

Oliver Stewart
RAIB Recommendation Handling Manager



5 June 2025

Mr Andy Lewis
Deputy Chief Inspector of Rail Accidents

Dear Andy,

RAIB Report: Collision between a passenger train and a fallen tree at Broughty Ferry, Dundee on 27 December 2023

I write to report¹ on the consideration given and action taken in respect of the recommendations addressed to ORR in the above report, published on 23 December 2024.

The annex to this letter provides details of actions taken in response to the recommendations and the status decided by ORR. The status of recommendation 1 is '**Open**'. RAIB addressed recommendation 2 directly to Dundee City Council. The status of recommendation 3 is '**Closed**'.

ORR will advise RAIB when further information is available regarding actions being taken to address these recommendations.

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

Initial consideration by ORR

1. Recommendations 1 & 3 were addressed to ORR when the report was published on 23 December 2024. RAIB addressed recommendation 2 directly to Dundee City Council.
2. After considering the recommendations ORR passed recommendation 1 to Network Rail and recommendation 3 to RSSB asking them to consider and where appropriate act upon them and advise ORR of its conclusions. The consideration given to each recommendation is included below.
3. ORR also brought recommendation 1 to the attention of other infrastructure managers as it was concluded that there are equally important lessons for them. ORR did not ask these organisations to provide a reply.

Recommendation 1

The intent of this recommendation is to use emerging technology to identify trees which have been subject to altered exposure and are potentially at risk of falling onto the railway.

Network Rail, as part of its development of aerial surveying technology, should consider how current and emerging technology of this nature could assist in the detection of trees subject to altered exposure, including those trees on third-party land, which could present a risk to the railway

ORR decision

4. Network Rail submitted a combined response for Roudham Heath rec 2 and Broughty Ferry rec 1, describing a R&D project to develop a vegetation risk model covering all known hazards, such as those in both incidents.
5. If developed as described, the risk model should form the basis of an appropriate means of addressing Broughty Ferry rec 1, but we will require more information about how the output from the tool is used to identify discrepancies identified through altered exposure, or if it will provide information for a person to do so manually.
6. We have also asked Network Rail if it is possible to provide intermediate milestones in order to track progress to completion in July 2027.
7. 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 close it.

Status: Open.

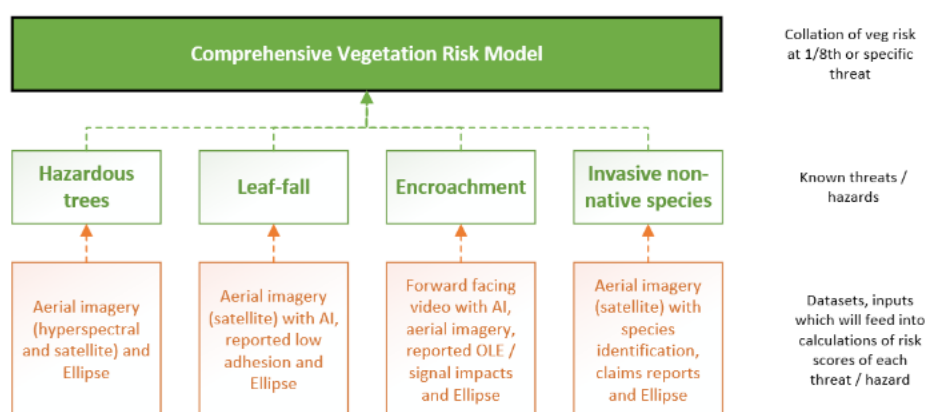
Information in support of ORR decision

8. On 15 April 2025 Network Rail provided the following initial response:

Action Plan**Please provide milestones with dates**

The current vegetation / tree risk models are fragmented into different places based on the specific threat. For example, dead, dying, diseased trees are identified by on-foot tree inspections and information required to be stored in Ellipse and new aerial technology using hyperspectral data collection gives another view of dead, dying or diseased trees. Other threats in vegetation / trees are linked to proximity, height/diameter of tree, encroachment, etc. The result of these disparate datasets and layers is the lack of a comprehensive vegetation risk model that includes all threats or hazards we require our engineers to understand. These would include leaf fall, hazardous trees, encroachment, and invasive and non-native species.

Technical Authority will lead an R&D project to build a national comprehensive vegetation risk model that will include all known threats/hazards and will apply risk assessment (risk = likelihood x impact), statistical calculations with weighted parameters and where possible application of AI/ML to provide a preventative approach to the dynamic risk that exists in vegetation / trees (created due to seasons, weather, changing profile after tree falls and/or growth over time).



The comprehensive vegetation risk model will include the utilisation of existing national trusted datasets such as hyperspectral data and will incorporate new technology such as exploitation of current satellite imagery (earth observation), DLI with AI integration as well as upcoming technologies. The incorporation of existing data such as soil moisture content, topography, soil category, catchment will enable improve of the risk model by correlating these parameters to past fallen tree incidents. This will support building a risk model which will highlight current risk of falling trees as well as support prediction of where trees may fall after extreme/adverse storms.

With the use of aerial imagery, a dynamic risk assessment can be possible by using regular updates of tree canopy via satellites' earth observation. Where trees have fallen or are showing signs of tilting towards railway/public, these factors can be built into the risk model as escalation for priority intervention. In addition, the changed risk profile of trees which are now exposed to wind (for example due to other trees being felled or falling), can be assessed.

Risk and interdependencies

There is funding within the R&D D&L portfolio to create the comprehensive vegetation risk model. The risk model would be best incorporated within StrEAMS – Asset Risk Evaluation Tool and therefore will need support from Route Services to build it into the live tool. The funding available as estimated a cost, however we would require a detailed quote (cost and time) from the DDAT team.

Additional funding from the Southern Region will be requested for an initial phase of the risk model to solely look at leaf fall risk assessment. The use of the existing platform and data pipelines from One Big Circle could be used to bring new dataset into Survey Data Platform. This would enable DLI to pull regular updated data and rerun the risk model. Again, a detailed cost and project remit is required as well as commitment from Southern Region on this initial phase.

Evidence required to support closure of recommendation

1. Validated and verification comprehensive risk model to be built in Power Bi to support the proof of concept.
2. Incorporation of the comprehensive vegetation risk model into StrEAMS – Asset Risk Evaluation Tool.

Recommendation 2

The intent of this recommendation is for Dundee City Council to improve its management of the trees which are its responsibility, and which are at risk of falling onto the railway.

Dundee City Council should review its management of the trees for which it is responsible to ensure that it is effectively controlling the risk of trees falling onto the railway. This review should consider:

- i. compliance with legal requirements and available good practice related to tree management
- ii. how trees within falling distance of the railway are identified
- iii. how factors that could increase the risk of healthy trees falling onto the railway such as tree species, growing requirements (including soil condition and effects of windthrow) are understood and accounted for
- iv. how a risk-based approach to tree inspections is to be established
- v. how accurate records of tree inspections are to be maintained.

Dundee City Council should develop a timebound programme to make any appropriate changes identified to their policies, procedures and systems

ORR decision

9. The recommendation was addressed to Dundee City Council. The recommendation is being handled by RAIB, as ORR does not have legal vires over the Dundee City Council as it is a government body.

Status: Other Public Body or Authority.

Recommendation 3

The intent of this recommendation is to provide additional information to the rail industry group which is currently evaluating the additional risk to train occupants associated with the continued operation of high speed trains, which entered service before modern crashworthiness standards were introduced in July 1994.

The Rail Safety and Standards Board Carmont Recommendations Steering Group should review its response to recommendation 19 made within [RAIB report 02/2022](#), following its investigation into the derailment of a passenger train at Carmont, Aberdeenshire on 12 August 2020 to ensure that the circumstances of this accident have been addressed

ORR decision

10. Part a. of Carmont rec 19 is to assess the crashworthiness of HSTs against the Railway Group Standard GM/RT2100, issue 1, July 1994. Broughty Ferry rec 3 required RSSB to take account of that incident in the work to address Carmont rec 19 part a.

11. To address Carmont recommendation 19 part a, Angel Trains Ltd conducted an HST crashworthiness knowledge study (AT/TR0329), using the Finite Element model developed for HST as part of Rec 18a, and an extensive review of HST incidents, engineering assessments and the output of Rec 17. A report has been produced which includes a full cost benefit analysis of options for HST enhancements using the same principles as that used in rec 15 and rec 17.

12. The accident at Broughty Ferry bears strong similarities to an accident involving a tree strike at Lavington on 10 July 2010, covered in RAIB report 08/2011, which formed part of the knowledge study for AT/TR0329.

13. The energy involved in the Lavington collision was 4 to 5 times higher than the criteria stated in GMRT2100 Issue 1. Report AT/TR0329 considered options to modify the HST driving cab structure to comply with GMRT2100 Issue 1. The cost benefit analysis demonstrated that the cost of any modification to the cab structure is considered grossly disproportionate to the benefit. The tree involved in the Broughty Ferry collision was considerably larger than that at Lavington, so the energy of the collision would have been significantly greater, meaning any modifications to the cab structure would be even more grossly disproportionate.

14. RSSB have demonstrated that the Carmont rec 19 a. work took into account the circumstances of Broughty Ferry to a sufficient degree to close the recommendation.

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

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

Status: Closed.

Information in support of ORR decision

16. On 23 April RSSB provided the following initial response:

The attached report and the supporting detail contained in Angel trains technical report AT/TR0329 CRASHWORTHINESS KNOWLEDGE ANALYSIS – HIGH SPEED TRAIN Issue 1, Revision B 10/02/2025, produced in support of RAIB Carmont accident report recommendation 19a, has been expanded to consider the Broughty Ferry RAIB Accident report 13/2024, recommendation 3.



RSSB Response to
Carmont Recommenc

The accident at Broughty Ferry bears strong similarities to an accident involving a tree strike at Lavington, RAIB report 08/2011. In report 08/2011 an estimation of the energy involved in the collision was provided. Within report AT/TR0329 this information has been compared to the cab design criteria stated in GMRT2100 Issue 1 for Carmont recommendation 19a. From this comparison the collision energy involved in the Lavington accident is 4 to 5 times higher than the criteria stated in GMRT2100 Issue 1. Even though the HST cab design predates GMRT2100 Issue 1, the original design criteria are understood and the Lavington report further states that the cab structure could be considered broadly comparable to the performance criteria contained within GMRT2100 Issue 3.

Report AT/TR0329 further explores the opportunity to modify the HST driving cab structure to comply with GMRT2100 Issue 1. The cost benefit analysis undertaken reveals that the cost of any modification to the cab structure is considered grossly disproportionate to the benefit.

Whilst no information is provided in the Broughty ferry report 13/2024 regarding the energy involved in the collision, the collision speed is broadly comparable to the Lavington accident and the tree involved in the collision appears to be considerably larger at 300mm diameter compared to 200mm at Lavington. The position of contact with the tree, the cab A pillar, is also very similar to that in the Lavington accident. Taking this information, it can be deduced that the energy involved in the Broughty ferry collision was likely to be of greater or comparable magnitude to that experienced at Lavington, which is noted as being 4 to 5 times greater than the requirements in GMRT2100 Issue 1.

Based on the above details and the work undertaken to review HST crashworthiness as part of Carmont accident recommendation 19a, RSSB is content that work undertaken in report AT/TR0329 addresses the Broughty Ferry Accident RAIB report recommendation 3.