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

Dear Andrew,

**RAIB Report: Collision between a train and a tractor at Oakwood Farm User
Worked Crossing, Knaresborough, 14 May 2015**

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 28 April 2016.

The annex to this letter provides detailed information regarding the action taken in respect of the recommendations. The status of recommendation 1 is '**progressing**'; recommendation 2 is '**implemented on-going**'; and recommendations 3 is '**insufficient response**'.

We will publish this response on the ORR website on 27 April 2017.

Yours sincerely,

A handwritten signature in black ink, appearing to read 'Oliver Stewart', is written over a horizontal line.

Oliver Stewart

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

Initial consideration by ORR

1. All 3 recommendations were addressed to ORR when the report was published on 28 April 2016.
2. After considering the recommendations ORR passed all three of them to Network Rail 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. This annex identifies the correspondence with Network Rail on which ORR's decision has been based.

Recommendation 1

The intent of this recommendation is to reduce the risk to users of Oakwood Farm UWC.

Network Rail should:

- a) undertake a comprehensive review of the safety of the crossing at Oakwood Farm UWC in the light of the findings in this report, its own hazard reviews, human factors advice, and suggestions from the authorised user, in order to minimise the risk to users; and
- b) implement any improvements identified in part a) above at Oakwood Farm UWC in liaison with the authorised user.

ORR decision

4. Following the publication of the RAIB report, Network Rail's LNE & EM Route agreed an action plan with the ORR, communicated on 20 May 2016. An initial review of the level crossing was undertaken which included reviewing the outputs from the HAZID undertaken as part of the Product Acceptance for POGO; a site visit where the existing signage and equipment on the approach to the level crossing was reviewed, with a view to simplifying the approach by removing redundant equipment and superfluous signage; and a review of the operation of the 'closure buttons'. The latter two actions included a review of the associated human factors.
5. A more comprehensive review was planned including a full independent risk review (by Mott MacDonald) of the level crossing as a system, working with the Authorised User to ensure that their opinions are included in the outputs.
6. Network Rail intended to investigate the provision of secondary MSL lights, placed higher than the existing lights, to assist tractor / HGV drivers, which would be larger and brighter than the existing MSL lights. An action plan would be produced following completion of the independent risk assessment.
7. A provisional date for closure of the actions relating to Oakwood was set as March 2017. We understand this has overrun but that Network Rail planned to install a larger MSL by the end of April and that the national POGO Hazid has been

finalised allowing them to start to use the information within it to look at inhibiting operation of the gates etc. We await written confirmation of this position from them.

8. 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 time-bound plan.

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

9. On 30 August 2016 Network Rail provided the following initial response:

Following the publication of the RAIB report into the incident at Oakwood Farm Level Crossing the LNE & EM Route have agreed an action plan with the ORR, this was communicated to them by the DRAM on the 20 May 2016.

a) *We have undertaken an initial review of the level crossing which has included:*

- *18 May 2016 – A review the outputs from the HAZID undertaken as part of the Product Acceptance for POGO*
- *15 June 2016 - A site visit was undertaken where the existing signage and equipment on the approach to the level crossing was reviewed, with a view to simplifying the approach by removing redundant equipment and superfluous signage. In addition to this a review the operation of the 'closure buttons' was also undertaken. Both these included a review of the human factors.*

These actions will inform the comprehensive review as follows:

- *Undertake a full independent risk review of the level crossing as a system. Start-up meeting held on 29 June 2016.*
- *We will be working closely with the Authorised User to ensure that their opinions are included in the outputs.*
- *Additionally, Network Rail will investigate the provision of secondary MSL lights, placed higher than the existing lights, to assist tractor / HGV drivers, which will be larger and brighter than the existing MSL lights.*

b) *Following completion of the independent risk assessment we will review the recommendations and produce an action plan for those taken forward.*

A provisional date for closure of the actions relating to Oakwood is March 2017; however this is subject to change depending on the outputs of the various reviews.

Recommendation 2

The intent of this recommendation is to reduce the risk to users of other *POGO equipped crossings*.

Network Rail should develop and implement a programme for a timely review of the safety of other user worked crossings it has fitted with POGO equipment and those it intends to fit in the future. The review should include particular consideration of the following:

- a) the design standard for crossings fitted with POGO equipment (paragraph 77);
- b) the ways in which users in different types of vehicles operate the crossing gates, including the function of the gate operating buttons (paragraph 74);
- c) the clarity of instructions to enable unfamiliar users to use the crossings safely and to minimise reliance on the briefing of all visitors by authorised users (which is not always practicable) (paragraph 94);
- d) improving the conspicuity of the MSLs (e.g. using two MSLs on each side of the crossing, the use of larger 'road traffic light' style red and green lights, flashing red MSLs, or wig wag lights) and the number and clarity of the signs, to minimise confusion and distraction (paragraph 64); and
- e) whether the opening of the gates should be disabled unless the MSLs are displaying green lights (paragraphs 41 and 61).

This review should draw on the findings from recent relevant research (eg RSSB's research into signs at private level crossings (T983) and human factors advice).

Any measures for safety improvements at such crossings should then be implemented at higher risk locations and incorporated into the standards for future designs.

ORR decision

10. ORR is content with the approach Network Rail were taking in addressing this recommendation, although considered the proposed timescales to be challenging. Since submitting their initial response, Network Rail have extended the timescale for completion to 30 September 2017.

11. 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 by 30 September 2017

Status: Implementation ongoing. ORR will advise RAIB when actions to address this recommendation have been completed.

Information in support of ORR decision

12. On 30 August 2016 Network Rail provided the following initial response:

In addressing the intent of this recommendation, Network Rail's central level crossing team will lead a safety review of the provision of POGO at UWCs. The review will take account of human factors behaviour and interaction with POGO (and MSL) at UWCs, equipment and positioning, signage requirements and ergonomic layout and consider RSSB research T983.

Phase 1 – Review & HAZID workshop

We will undertake a review of the design standard for POGO. This will incorporate a consolidated approach in respect to the undertaking of:

- *A combined review of former standard NR/L2/SIG/30039 and current standard NR/L2/SIG/11201/Mod X42 to confirm all good practice opportunities featured in the former standard are replicated in the current document (so far as is relevant to new equipment).*
- *Review of the original POGO HAZID to determine:

 - *That all actions relevant to the identified risks and hazards regarding the operation and provision of POGO are managed through design (so far as is reasonably practicable).*
 - *The design standard takes account of the output of the HAZID in relation to the provision and ergonomics of equipment.**
- *The lessons from this investigation will be reviewed against the design standard and opportunities to strengthen process incorporated.*
- *The output of the combined POGO/MSL HAZID will be integrated into the design standard (so far as is relevant) (see action plan below).*

This approach will serve to confirm that the design standard suitably and so far as is reasonably practicable, accounts for human factors risks and hazards and equipment provision and ergonomics based on holistic intelligence.

Bullets b) to e) in the recommendation will be addressed in the following way: We will undertake a HAZID workshop incorporating the expertise of professionals within Network Rail to determine the risks and hazards pertinent to the combined presence of POGO and non-interlocked MSLs at UWCs.

Working group to encompass a broad collective of expertise with proficiencies in the following disciplines (as a minimum): Railway safety and operations, level crossing safety and operations, human factors ergonomist, engineering and signalling (technical) and asset management.

The HAZID will take account of all modes of operation for both pedestrian and vehicular users and the users interaction with the level crossing, consider degraded/failure modes and will include layout, equipment conspicuity and instructional signage (wording, clutter and priority) within its assessment criteria.

The HAZID will facilitate:

- *The identification of human factors risks and hazards generated by the non-interlocking of equipment; e.g. potential for conflicting advice to generate unintended action by crossing users.*
- *Identification of essential risk control requirements needed to manage safety and reduce confusion / likelihood for human error - if non-interlocking arrangements are determined to still be appropriate, or;*
- *Lead to Standards change and action to interlock POGO and MSL where solutions are combined; both reactive at locations commissioned and proactively at locations yet to be commissioned and incorporating interim risk management solutions as needed.*

The output of the HAZID will inform the business approach and long-term strategy in regard to the appropriateness of combining of POGO/MSL and of the prerequisites in doing so. Relevant lessons learnt will be incorporated within design standard specifications and guidance documentation to improve consistent adoption of safe protocols.

This review should draw on the findings from recent relevant research (e.g. RSSB's research into signs at private level crossings (T983) and human factors advice).

Any measures for safety improvements at such crossings should then be implemented at higher risk locations and incorporated into the standards for future designs.

Phase 2 – Implementation

Following the review/HAZID phase and accounting for any requirement to undertake design standard change, it is feasible that there might be a requirement to undertake physical work alterations / asset improvements. There might also be a requirement to trial new signage or other ergonomic solutions. It is proposed that the Phase 2 action plan be developed once intelligence has been accrued through completion of phase 1.

Timescale

Proposal to complete review phase 1 (excluding implementation of design standard change at a working level) – 31 December 2016. Phase 2 action plans to follow.

13. Network Rail provided an update on the work they had been doing (in collaboration with a consultant) to address the recommendation at a meeting on 13 January 2017:

Provide an auto-close function on the POGO gates (Motts). Automatic closure of POGO gates has been previously ruled out due to the imported risk of trapping a vehicle on the crossing

Interlock the POGO gates with the MSLs (Motts). Part of the HAZID review for RAIB Recommendation 2 (no product approved solution currently)

Install (re-enable) photo-eye sensors to prevent gates closing on vehicles whilst on the crossing (Motts). RLCM to reassess

Install rubberised safety edges to the leading edge of the gates (Motts). Pressure sensor already provided on gate

Increase the size of the MSLs (RAIB, NR, Motts). Work to replace lights is underway

Replace existing signage with new and improved (RAIB, NR, Motts). Complete

Improve road markings including stop lines and hatching (NR, Motts). Complete

Disable the gate opening function on the furthest push buttons from the crossing (NR Motts). Complete

Relocate gate opening push buttons to behind the STOP sign / proposed stop line, particularly on the south side (NR Motts). Complete

Improve push button visibility (NR Motts). Complete

Widen the crossing to maximum permitted (Motts). Crossing surface has been widened to accommodate larger vehicles

Replacement gate to be product approved (Motts). There is a product approved 16ft gate (current gate size 15ft)

Improve the crossing approach vertical profiles to reduce the steep gradients (Motts). Some work carried out to date to improve. Communication ongoing with track team

Improve the vertical profile over the crossing to reduce the current hump, as per current standards (Motts). As above

Widen the crossing decking to 300mm wider than the gates, as per current standards (Motts). *Complete*

Increase the width of the tarmac access road to accommodate the maximum width of vehicle (Motts). *Complete*

It is recommended however that Network Rail undertake a study to confirm the cost and feasibility of constructing an offline over bridge adjacent to the existing crossing location (ORR). *NR have priced a similar location for an over bridge and costs were prohibitive – see Crabley Creek costs (enclosed in email).*

Critically consider the impact the new stop line has on crossing traverse times. It is our view that the stop line implies a decision point from which traverse times should be calculated, rather than the MSL position used in the Mott MacDonald report. This will adversely affect some of the already insufficient warning times particularly for longer vehicles. *(ORR) The traverse times are calculated from the MSLs location*

Consider the immediate effect from the known December 2017 increase in train numbers over the crossing and the future effect of proposed two tracking of the route – *(ORR) Currently no formal request to NR to increase the timetable in Dec 17*

Consider whether the planned increase in train numbers will also involve an increase in line speed and the subsequent effect on the three crossings' risk profiles; *(ORR) this is being explored as part of the current enhancement scheme although in early development and any impact will be considered as part of the scheme*

Consider the effects of future growth of the farm business/those with the same postcode (P50 – Mott MacDonald report) and the increased traffic this may bring to the crossing *(ORR) this would be captured in any discussions with NR/Council, and impacts assessed through Town Planning/Property Team.*

Clarify the operational sequence for the power operated gate (POGO) buttons is correct. There is a discrepancy between the ergonomics report from Network Rail (page 16) and the assessment by Mott Macdonald (page 10). You should then consider the outcome in relation to vehicles becoming trapped on the crossing. *(ORR/NR) On review whilst the wording is slightly different in the two documents the description of the sequence is the same.*

Consider all possible crossing types for example, there is no justification for dismissing an automatic half barrier (AHB) other than Network Rail considers this is not a viable option; and the possibility of an automatic barrier crossing locally monitored (ABCL) is not considered at all; *(ORR/NR) agree with this comment and Motts have been approached to uplift the report*

Network rail to consider the effectiveness of a back to back light or other

means that provide a clear visible indication of whether it's clear to cross. NR believe this has been previously considered by the RSSB (will check internally with STE for any further information), however we changed to the current light arrangement some years previously. We continue to progress a larger light unit for this site to improve visibility.

Recommendation 3

The intent of this recommendation is to reduce the risk from the introduction of infrastructure equipment onto the railway network.

Network Rail should review the robustness of its processes for accepting new equipment and technology onto the railway, including particular consideration of the following:

- a) definition and adherence to an appropriate level of safety assurance;
- b) the early involvement of human factors expertise, where appropriate, throughout the product's introduction;
- c) the risk assessment processes applied to the new equipment itself and the infrastructure into which it is to be integrated;
- d) definition and monitoring of trials, implementation of any resulting improvements, and the roll-out of the product to other locations;
- e) maintenance of a hazard record for the life-cycle of the product; and
- f) a process for undertaking regular audits to check the implementation of its product introduction processes and correcting any identified shortcomings (paragraph 116b).

It should then, where appropriate, produce a time bound plan for the amendment of the standard.

ORR decision

14. Network Rail's only response to this recommendation contains virtually no information about how they will go about addressing it and does little more than repeat the wording of the recommendation. We have written to them requesting greater detail on how they will address the recommendation, supported by a time-bound plan and have chased twice.

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

- has not provided a sufficient response setting out how they will address the recommendation, nor provided a time-bound plan for it to be delivered.

Status: Insufficient response. ORR will advise RAIB when further information is available regarding actions being taken to address this recommendation.

Information in support of ORR decision

16. On 30 August 2016 Network Rail provided the following initial response:

Network Rail will review the robustness of its processes for accepting new equipment and technology onto the railway, including particular consideration of the following:

a) definition and adherence to an appropriate level of safety assurance;

b) the early involvement of human factors expertise, where appropriate, throughout the product's introduction;

c) the risk assessment processes applied to the new equipment itself and the infrastructure into which it is to be integrated;

d) definition and monitoring of trials, implementation of any resulting improvements, and the roll-out of the product to other locations;

e) maintenance of a hazard record for the life-cycle of the product; and

f) a process for undertaking regular audits to check the implementation of its product introduction processes and correcting any identified shortcomings.

The review will be undertaken in accordance with Network Rail's standards change process and will be issued by the target date below.