

Andrew Eyles
RAIB Relationship and Recommendation Handling
Manager

Telephone 020 7282 2026

E-mail andrew.eyles@orr.gsi.gov.uk

15 December 2015



Mr Andrew Hall
Deputy Chief Inspector of Rail Accidents
Cullen House
Berkshire Copse Rd
Aldershot
Hampshire
GU11 2HP

Dear Andrew,

RAIB Report: Derailment of a freight train at Barrow upon Soar, Leicestershire

I write to provide an update¹ on the action taken in respect of recommendation 1 addressed to ORR in the above report, published on 11 December 2013.

The annex to this letter provides details of the action taken. The status of this recommendation is now '**Implemented by alternative means**'. We do not propose to take any further action in respect of this recommendation unless we become aware that any of the information provided becomes inaccurate, in which case I will write to you again.

We will publish this response on the ORR website on 18 December 2015.

Yours sincerely,

Andrew Eyles

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 reduce the risk of an embankment failure due to flooding by providing the Route geotechnical team with information that will trigger an earthwork evaluation.

Network Rail should amend its company standards so that track maintenance staff are required to notify the Route geotechnical team if the foot of an embankment is saturated, flooded or has recently been flooded and a track geometry defect or loss of ballast is found on top of the embankment.

ORR Decision

1. Having reviewed Network Rail's closure statement ORR is content that Network Rail has now provided sufficient information to substantiate its original position that its existing standards do not need to be amended. ORR notes, however, that Network Rail is taking action to increase the clarity of current requirements and mitigate the risk by alternative means.
2. Network Rail's closure statement includes reference to the bow tie analysis it has been undertaking as part of the Business Critical Rules (BCR) programme to:
 - illustrate that the control that recommendation 1 is targeting is a poor one; and
 - demonstrate that other controls exist on the threat line that are considered more effective.
3. This type of analysis was probably something that would have been very immature at the time of RAIB's initial investigation.
4. ORR considers that the key points to note are as follows:
 - Network Rail has undertaken the review involving the Chief Track & Lineside Engineer (CTLE, ex PHoT), asset managers, and other discipline experts, as indicated in its February 2014 submission, and have concluded that the requirements of the current track standards do not require to be enhanced. Whilst the current track standards do not have the explicit requirement RAIB recommend, the standards do require the track engineer to have knowledge of higher risk sites, to have contact with geotechnical engineers regarding problem sites, and more generally to take action to ensure safety of the line when track geometry is presenting an unacceptable risk;
 - The BCR programme, and more specifically the work to produce the plain line track bow tie analysis, means of compliance (MOC) and role based manuals have provided greater clarity to the requirements above and where accountabilities and responsibilities lie. For example, within the track discipline means of control, the Route Asset Manager Geotechnics has an

explicit responsibility to liaise with the Track Maintenance Engineer (TME) regarding information to help him manage the impact of earthwork condition on track; and the TME has a responsibility to initiate a request to the RAM Geotechnics to consider undertaking an earthworks investigation for higher risk sites when necessary. The TME track trace review analysis remains an important part of the risk control process to manage track risk, and the relevant MOC references indicators of earthwork movement for example. The output of the track review is designed to inform future refurbishment items (that could include geotechnical work) and maintenance plans (that can include increased monitoring activity). The planned TME training course (stage 1 mandated for all TMEs, to be complete by March 2016) contains a module on Track Geometry management that will include track review;

- Network Rail's BCR bow tie analysis has included two specific loss events relevant to loss of track support due to embankment instability: one on the track discipline and one in the geotechnical discipline. Each threat line contains a number of controls to prevent the loss event being realised, and in the track discipline, supporting MOC that are now reported as implemented across all routes. Both loss event threat lines indicate that relying on track inspection personnel to identify saturated embankments *et al* and communicate to geotechnical engineers is a poor control, and that more effective, stronger and reliable controls exist in place in both the Track and Geotechnical disciplines. The proactive risk controls generally exist on the Geotechnics threat line, such as their 'earthwork management process' and 'weather – managing the operational risk process' that requires route RAM staff to assess earthwork risk to inform adverse weather plans that Network Ops staff then implement. The Head of Geotechnics also confirms that the track inspection regime is complementary to the stronger mitigation means of control provided by the Earthworks management process.
- NR's conclusion as to the appropriateness of track inspections does not appear an unreasonable conclusion given the increasingly restricted visibility of earthworks due to access restrictions; the move away from manual inspection; and limited competence of track personnel in earthworks matters generally.
- Network Rail's closure statement states that the Chief Track & Lineside Engineer (CTLE) is satisfied that track engineers do liaise with geotechnical staff and exchange data; and in response to our challenge sampled the views of the geotechnical community. Although feedback was mixed, dependent on the extent and scale of geotechnical problems that are impacting track condition, the CTLE concluded that there was sufficient communication between TMEs and geotechnical engineers.

5. ORR concludes that, in accordance with the Railways (Accident Investigation and Reporting) Regulations 2005, Network Rail has:

- taken the recommendation into consideration; and
- provided a full explanation as to why it does not think that any measures to implement the recommendation are necessary; and

- through BCR, is taking action to increase the clarity of current requirements and mitigate the risk by alternative means.

Status: Implemented by alternative means.

Brief Summary on what was previously reported to RAIB on 11 December 2014

6. Network Rail had expressed its satisfaction that the requirement of the recommendation was adequately covered by its existing company standard for Inspection and Maintenance of Permanent Way, NR/L2/TRK/001. Network Rail also indicated that it was taking action to align its response to the RAIB recommendation with recommendation A5.2 of its own formal investigation into this incident.

7. ORR reported, however, that it was not satisfied that the recommendation had been adequately addressed and it was seeking further information on how water saturation at the foot of embankments, putting track geometry and stability at risk, will be recognised and reported to the Route Geotechnical Team.

Update

8. On 5 August 2015 Network Rail submitted its closure statement to ORR:



Barrow Full closure
Rec 1.pdf

In summary, the Chief Track & Lineside Engineer has reviewed existing standards and processes and in doing so determined that when followed, they provide sufficient address to these recommendations.

The adoption of the 'BOW TIE' risk management approach for mitigating against threats which could lead to a significant loss event, e.g. derailment, has greatly improved the approach traditionally taken; as well as highlighting its traditional human interface weaknesses. Consideration of those Bow Ties developed for the loss events of 'Loss of geometry (excluding gauge) beyond safety limits' and 'Embankment- Loss of track support and / or track geometry shows that, for the identified threats, those controls which rely on continuous human involvement are not the most effective and that there are more effective controls.

Interestingly the feedback provided by the Routes themselves shows that communication between the TME & Geotechnical Engineer has been found to be sufficient to highlight issues where potentially the loss of track geometry is due to earthwork failure. There needs to be an acknowledgement that the management of embankments, and their condition, are not wholly reliant on TME alerts; only as one aspect of the wider controls already in place and applied by the Geotechnical fraternity.

It is proposed that through this review the intent of RAIB Recommendation 1 and Network Rail Formal Recommendation A5.2 has been met and both are therefore considered closed.

9. On 2 December 2015 ORR received the following update from Network Rail's geotechnical team:

The bow tie for embankments shows the barriers against threats of scouring and adverse/extreme weather events. The main barriers against these threats are as follows:

- 1. Earthwork management process. A suite of Network Rail standards address this earthwork management process. These are NR/L2/CIV/086 Management of Earthworks, NR/L3/CIV/065 Examination of Earthworks and NR/L3/CIV/071 Geotechnical Design. There is also drainage standard NR/L3/CIV/005 Drainage which specifies Drainage Management Plans which have been produced for each Route. The Business Process Documents referred to on the attached bow tie are currently being drafted.*
- 2. Weather – managing the operational risk. Earthworks have been risk assessed nationally for adverse/extreme weather. This was carried out by plotting earthworks on a risk matrix with axes of Earthwork Hazard Category (giving likelihood of failure) and Earthwork Asset Criticality Band (modified for drop-offs). Each Route has an adverse/extreme weather plan with actions to mitigate risks once rainfall trigger levels have been exceeded.*

The bow tie shows that reports from Network Rail staff (including TME) is one source of information that the RAM (Geotechnical) team get on scouring or adverse/extreme weather events. Track inspection staff report to Section Manager, via a TEF, in accordance with NR/L2/TRK/001. Notification of such issues to the RAM (Geotechnical) by TME is complementary to the stronger mitigation means of control provided by Earthwork management process.



Embankment
15072015_V35.pdf