the two taskforce reviews.

The reports show that the challenge of climate change on the railway is substantial. Most earthworks alongside the tracks were built around 150 years ago and poorly engineered by modern standards, overly-steep and unstable, and with drainage of a similar age and installed to a pre-set design, regardless of location. When combined with heavier rainfall, as has been experienced in recent years, landslips and flooding can occur.

The reviews recognise it's not practicable to rebuild nearly 200,000 separate slopes alongside 20,000 miles of track, and they commend the work that has been done to upgrade the Victorian infrastructure where possible and manage risk across the network. Investment in resilience work has almost doubled in the past decade, and new systems, technology, standards and practices have been introduced or updated. The reports also note that this work has accelerated further since the summer, with trials of new technology being rolled out more widely across the network, and new dynamic, route-based weather forecasts, using the latest science, trialled in cooperation with the Met Office. Network Rail has also published its Environmental Sustainability Strategy, a plan to reduce carbon emissions and help tackle climate change at its root, rather than only dealing with its effects.

However, while acknowledging the significant amount of work being undertaken, the reports show that there is more that can be done and offer over 50 recommendations for Network Rail to now look at in detail.

Martin Frobisher, Network Rail's safety and engineering director, said: "The UK's railway is one of the safest in Europe, but something went tragically wrong at Stonehaven last summer and our thoughts remain with the families and friends of Brett McCullough, Donald Dinnie and Christopher Stuchbury.

"Heavy rain caused ground slips on many occasions across the entire network last year and although tragic accidents are thankfully incredibly rare and none other than Stonehaven caused injuries, it is clear that extreme weather presents a significant challenge to the way we safely and reliably manage railway infrastructure.

"We do a vast amount to tackle the effects of climate change already but there is more to do. We established two independent, expert taskforces led by world-class specialists to investigate the problems we face and, crucially, to guide us as we make substantial improvements.

"We will carefully consider every single recommendation and develop a science-backed improvement plan, to target available money and technology in the best possible way. This is a real breakthrough."

All recommendations from the reports are being analysed now, with some already implemented. Many of the recommendations focus on the considerable progress that has been made with technology over recent years, bringing Network Rail up to speed. Some technology has been trialled – including a system to provide detailed information on where intense, short-term rain is falling, and monitoring sensors that can be adopted on potentially critical slopes to provide early detection of failure – but the reports are clear that

advancements happen quickly and more can be done to keep on top of latest developments.

Crucially, both reports recommend looking at culture and organisational change, upskilling the workforce to better access, interpret and use weather data and technology, to carry out inspections and examinations of earthworks and drainage, and to improve knowledge and competencies consistently across the organisation.

Other recommendations include:

- Carry out detailed analysis of previous slope failures and washouts, together with accompanying weather patterns and ground conditions.
- Accelerate the deployment of state-of-the-art weather forecasting capabilities through digital platforms.
- Proactively review and maintain earthworks drainage and consider having dedicated teams.
- Use helicopters and drones more widely for inspections, particularly after intense rainfall.

Lord Mair and Dame Julia have both been retained to act as mentors and provide links to a wider group of engineering and scientific peers as longer-term recommendations are considered and implemented.

Transport Secretary Grant Shapps said: “The incident at Stonehaven in August was devastating, and my thoughts remain with the families of Brett McCullough, Donald Dinnie, and Christopher Stuchbury, who tragically lost their lives.

“We must do everything we can to keep our railways safe, and I immediately commissioned this report so that lessons would be learnt without delay. This document sets out how our investment can enhance the resilience of our rail network against climate change and incidents of extreme weather in the future.

“We will be considering these findings carefully as we progress these works at pace.”

The full RAIB interim report can be read here.

Photo credit: Network Rail