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10 December 2014

Ms Carolyn Griffiths  
Chief Inspector of Rail Accidents  
Cullen House  
Berkshire Copse Rd  
Aldershot  
Hampshire GU11 2HP

Dear Carolyn,

**RAIB Report: Fatal accident at Motts Lane level crossing, Witham, Essex**

I write to report<sup>1</sup> on the consideration given and action being taken in respect of the recommendations addressed to ORR in the above report, published on 14 January 2014.

The annex to this letter provides details of the consideration given/action being taken in respect of each recommendation where the status of all 4 recommendations is 'implementation on-going'.

ORR will advise RAIB when actions being taken to address these recommendations have been completed.

We will publish this response on the ORR website on 31 December 2014.

Yours sincerely,

Chris O'Doherty

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

## **Initial consideration by ORR**

1. All 4 recommendations were addressed to ORR when the report was published on 14 January 2014.
2. After considering the recommendations ORR passed all 4 recommendations to Network Rail asking it to consider and where appropriate act upon them and advise ORR of its conclusions. The consideration given to each recommendation is included below.

### **Recommendation 1**

*The intention of this recommendation is to reduce the risk created by long waiting times by taking action at other locations where this situation may exist.*

Network Rail should, as soon as possible, review all automatic level crossings (including AHB, ABCL, AOCL and MSL crossings) to identify locations where complex track and signalling layouts, nearby stations and/or railway operations may lead to the red road/pedestrian lights showing for an excessively long time. At each location that is identified, Network Rail should assess the risk from extended closure times.

**And**

### **Recommendation 2**

*The intention of this recommendation is to reduce the risk that local signalling practices may lead to unnecessarily long waiting times at level crossings.*

Network Rail should determine, in the light of the risk that arose from the indiscriminate use of the non-stopping setting at Liverpool Street IECC, whether there are any other locations where local instructions/practices may be at risk of introducing unnecessarily long waiting times at automatic crossings, and take appropriate action to correct the situation.

### **Steps taken or being taken to address recommendations 1 and 2**

3. On 16 April 2014, Network Rail provided ORR with the following information:  
General Summary:

*Network Rail will carry out a review of all automatic level crossings to ascertain which ones have excessive sequence times. Those that are identified as having excessive sequence times shall be reviewed to understand the reasons for the excessive sequence times; complex layout/engineering design or operational reasons. Where it has been found that complex layout or engineering design is the cause, an action plan shall be developed to manage the risk.*

Detailed Action Plan:

- i. Investigate survey methodology for obtaining information on level crossings with excessive warning times. Produce a Special Inspection Notice (SIN) covering the following elements.*
- ii. Brief the contents of the SIN to the Signalling Asset Management Group. Note: information required will include; design sequence/barrier down time, average achieved sequence times and maximum achieved sequence times.*

- iii. *As part of the SIN, produce a spread-sheet listing all automatic level crossings.*
- iv. *Route Signalling & Telecoms Technical Services to obtain required information from those level crossings equipped with data loggers.*
- v. *Route Level Crossing Managers to arrange for required information to be obtained through observations/cameras at crossings not equipped with data loggers (indicative timescale TBC as it depends on numbers of crossings without data loggers).*
- vi. *Those crossings which are identified as having excessive sequence times shall then be reviewed to identify what action is needed to reduce sequence times. Reviews involve; a) ORA/RLCM/LCM, b) OM, c) RAM Signalling.*
- vii. *(Recommendation 2) Where it has been found that local instructions and practice is the cause appropriate action shall be taken to correct the situation (date TBC)*

*Network Rail will develop and implement action plans to manage risk where it is found that complex layout/engineering design leads to the excessive sequence times.*

*Timescale: 30 June 2014 to determine action plans. Implementation date TBC.*

4. On 20 June 2014, Network Rail notified ORR of timescale extensions for recommendations 1 and 2, both extended to 31 October 2014.

*Reason for extension:*

*A Special Instruction Notice (SIN) was drafted on 29 May 2014. The purpose of this SIN was to define the scope for investigating the warning time given to the public at automatic crossings, then to collect warning time information for those crossings in scope. In conjunction with this notice a Data Collection Spread-sheet and Warning Time Assessment Report were also drafted to gather information at each crossing. This information was presented to the Signalling Asset Managers Group (SAM-G) on 3 June 2014 and Network Rail is awaiting consultation comments on this. Once these are received, an updated SIN will be prepared accordingly.*

*Network Rail considers that parts 1, 2 and 3 of its action plan have been partially completed and that Network Rail is awaiting the final version of the SIN. However, it will now take some time to gather the information required from the identified sites.*

*Network Rail's revised extension scales are as follows:*

*Part 4 - Route Signalling & Telecoms Technical Services to obtain required information from those level crossings equipped with data loggers (31 August 2014).*

*Part 5 - Route Level Crossing Managers to arrange for required information to be obtained through observations/cameras at crossings not equipped with data loggers (31 August 2014) indicative timescale as it depends on numbers of crossings without data loggers).*

*Part 6 - Those crossings which are identified as having excessive sequence times shall then be reviewed to identify what action is needed to reduce sequence times. Reviews involve; a) Operations Risk Advisor / Route Level Crossing Manager / Level Crossings Manager, b) Operations Manager, c) Route Asset Manager Signalling (31 August 2014 indicative timescale to 30 September 2014).*

5. On 29 October 2014, provided reasons for further extending the timescale:

*Revised completion date proposed: 31 July 2015*

*Special Inspection Notice (SIN) 133 was issued on 17 July 2014 with a compliance date of 5 September 2014. To date, responses have been received by the majority of Routes. The return is still due from one Route which has requested additional time to complete its response to the SIN.*

*SIN 133 is aimed at defining the scope for recording and assessing the warning time given to the users of level crossings. The designed strike in and warning times form part of the returns.*

*SIN 133 is the first stage in identifying automatic level crossings at which there are excessive warning times. The data gathered will be used to scope the action plan to measure and assess the recorded warning times of trains.*

*A second SIN (SIN 137) is being drafted. SIN 137 will mandate the measurement of warning time over a seven day period. A spread sheet tool has been developed that plots a graph using the strike in and measured warning times. This will be used by Route teams to identify crossings with:*

- *Excessive warning times,*
- *Inconsistent warning times, and*
- *Borderline compliant warning times.*

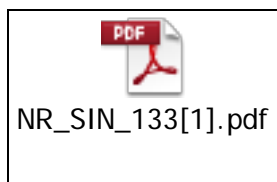
*The Route returns on SIN 137 are to include their proposal for how level crossings with excessive, inconsistent or borderline compliant warning times will be addressed i.e. whether an engineering solution or changes to local instructions are to be applied. The returns will be reviewed by the National Level Crossing Team to assess the suitability of the proposed action.*

*Routes will then be asked to agree their action plans for implementing the proposed course of action. The plans will include dates for implementation of actions. Once the action plans have been agreed, we will be able to confirm the final date by which the intent of the recommendation will be addressed.*

*The timescales for the stages envisaged are:*

- *SIN 137 issued - January 2015*
- *Returns for SIN 137 due- April 2015*
- *NLCT analysis complete - July 2015*
- *Action plans requested - September 2015*
- *Action plans returned - December 2015*

*Recommendation closure date - December 2015*



## **ORR decision**

6. Network Rail has provided a response to address recommendations 1 and 2: It has set out to *review all automatic level crossings to ascertain which ones have excessive sequence times. Those that are identified as having excessive sequence times shall be reviewed to understand the reasons for the excessive sequence*

*times; complex layout/engineering design or operational reasons. Where it has been found that complex layout or engineering design is the cause, an action plan shall be developed to manage the risk.*

7. After reviewing information received 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. Completion date: December 2015

**Status: Implementation On-going.** *ORR will continue to engage with Network Rail to make sure that the operational aspect of recommendation 2 is addressed.*

*ORR will advise RAIB when actions being taken to address these recommendations have been completed.*

### **Recommendation 3**

*The intention of this recommendation is to reduce the risk that may be created by the interaction of ARS [Automatic Route Setting] with the controls for level crossings, by reviewing the principles which define the design of such systems.*

Network Rail should review its processes for designing and implementing ARS where it interacts with level crossing controls, and amend or enhance them as necessary to produce assurance that the design will result in the crossing operating in accordance with relevant standards and guidance.

#### **Steps taken or being taken to address the recommendation**

8. On 16 April 2014, Network Rail provided ORR with the following information: *Network Rail will review its processes for designing and implementing ARS where it interacts with level crossing controls. Where the review does not provide assurance that following the process will result in the crossing operating in accordance with the relevant requirements and guidance, it will propose change.*

*The review will investigate the life cycle of design, check and implementation, and will test the integration aspects of each stage in the cycle. The output from the review will be a report demonstrating the areas that have been reviewed, the findings from the review, and recommendations for change. The completion date for the agreed final report and its recommendations will be 30 June 2015.*

*The RAIB recommendation will be closed on completion of the agreed changes to standards and processes. Allowing for publication dates, the completion date for the changes to standards and processes will be 30 September 2015.*

*Timescale: 30 September 2015*

9. On 15 May 2014, ORR asked Network Rail to provide reasoning to support the proposed timescales. Network Rail responded on 7 July 2014 stating: *The end date of 30 September 2015 is the next practicable planned publication date that can be used for any of the standards and requirements that need to be altered as a result of the action plan.*

*The first phase, investigation into the existing standards, has begun. The review is now coinciding with the Business Critical Rules Programme, which the review will*

*use to capture the potential for better application of requirements to integrate level crossing design. The output of this is due to be substantially complete in November 2014, following which the detailed report to close the first part of the action plan can be started to take BCRP into account. BCRP's principle task is to risk assess using the "bow tie" method, and then create role based manuals. It is anticipated that the process should create manuals for roles that have not previously had requirements, making it an excellent opportunity to define requirements applicable to the circumstances in this RAIB report.*

*The final output of the report is due in June 2015, but will be preceded with Stakeholder consultation and internal governance phases before then, and in practice the report may be completed before this date.*

*Following publication of the date, if any requirements are identified as requiring a change, they will be updated, and issued in the September 2015 standards publication.*

### **ORR decision**

10. After reviewing information received 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. Completion date: September 2015

**Status: Implementation On-going.** *ORR will advise RAIB when actions being taken to address this recommendation have been completed.*

### **Recommendation 4**

*The intention of this recommendation is to improve the control of risk by establishing appropriate maximum times that red lights should show for, and taking the red light times into account at regular reviews of the safety of level crossings.*

Network Rail should establish, by carrying out research or otherwise, appropriate maximum time(s) for red lights to be designed to be shown at MSL crossings, and acceptable levels of variability for this time (taking into account factors such as the types of train, and stopping patterns), in view of the risk that users may become intolerant of extended waiting times. Taking account of the results of this work, it should modify its risk management processes for MSL crossings to include consideration of the length of time that the red lights show.

### **Steps taken or being taken to address the recommendation**

11. On 16 April 2014, Network Rail provided ORR with the following information:

*The National Level Crossing Team will work with the Network Rail Ergonomics Team to carry out a desktop review of research into optimal warning times for MSL type crossings; the origin of the historic use of 20 seconds warning time (for MSLs at Footpath crossings) and 40 seconds warning time (for MSLs at UWCs); and in light of research to assess the operational impact on the railway.*

*Network Rail will produce a distribution chart showing how the effectiveness of MSLs drop as the warning time increases beyond an optimal point up to 4 minutes when the lights enter dark mode (time out).*

*Network Rail will identify maximum allowable time for red light design and modify its risk management processes for MSL crossings to include consideration of the length of time that the red lights show.*

*The aim is to provide a suggested approach at the cross industry Level Crossing Strategy Group on 22 May 2014 with final completion of work by 31 August 2014.*

*Timescale: 31 August 2014*

12. On 16 April 2014, Network Rail provided ORR with the following information: Network Rail has concluded that:

- *There are many factors that influence “willingness to wait”, not just the amount of time the signal remains at red.*
- *There seems to be no specific research on pedestrian willingness to wait, it is mainly focussed on motorists although there may be some transferrable issues.*
- *There is some guidance we can take from existing research that suggests waiting times should not exceed 90 seconds*
- *People are unreliable in their estimates of time and have a tendency to over-estimate waiting times. Therefore there may be some value in providing “waiting time information” so that users have an accurate estimate of how long they will be kept waiting*

### **Next Steps**

*Research is required to:*

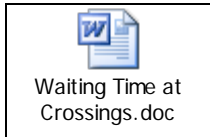
1. *Validate and assess the impact of a 90 second “extended wait time” limit.*
2. *Determine the variability criteria to take account of slower moving trains etc.*
3. *Understand whether there are significant differences in pedestrian and motorist behaviour.*

*It is proposed that this research should involve:*

1. *Identifying crossings (at least 20) where there is a known history of red light abuse, based on local knowledge of Route Level Crossing Managers.*
2. *Undertake surveys and user questionnaires at those sites in order to determine which factors might be influencing the red light violation. This would include the investigating the variability in wait times that can exist and the extent to which behaviour might vary between motorist and pedestrian.*

*Consideration could be given to using covert cameras at certain sites to observe actual behaviours or to utilise existing data from the BTP enforcement cameras or other locations where there is existing CCTV or camera footage. The cost implications of this type of research need to be assessed.*

*This research would give Network Rail a clearer picture about the extent to which waiting time is a factor in level crossing violations, building on the Human Engineering work undertaken in 2004. It would also help form some hypotheses to test in step 3. To understand whether there are significant differences in pedestrian and motorist behaviour.*



13. On 27 August 2014, Network Rail notified ORR that the timescale to address this recommendation had been extended to 31 May 2015:

*A paper, which was intended to address the recommendation, has been produced by Network Rail's human factors specialists; the findings of which require further validation. The paper incorporates input from a key expert involved in the RSSB research project T984 'The causes of pedestrian accidents at level crossings and potential solutions'. It outlines the findings of an initial review of existing literature on waiting times at level crossings. The paper concludes that there are many factors affecting people's 'willingness to wait' in addition to the length of time the signal remains at red.*

*No specific research on pedestrian willingness to wait was identified. Guidance from existing research, focused on motorists, indicates that waiting times should not exceed 90 seconds. The work undertaken so far indicates that the 90 seconds applied to vehicle drivers appears to be a reasonable maximum threshold for pedestrian users. However, further research is needed to corroborate this. Therefore, further steps are needed to assess and validate the impact of a 90 second waiting time limit; determine the variability criteria; and understand if there are significant differences in pedestrian and motorist behavior.*

*The availability of funding to conduct the research to be undertaken is a risk to the completion of the work to address the recommendation. Funding will be needed to either enable the research to be delivered internally by Asset Management Services Human Factors specialists or by a suitable external company.*

*It is anticipated that 9 months will be needed to secure funding, complete the research and include its outcome in risk management processes for MSL crossings.*

*Original Planned Completion Date: 31 August 2014*

*Revised Planned Completion Date: 31 May 2015*

### **ORR decision**

14. After reviewing information received 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. *Completion date: 31 May 2015*

**Status: Implementation On-going.** *ORR will advise RAIB when actions being taken to address this recommendation have been completed.*