

Oliver Stewart
RAIB Recommendation Handling Manager



12 February 2026

Mr Andy Lewis
Deputy Chief Inspector of Rail Accidents

Dear Andy,

RAIB Report: Freight train derailment at Willesden High Level Junction, north-west London on 6 May 2019

I write to provide an update¹ on the action taken in respect of recommendation 1 addressed to ORR in the above report, published on 25 August 2020.

The annex to this letter provides details of actions taken in response to the recommendation and the status decided by ORR. The status of recommendation 1 is **'Closed'**.

We do not propose to take any further action in respect of the recommendation, unless we become aware that any of the information provided has become inaccurate, in which case I will write to you again.

We will publish this response on the ORR website.

Yours sincerely,

Oliver Stewart

¹ In accordance with Regulation 12(2)(b) of the Railways (Accident Investigation and Reporting) Regulations 2005

Recommendation 1

The intent of this recommendation is to make best use of routinely collected track geometry information for the purpose of understanding the condition of track bed and earthwork assets and how this may affect the safe running of trains.

Taking into account findings from its ongoing research programmes, Network Rail should investigate whether recent advances in computing techniques allow data recorded by its track geometry measurement trains to be analysed in a way that enables the identification of track movement trends that are indicative of underlying problems with the track bed and/or supporting earthworks. If reasonably practicable, it should develop and implement analysis tools and processes and make these available to engineers responsible for the management of such infrastructure assets

ORR decision

1. In response to the recommendation, Network Rail has reviewed the existing tools for analysing track geometry data, identified gaps and developed tools to fill those gaps. Track Geometry Analysis Dashboard is available to harmonise the track and earthwork asset condition datasets. This accounts for embankments which are 5-chain (110y) length assets. The track geometry reporting portal allows engineers to assess latest and historical records of track conditions (not isolated faults).
2. The limitations identified through analysing the two tools found that – there is a lack of integration of diverse asset data from various disciplines. It only matched track geometry threshold exceedances and earthwork hazard category. It did not include other factors such as geology, examination observations or related structural asset, broader system insights to be obtained. It overlooked gradual track geometry changes, critical in detecting progressive failures especially on brittle clay embankments. Focussed solely on thresholds defined for track maintenance. The Track Geometry Analysis Dashboard relies on counting threshold exceedances, which is skewed by the frequency of recordings.
3. An insight query builder tool has been created to allow track geometry data and earthwork datasets to be integrated together. Insight functionality enables users to combine asset and condition data to identify locations where specified criteria coexist. In addition, a new algorithm and tool – Embankment Instability Metric (EIM) and Linear Data Viewer has been developed by AECOM. This tool quantifies track geometry deterioration as an indicator for potential embankment failure. This is calculated over a 12-month period for each 10-yard segment and is based on the rate of deterioration in horizontal alignment and vertical alignment. Geometry traces and various parameters related to the EIM are visualised in the Linear Data Viewer (LDV), which was developed by AECOM and now incorporated into GyRO (the earthwork asset management application formerly known as JBA). This picks up discreet faults, such as twist.
4. Network Rail has also made changes to processes for reviewing track geometry data. Interdisciplinary reviews introduced to the standard NR/L2/CIV/086/Mod 01 in response to Willesden Rec 3 have been moved to

NR/L2/CIV/086. This is attended by Earthwork Managers/Asset Engineers, Track Maintenance Engineers and Infrastructure Maintenance Engineers. The reviews take place at least every 12 months. The new tools can be used as part of these reviews. Briefings have been undertaken at Asset Technical Review meetings and the Annual National Geotech & Mining Conference.

5. After reviewing the information provided ORR has concluded that, in accordance with the Railways (Accident Investigation and Reporting) Regulations 2005, Network Rail has:

- taken the recommendation into consideration; and
- has taken action to close it.

Status: Closed.

Previously reported to RAIB

6. On 24 August 2021 ORR reported the following:

Network Rail has provided information setting out the scope and expected outputs of the R&D project aimed at using track geometry data to give early warning of embankment failures. However the plan lacks sufficient detail and a timescales for us to make a clear judgment on whether it will addresses the recommendation.

We have asked Network Rail to set out how they will use the findings of the R&D project to develop an analysis tool for its engineers. From our regular liaison meeting and regulatory work we believe Network Rail have done much of the required R&D project to analyse track geometry data and embankment failures to investigate whether track geometry data can give early warning of embankment failures. We are discussing the detail of this work with Network Rail and if it has included use of tools such as TIGER (Track Integrated Geometry Engineer Reports) and LADS (Linear Asset Decision Support).

Update

7. On 16 December 2025 Network Rail provided the following closure statement and supporting documents:



[N247-11] Willesden Rec 1.pdf



[N247-11] Willesden Attachment 2 - Day 1_Attachment 1 - QLM -



[N247-11] Willesden

Previously reported to RAIB

Recommendation 1

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Taking into account findings from its ongoing research programmes, Network Rail should investigate whether recent advances in computing techniques allow data recorded by its track geometry measurement trains to be analysed in a way that enables the identification of track movement trends that are indicative of underlying problems with the track bed and/or supporting earthworks. If reasonably practicable, it should develop and implement analysis tools and processes and make these available to engineers responsible for the management of such infrastructure assets

ORR decision

1. Network Rail has provided information setting out the scope and expected outputs of the R&D project aimed at using track geometry data to give early warning of embankment failures. However the plan lacks sufficient detail and a timescales for us to make a clear judgment on whether it will addresses the recommendation.
2. We have asked Network Rail to set out how they will use the findings of the R&D project to develop an analysis tool for its engineers. From our regular liaison meeting and regulatory work we believe Network Rail have done much of the required R&D project to analyse track geometry data and embankment failures to investigate whether track geometry data can give early warning of embankment failures. We are discussing the detail of this work with Network Rail and if it has included use of tools such as TIGER (Track Integrated Geometry Engineer Reports) and LADS (Linear Asset Decision Support).
3. After reviewing the information provided ORR has concluded that, in accordance with the Railways (Accident Investigation and Reporting) Regulations 2005, Network Rail has:
 - taken the recommendation into consideration; and
 - is taking action to implement it, but ORR has yet to be provided with a detailed action plan and timescales

Status: Progressing. ORR will advise RAIB when further information is available regarding actions being taken to address this recommendation.
Information in support of ORR decision

4. On 3 December 2020 Network Rail provided the following initial response:

Action Plan

Network Rail Geotechnical department will:

1. Carry out an R&D project to analyse track geometry data and embankment failures to investigate whether track geometry data can give early warning of embankment failures.
2. Consult the RAM(G) & RAM(Track) Asset technical Review on track geometry recording data from measurement trains and embankment failure data to identify data sets for analysis;
3. Review the need for implementing analysis tools for decision-making processes for earth embankment and track assets vulnerable to progressive or rapid failure of embankments. Update control documents as necessary.

Evidence required to support closure of recommendation

- 1) Updated control documents, including the briefing of changes to the earthworks and track RAM teams;
- 2) Enhanced data availability between management of Track and Management of Earthworks to allow track geometry data to be made available to RAM (G) and earthwork data to RAM (Track) to allow timely interventions.