

Chris O'Doherty
RAIB Relationship and Recommendation Handling
Manager

Telephone: 020 7282 3752

E-mail: chris.o'doherty@orr.gsi.gov.uk

2 August 2013

Ms Carolyn Griffiths
Chief Inspector of Rail Accidents
Rail Accident Investigation Branch
Block A, 2nd Floor
Dukes Court
Dukes Street
Woking GU21 5BH

Dear Carolyn

Collapse of the Overhead Line near to Jewellery Quarter Tram Stop, Midland Metro: 20 April 2011

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 27 September 2012.

The annex to this letter provides details of the consideration given/action taken in respect of each recommendation where recommendations 1 to 7 have been implemented and recommendations 2, 3, 6 & 7 are being implemented².

ORR will carry out inspection work to check that the actions to address the recommendation have been carried out. If in doing so we become aware of an inaccuracy we will write to RAIB again³.

We expect to publish this response on the ORR website on 19 August 2013.

Yours Sincerely

Chris O'Doherty

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

² In accordance with Regulation 12(2)(b)(i)

³ In accordance with Regulation 12(2)(c)

Initial Consideration by ORR

All 7 recommendations contained in the report were addressed to ORR when RAIB published its report on 27 September 2012.

After considering the report / recommendations, on 24 October 2012, ORR passed all 7 Recommendations to National Express Midland Metro asking it to consider and where appropriate act upon them.

Details of consideration given and any action taken, in respect of these recommendations are provided below.

Recommendation 1

The purpose of this recommendation is to prevent damage to tensioned components within the Midland Metro OLE system which may result in their failure.

National Express Midland Metro should determine the minimum mechanical clearance necessary around tensioned components within the OLE system to prevent contact that may damage them.

It should introduce controls to prevent smaller clearances than this minimum from either being introduced into the system or developing during operational service and not being detected.

Details of steps taken or being taken to implement the recommendation

1. National Express Midland Metro in its initial response on 26 November 2012 advised that:

1.1 NXMM will establish a clearance standard of 80mm as defined by the system manufacturer (Brecknell Willis) and this will be reflected in the relevant maintenance manuals and supporting documentation.

1.2 Where clearances of 80mm are not achievable due to installation or operational constraints 'Parafil' rope shall either be replaced with an appropriately specified stainless rope, insulated at a point along its length to maintain system design integrity or be mechanically protected.

1.3 Any change made in this regard will be subject to safety validation.

1.4 Scheduled High Level OHLE inspection documentation will be amended to ensure the inspecting engineer is required to pay particular attention to mechanical clearances.

<i>Action</i>	<i>Commentary on progress</i>	<i>Target Completion Date</i>
<i>1.1</i>	<i>Inspection and maintenance manuals are to be reviewed and any changes made to ensure the 80mm clearance is maintained will be implemented through the companies change control process.</i>	<i>28/02/13</i>
<i>1.2</i>	<i>Work to identify any such areas will be undertaken and modifications to the assemblies will be carried out as</i>	<i>31/12/12</i>

	<i>appropriate. Pole locations will be recorded in conjunction with the detail of works carried out.</i>	
1.3	<i>Any changes implemented as part of 1.2 will be subject to implementation through the companies change control process</i>	31/12/12
1.4	<i>Inspection and maintenance manuals are to be reviewed and changes made to ensure particular attention is paid to the required 80mm clearance</i>	28/02/13

2. National Express Midland Metro provided an update on 2 August 2013.

Work to review the maintenance manual has been completed and a safety validation of change certificate was issued on 24 June 2013 to reflect this. One location was identified where the 80mm clearance is not maintained (pole 18392) and the design of the assembly at that location does not allow the clearance to be achieved, therefore, the parafil rope at this location has been changed to stainless steel to ensure against failure as per Action 1.2.

Actions against Recommendation 1 are therefore completed.

ORR Decision

3. After reviewing information received from National Express Midland Metro, ORR has concluded that, in accordance with the Railways (Accident Investigation and Reporting) Regulations 2005, National Express Midland Metro has:

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

ORR will carry out inspection work to check that the actions to address the recommendation have been carried out. If in doing so we become aware of an inaccuracy we will write to RAIB again.

Status: *Implemented*

Recommendation 2

The purpose of this recommendation is to ensure that persons holding responsibility for directing work on the OLE on the Midland Metro and/or for passing it as being fit for service have access to up-to-date and relevant information regarding its correct installation and configuration.

National Express Midland Metro should ensure that staff within its organisation that hold responsibility for supervising work on the OLE and/or for passing it as being fit for service have access to the information needed for them to confirm its correct installation and configuration.

This information should be up-to-date and accurate and would typically include items such as manuals, drawings or other supporting documents. This information should be made available to any third-parties undertaking similar duties (paragraph 130a).

Details of steps taken or being taken to implement the recommendation

4. National Express Midland Metro in its initial response on 26 November 2012 advised that:

2.1 A full assessment of the maintenance documentation and installation will be carried out and any omissions shall be identified as so far as is reasonably practicable

2.2 Any shortfalls in maintenance documentation will be rectified as far as is reasonably practicable

2.3 A duplicate copy of the maintenance and installation documentation will be supplied to all existing and future OLE contractors prior to the commencement of future works

2.4 The supply of such documentation will be recorded within the NXMM Document Control process and receipt shall be similarly recorded

Action	Commentary on progress	Target Completion Date
2.1	<i>Inspection and maintenance manuals are to be reviewed to ensure they reflect the installed system and any omissions shall be identified.</i>	30/04/13
2.2	<i>Inspection and maintenance manuals are to be reviewed to ensure they reflect the installed system and any differences in the documentation to the installed system shall be rectified.</i>	30/04/13
2.3	<i>Upon completion of the document review, copies shall be supplied to all relevant contractors.</i>	31/05/13
2.4	<i>The supply and receipt of this documentation shall be recorded within the company's document control processes.</i>	31/05/13

5. National Express Midland Metro provided an update on 2 August 2013.

Discussions with the system manufacturer have led to the supply of further maintenance documentation relating to the system. This documentation together with the existing has been reviewed and all tasks are relevant to the current maintenance and there are no omissions.

Supplementary work to photograph every assembly on the system and incorporate general arrangement drawings, parts lists and height and stagger measurements has also been undertaken to provide a manual for re-build in the event of further dewirements. This will also provide a reference document for maintenance and renewals activities. This work is partially completed.

Once completed this document will be reviewed by the system manufacturer and incorporated into the company SMS. A duplicate copy will be issued to our principle maintenance contractor.

Actions against Recommendation 2 are currently on-going.

ORR Decision

6. After reviewing information received from National Express Midland Metro, ORR has concluded that, in accordance with the Railways (Accident Investigation and Reporting) Regulations 2005, National Express Midland Metro has:

- taken the recommendation into consideration; and
- has reported that it is taking action to implement it.

ORR will carry out inspection work to check that the actions to address the recommendation have been carried out. If in doing so we become aware of an inaccuracy we will write to RAIB again.

Status: NXMM has reported that it is taking action to Implemented the recommendation

Recommendation 3

The purpose of this recommendation is to ensure that the mechanism(s) by which operating loads are able to deform the twin track bracket arm assembly at 18512 pole are identified and addressed.

National Express Midland Metro should determine how the operating loads within the OLE are able to cause the type of deformation observed in the twin track bracket arm assembly at 18512 pole in July 2011.

It should identify and implement appropriate measures to remove the causes of this deformation (paragraphs 128c and 129c).

Details of steps taken or being taken to implement the recommendation

7. National Express Midland Metro in its initial response on 26 November 2012 advised that:

3.1 NXMM will correctly align cantilever poles on Midland Metro within the tension length including Pole 18512 as per the OEM standard. This work is designed to remove the deformation at Pole 18512 and will be done in conjunction with the system manufacturers. It will include temperature related offset of cantilever poles, an assessment of potential loads within the system and the elimination of pole deformation through re-tensioning to the design specification.

3.2 NXMM will contract to resolve any identified issues, prioritising Pole 18512 and any other identified critical locations.

3.3 NXMM will subsequently resolve any residual issues, either by use of direct labour, or through contract.

<i>Action</i>	<i>Commentary on progress</i>	<i>Target Completion Date</i>
<i>3.1</i>	<i>NXMM will implement a rectification plan to address the offset of cantilever arms under radial loads in relation to OLE masts within the tension length incorporating pole 18512.</i>	<i>Planning meeting held on 22/08/12 and work to commence in December 2012</i>
<i>3.2</i>	<i>Tension length to be re-tensioned in order for the</i>	<i>31/05/13</i>

	<i>cantilever arms to be set up correctly, and cantilever arms will be set perpendicular to the track dependant on temperature.</i>	
3.3	<i>Residual works will be carried out in conjunction with 3.2.</i>	31/06/13

8. ORR was not satisfied that National Express Midland Metro had adequately considered the recommendation so wrote to it, on 7 January 2013, requesting a brief outcome of its assessment of potential loads within the overhead line system.

9. On 23 January 2013 NXMM advised:

Works to prepare for the assessment of the tension length were carried out in December which involved the replacement of four contact cables. However, during these works a stainless steel banding strap securing a bracket foot assembly failed. As a result of this failure the contact cable replacement works have been suspended and a modification to the arrangement for securing cantilever arms to the masts in areas of high lateral load is currently being considered.

This work is being carried out in partnership with Brecknell Willis, the system manufacturers and a more robust assembly (which locks the bracket foot to the mast to stop rotation) is currently in design. This modified component will be validated through the companies change validation process.

Brecknell Willis has been commissioned to carry out an assessment compliant with our response to recommendation 3 and now subsequent to the installation of the modified brackets. This assessment is to include the following:

- *A review of the design along-track loads within the tension length incorporating Pole 18152.*
- *Calculation of the intended design radial loads within the tension length.*
- *Measurement of the actual along-track loading within the tension length.*
- *Measurement of the actual radial loading within the tension length.*
- *Detail how these loads and resultant tensioning mechanisms are able to deform the twin track bracket arm assembly at pole 18153.*
- *Provide recommendations to return the tension length to design specification loads if possible including the elimination of deformation of cantilever arms, particularly at pole 18153.*
- *Provide recommendations to further modify the OHLE assemblies within the tension length to cater for the actual loading and remove deformation if appropriate.*

A summary of the current situation and our intended course of was verbally communicated to the ORR at the Metro Safety Compliance meeting held at Midland Metro on 22 January 2013.

The stated completion date of 31 May for the completion of actions relating to this assessment and works arising (response 3.2) is not anticipated to change at this time.

10. National Express Midland Metro provided an update on 2 August 2013.

As detailed in our response of 23 January, works to prepare for the assessment of the tension length were carried out in December which involved the replacement of four contact cables. However, during these works a stainless steel banding strap securing a bracket foot assembly failed. As a result of this failure the contact cable replacement works were suspended and a modification to the arrangement for securing cantilever arms to the masts in areas of high lateral load has been implemented. This work was completed in early July 2013.

The system manufacturer, Brecknell Willis, was commissioned to carry out an assessment compliant with our response to recommendation 3, but further issues have led to a more fundamental approach being adopted, which is to redesign the tension length and to replace the overlap at pole 18512 with a mid-point anchor. This will remove the high radial loading incurred as a result of the alignment of the 'run-in' and 'run-out' cables. This modification will serve to minimise deformation of cantilever arms and will include the upgraded cantilever foot brackets recently installed.

Actions against Recommendation 3 are currently on-going.

ORR Decision

11. After reviewing information received from National Express Midland Metro, ORR has concluded that, in accordance with the Railways (Accident Investigation and Reporting) Regulations 2005, National Express Midland Metro has:

- taken the recommendation into consideration; and
- has reported that it is taking action to implement it.

ORR will carry out inspection work to check that the actions to address the recommendation have been carried out. If in doing so we become aware of an inaccuracy we will write to RAIB again.

Status: *NXMM has reported that it is taking action to Implemented the recommendation*

Recommendation 4

The purpose of this recommendation is to ensure that the ability of bracket foot assemblies to rotate freely is not restricted by contact between pole bracket clevises and clevis covers.

National Express Midland Metro should inspect the tensioned section of the OLE to ensure that there is clearance between the clevises of OLE pole

brackets and the clevis covers of bracket foot assemblies sufficient to allow these assemblies to rotate freely around pole bracket pins. Any inadequate clearances identified should be rectified (paragraph 129a).

Details of steps taken or being taken to implement the recommendation

12. National Express Midland Metro in its initial response on 26 November 2012 advised that:

4.1 NXMM will carry out a low level inspection of the tensioned section to identify any modified OHLE pole brackets.

4.2 Where modified OHLE pole brackets are identified, a high level inspection will be carried out on the assembly and these assemblies will be changed to the OEM specification to allow cantilever arms to rotate freely around pole bracket pins.

<i>Action</i>	<i>Commentary on progress</i>	<i>Target Completion Date</i>
<i>4.1</i>	<i>A low level inspection has been undertaken and locations requiring component change have been identified.</i>	<i>30/04/12</i>
<i>4.2</i>	<i>A high level inspection will be carried out and components will be changed to the manufacturers' original specification as required.</i>	<i>31/12/12</i>

13. National Express Midland Metro provided an update on 2 August 2013.

A low level inspection was undertaken and components requiring change were identified at poles B18642, 18606, 18585, 18550, 18512, 18472, 18432, 18392, 18347, 18302, 18258, 18167, 18127, 16895, 15138 and 15098. These were changed to the original 'banded' design, and subsequently changed to an upgraded bracket designed by the OEM (part number M49225/01/A).

A report (4-Rail Services Ltd, report number 4RS-RG-120969-R372876) was commissioned on the stainless steel banding straps. This found that the design was sufficient for normal useage on the system. This report identified that excess loading may result in strap failure, and this led to the decision to upgrade these straps to the modified brackets in the tension length incorporating pole 18512.

Actions against Recommendation 4 are completed.

ORR Decision

14. After reviewing information received from National Express Midland Metro, ORR has concluded that, in accordance with the Railways (Accident Investigation and Reporting) Regulations 2005, National Express Midland Metro has:

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

ORR will carry out inspection work to check that the actions to address the recommendation have been carried out. If in doing so we become aware of an inaccuracy we will write to RAIB again.

Status: *Implemented*

Recommendation 5

The purpose of this recommendation is to ensure that National Express Midland Metro identifies OLE components that may affect the safe operation of the tramway and controls any changes made to them.

National Express Midland Metro should identify those OLE components which may affect the safe operation of the tramway. It should review the current processes and practices intended to control changes to these components and implement any actions required to ensure that effective change control is exercised in the future (paragraphs 129a and 131a).

Details of steps taken or being taken to implement the recommendation

15. National Express Midland Metro in its initial response on 26 November 2012 advised that:

5.1 NXMM considers all OLE components as safety critical and changes to components, either materially or as a result of a change of supplier, will be subject to validation through the company's change control.

5.2 NXMM will carry out a retrospective assessment of any OLE components that have either had their specification altered, or have been sourced from an alternative supplier to the OEM and seek to validate the design and specification of these components through its change control process.

<i>Action</i>	<i>Commentary on progress</i>	<i>Target Completion Date</i>
<i>5.1</i>	<i>Component or design changes will be subject to validation within the company's change control processes. The system manufacturer will be involved in consideration and validation of these changes.</i>	<i>On-going</i>
<i>5.2</i>	<i>Any OLE equipment which is not purchased from the original manufacturer already held on stock will be quarantined until a retrospective change control is undertaken to identify and validate any change of manufacturer or supplier. Note: the only component identified to date is a pole clamp. These have been quarantined and a change control submission is currently in process.</i>	<i>30/06/13</i>

16. National Express Midland Metro provided an update on 2 August 2013.

The safety validation of change process has been adopted for all changes relating to the OHLE, and evidence of this can be supplied in respect of changes made in response to this report.

The only components identified that were not manufactured to the original design were a number of pole clamp brackets. These have been quarantined and are due to be forwarded to the system manufacturer for exchange.

Actions against Recommendation 5 are completed.

ORR Decision

17. After reviewing information received from National Express Midland Metro, ORR has concluded that, in accordance with the Railways (Accident Investigation and Reporting) Regulations 2005, National Express Midland Metro has:

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

ORR will carry out inspection work to check that the actions to address the recommendation have been carried out. If in doing so we become aware of an inaccuracy we will write to RAIB again.

Status: *Implemented*

Recommendation 6

The purpose of this recommendation is to ensure that any risks created by a driver becoming incapacitated during an incident are assessed and that appropriate mitigation measures are adopted by National Express Midland Metro.

National Express Midland Metro should assess what, if any, risks would be created by a driver becoming incapacitated during an incident. It should identify and implement appropriate measures to manage any identified risks, such as additional training for CSRs.

Details of steps taken or being taken to implement the recommendation

18. National Express Midland Metro in its initial response on 26 November 2012 advised that:

6.1 NXMM will carry out a risk assessment to assess what, if any, risks would be created by a driver becoming incapacitated during an incident

6.2 NXMM will identify measures for mitigation of these risks and implement sufficient controls which may include revisions to CSR training and/or changed or additional procedures or equipment

<i>Action</i>	<i>Commentary on progress</i>	<i>Target Completion Date</i>
6.1	<i>Risk Assessment to be carried out involving safety representatives.</i>	30/11/12
6.2	<i>Actions from the risk assessment to be implemented within the business. Summary of findings: • CSR's to be PriMOSS, Emergency Evacuation of</i>	(see 7.6) [30/11/13]

	<p><i>Trams and Radio Communications trained (training will be carried out on regular training days)</i></p> <ul style="list-style-type: none"> • <i>Instruction to be issued for CSR's to carry cab keys, radio and 'T' key at all times (this action will serve to mitigate the on-going risk until the CSR training programme is complete, see 7.6)</i> • <i>NXMM will review medical periodicities (by risk assessment) for Driver grade staff.</i> 	
--	---	--

19. National Express Midland Metro provided an update on 2 August 2013.

A risk assessment was carried out on 30/11/12. Actions arising from the risk assessment (as detailed above) have been implemented within the business and training is on-going within the periodic operational training arrangements. The company's operational procedure for managing incidents has been reviewed to reflect the changes to staff roles.

Medical periodicities have been reviewed and no changes were identified as being necessary.

Actions against Recommendation 6 are completed in respect of 6.1 and are partially completed in respect of 6.2.

ORR Decision

20. After reviewing information received from National Express Midland Metro, ORR has concluded that, in accordance with the Railways (Accident Investigation and Reporting) Regulations 2005, National Express Midland Metro has:

- taken the recommendation into consideration; and
- has reported that it is taking action to implement it.

ORR will carry out inspection work to check that the actions to address the recommendation have been carried out. If in doing so we become aware of an inaccuracy we will write to RAIB again.

Status: NXMM has reported that it is taking action to Implemented the recommendation

Recommendation 7

The purpose of this recommendation is to ensure that the mandatory competencies of drivers and CSRs are assessed and that those found critical to the safe operation of the Midland Metro are subject to a competence management system that ensures they are achieved and maintained.

National Express Midland Metro should review the current mandatory competences held by drivers and CSRs in order to identify those which are essential to the safe operation of the Midland Metro. It should identify and implement appropriate measures to ensure that all such competences are maintained.

Details of steps taken or being taken to implement the recommendation

21. National Express Midland Metro in its initial response on 26 November 2012 advised that:

7.1 NXMM will review the current mandatory competencies held by drivers and CSRs in order to identify those which are essential to the safe operation of the Midland Metro.

7.2 NXMM will ensure that sufficient training resource is provided to ensure all operational staff competencies are maintained through periodic training.

7.3 NXMM will ensure attendance at periodic training sessions is mandatory.

7.4 NXMM will ensure that operational staff with expired competencies that are essential to the safe operation of the Midland Metro are withdrawn from operations duties until the expired competency is achieved.

7.5 NXMM will review the operational competency matrix to include 'Principle Member of Staff on Scene' training in the CSR grade core competency and Emergency Evacuation of Trams and Radio Communications in the Driver and CSR grade core competencies.

7.6 NXMM will train all CSR's in PriMOSS, Radio Communications and Emergency Evacuation of Trams on regular training days and refresher train every three years

<i>Action</i>	<i>Commentary on progress</i>	<i>Target Completion Date</i>
<i>7.1</i>	<i>Competency matrix to be reviewed to identify which competencies are safety critical.</i>	<i>30/11/12</i>
<i>7.2</i>	<i>Training resource requirement to be reviewed and sufficient resource made available to ensure periodic training. Update: An additional training officer will be recruited in January 2013.</i>	<i>30/01/13</i>
<i>7.3</i>	<i>Management instruction in place to ensure that regular training days are mandatory, and that missed training days are reported for further action.</i>	<i>30/11/12</i>
<i>7.4</i>	<i>Staff with expired competencies to be withdrawn from operational service until competency is achieved.</i>	<i>30/11/12</i>
<i>7.5</i>	<i>Summary of Review: The Operational staff competencies will be revised and PriMOSS, Radio Communications and Emergency Evacuation of Trams will be defined as a Safety Critical competency for CSR and Driver staff.</i>	<i>30/11/12</i>
<i>7.6</i>	<i>CSR and Driver grade staff will be trained in PriMOSS, Radio Communications and Emergency Evacuation of Trams on rostered training days in 2013 and these will be refreshed every three years. Note CSR's are already trained on radio communications.</i>	<i>30/11/13</i>

22. National Express Midland Metro provided an update on 2 August 2013.

Actions 7.1 to 7.5 are completed. Action 7.6 is in progress as detailed in the status update for recommendation 6.

ORR Decision

23. After reviewing information received from National Express Midland Metro, ORR has concluded that, in accordance with the Railways (Accident Investigation and Reporting) Regulations 2005, National Express Midland Metro has:

- taken the recommendation into consideration; and
- has reported that it is taking action to implement it.

ORR will carry out inspection work to check that the actions to address the recommendation have been carried out. If in doing so we become aware of an inaccuracy we will write to RAIB again.

Status: NXMM has reported that it is taking action to Implemented the recommendation