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9 February 2016

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

Dear Andrew,

RAIB Report: Class investigation into landslips affecting Network Rail infrastructure

I write to provide an update[1] on the action taken in respect of recommendation 3 addressed to ORR in the above report, published on 2 April 2014. The annex to this letter provides details of the action taken regarding recommendation 3.

The status of recommendation 3 is **'implemented'**. 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 12 February 2016.

Yours sincerely,

Oliver Stewart

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

Recommendation 3

The intent of this recommendation is to increase the likelihood that appropriate Network Rail staff are aware of landslip risk due to adverse rainfall conditions which have not been forecast or detected by Network Rail's formal rainfall monitoring processes.

Network Rail should implement a process for real-time collection (and appropriate use of) intelligence about very unusual rainfall or flooding conditions. Development of this process should take into account the differing risk levels on different parts of the infrastructure and should consider using the following information sources:

- emergency service control centres;
- other organisations involved in the provision and management of rail and non-rail transport;
- reports (encouraged by appropriate railway industry publicity) from on-duty and off-duty railway industry staff including those employed by train operating and maintenance companies; and
- rain gauge and other types of weather sensor capable of providing data in real time.

ORR decision

1. By carrying out a review of existing procedures of collection of intelligence about rainfall and putting together a plan to make better use of existing sources of information, Network Rail has taken appropriate action to meet the requirements of the recommendation. Network Rail has now completed all the actions in the plan they had previously reported to us.

2. ORR, in reviewing the information provided by Network Rail, has concluded that in accordance with the Railway (Accident Investigation and Reporting) Regulations 2005. It has:

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

Status: Implemented

Previously reported to RAIB

3. On 31 March 2015 ORR reported to RAIB that the status of this recommendation was Implementation on going as Network Rail had provided an appropriate time-bound action plan to deliver its implementation.

Update

4. Network Rail wrote to ORR on 15 December 2015 with a closure statement containing the following information:

A review by the Network Rail National Control Manager and National Weather Specialist was undertaken to consider how a new process for real-time collection of intelligence about rainfall or flooding conditions could be implemented. Whilst it was agreed that there was more that could be done in this area, introducing another procedure was seen to risk being over complicated and thus risk inconsistent application. Therefore the option to incorporate better intelligence into current incident management processes was chosen as a more viable option. The actions were split into three elements to determine the quality of available data from three sources:

- *emergency service control centres and other organisations involved in the provision and management of rail and non-rail transport;*
- *reports (encouraged by appropriate railway industry publicity) from on-duty and off-duty railway industry staff including those employed by train operating and maintenance companies; and*
- *rain gauge and other types of weather sensor capable of providing data in real time.*

Part 1: *Investigate the quality of the available data and reporting available through emergency services control centres, other transport companies (rail and non-rail) and whether this offers a feasible solution.*

Findings:

Network Rail has been in contact with emergency service representatives, who act as lead contacts for numerous Local Resilience Forums (LRF), the highways agency, airports and port authorities. An interview was undertaken with each to determine the availability of quality and viability of the intelligence.

The intelligence received by these groups varied, although the general theme was that much of their own intelligence and data in this area was received by email from a number of forecast providers.

Operational staff working for all parties interviewed would through their normal reporting lines report extreme events, but the general consensus was that the quality of such reports is unreliable and that quantitative intelligence is normally preferred through the facets above.

Heathrow Airport in addition makes use of an imbedded Met Office forecaster for local weather conditions and measurements and while useful it was felt that the rail industries capability was superior due to the breadth of forecasting capability offered by Network Rail's forecasting service and provider.

The Highways Agency Weather Information System (HAWIS), which was seen to be the most advanced source outside our own infrastructure, uses Met Office forecasts, and they too make use of an embedded forecaster in their National

Control Centre. They use this forecast information in conjunction with their weather stations, which are installed and managed by Vaisala. The availability of data from such sources was considered valuable and has been incorporated into Network Rail's weather system for live observational use and to feed into the functions of the system (see action 3).

Action taken:

LRF's, emergency service control centres and other transport control centres now have direct contacts within Network Rail for reporting of extreme weather, weather management coordination and weather information support. Qualitative intelligence through reporting from these functions has been encouraged and such intelligence can be use is existing procedures for incident management and response arrangements (National Control Instructions NR/L3/OCS/043/2.3 – Incidents), although emphasis on live weather data and use of technology (action 3) has been noted to be the most reliable intelligence source.

Part 2: *Investigate the current arrangements by which on or off duty (whether that be Network Rail, contractor or TOC/FOC) are encouraged to report issues they perceive to be a risk.*

Findings:

Signallers, front-line operations staff, delivery unit staff and TOC/FOC drivers receive briefings at various times throughout the year and part of this informs of possible weather issues. These briefings in the past have focussed on reporting of incidents which occur because of weather conditions rather than reporting of unusual weather itself. As such any reporting would normally be reactive and only after safety of the line incidents had occurred, rather than attempting to understand, and if necessary impose mitigation in the events of extreme weather conditions before any notifiable incident. It was also noted that whilst briefings of front line staff are carried out on a regular basis, other employees who work for the industry may often fall outside these and will be unaware of reporting lines. As such a way of engaging with all staff has been deemed the appropriate way to proceed in an effort to extend the availability of intelligence in this area.

Actions taken:

A Seasonal calendar has been implemented which details the stage gates required to be met, and also communication requirements for seasonal and weather related planning. As different weather risks tend to occur at different times of the year the seasonal calendar has been set up to cater for the requirements and stakeholders throughout the year. A key part of the seasonal calendar is the communication plan for delivery which will prompt the necessary engagement with all parts of the industry and employees, which aims to promote the reporting of seasonal issues, unusual weather, and incidents.

Part 3: *Investigate what technology is available to provide accurate actual rain fall amounts in real time and predictive alerts of adverse and extreme rainfall amounts.*

Findings:

At the time of the recommendation Network Rail had minimal ability to utilise actual rainfall data in real time to prompt proactive response into the management of unusual amount of rainfall. As of the 1st of October 2015 Network Rail has procured a more advanced weather system capability with the ability to utilise actual rainfall data.

The new system capability has been developed to offer greater levels of detail in both forecasting and on live weather data through observations for alerting. Each user of the new system can configure their interface to offer a weather system that is set up for their own areas of importance.

The use of rainfall gauges and weather stations have been incorporated into the data feeds used by the new weather systems, although singly only provide limited use due to only monitoring specific locations. However, by incorporating the data feeds from a number of these with the inclusion of satellite and radar, the granularity and quality of live data has now been much improved. Network Rail's new forecasting system is now built around the availability of this data.

Current feeds of data being gathered for rainfall are:

Forecast -

- *10 day national forecast – long range forecast which isn't specific to and hazard but gives areas of note to consider.*

- *5 day forecast – A more granular forecast identifying forecast estimates for specific hazards and alerting if thresholds have been breached. Forecast areas are split into subsections of main Network Rail Routes.*

- *Hourly forecasts – Further granularity as per above but spilt further into many individual forecast areas within the route and identifying again hazards and threshold breaches. These hourly forecasts are from 1 - 24 hours.*

Live data and observations –

- *6 hour precipitation observation – Granular down to individual locations on the network and uses weather measuring capability to determine actual rainfall*

amounts which have fallen over a 6hour period and whether and triggers have been met.

1 hour – As above in terms of granularity and uses the same capability to determine current rainfall levels and those which have fallen in the last hour to determine whether triggers have been met.

The current technology now allows Network Rail to better predict areas of concern for individual hazards but also act on hazards which may have occurred which were not predicted. Applying this additional intelligence into well a practiced incident management approach leaves us in a far better position in terms of risk management for unusual and weather conditions which were not forecast.

Action Taken:

Network Rail Weather Service implemented and briefed to key Network Rail and Industry staff for use in operational environments with configurable alert functions available for rainfall and all other weather related hazards.

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