Oliver Stewart
RAIB Recommendation Handling Manager

11 February 2025

Mr Andy Lewis
Deputy Chief Inspector of Rail Accidents

Dear Andy,

RAIB Report: Collision between a tram and a child cyclist near to Audenshaw tram stop on 1 September 2021

I write to provide an update[1] on the action taken in respect of recommendation 5 addressed to ORR in the above report, published on 25 August 2022.

The annex to this letter provides details of actions taken in response to the recommendation and the status decided by ORR. The status of recommendation 5 is **'Closed'.**

We do not propose to take any further action in respect of the recommendation, unless we become aware that any of the information provided has become inaccurate, in which case I will write to you again.

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

Recommendation 5

The intent of this recommendation is to ensure that, as far as is reasonably practicable, systems on Metrolink trams are serviceable.

TfGM (as asset owner) and KAM (as equipment maintainer) should review the reliability, operation and maintenance of sanding equipment and CCTV on M5000 trams to ensure that they are fit for purpose.

This review should identify appropriate improvements in the maintenance regime or the equipment design which will improve their reliability. These improvements should be applied both to the current fleet of M5000 trams and for any vehicles procured for the Metrolink network in the future.

ORR decision

1. The cause of the reliability issues with the FFCCTV equipment on the Metrolink M5000 tram fleet was thought to be the system hard drives, which TfGM agreed to fund the replacement of. However, the hard drive replacement did not fix the problem so the full CCTV system is being replaced, which will take approximately 5 years. As an interim measure, trams will be fitted with dashcams, with fleet fitment expected to be completed by the end of April 2025. These provide recording functionality and will provide KAM with a similar level of moving image detail as the current CCTC system and enables KAM to use this footage for investigative purposes as and when necessary.

2. As previously reported, KAM now uses sand with a lower clay content than what was in use at the time of the Audenshaw incident, with the aim of improving the reliability of a tram's sanders.

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

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

Status: Closed.

Previously reported to RAIB

4. On 22 December 2023 ORR reported the following:

Initially the root cause of the reliability issues of the FFCCTV equipment on the Metrolink M5000 tram fleet was thought to be the hard drives. TfGM had agreed to fund new hard drives for the M5000 tram fleet, together with a software upgrade which should have increased the overall reliability of the FFCCTV system. However, the manufacturer of the equipment has not yet been able to identify the root cause of the reliability issue.

TfGM are continuing to work with the equipment manufacturer to develop a solution, but are also considering fitting a new system if a fix to improve reliability is not possible. In parallel, KAM have been investigating a modification to the CCTV using a 3rd party solution. Initial testing has been positive, but is at an early stage of development.

To reduce the risk of the sanders on the M5000 tram fleet from becoming blocked, KAM ran a trial using a different grade of sand with a lower clay content. The trial was successful, and the new sand is being introduced across the tram fleet.

Update

5. On 4 November 2024 TfGM provided the following update:

TfGM have an interim measure to deploy dashcams in all trams to capture video evidence for accident investigations. We have been trialling a preferred dashcam model over recent weeks, monitoring its reliability, and concurrently developing a bespoke bracket for optimal fitment. We are now moving forward with hardware procurement to enable a full fleet rollout. While our timeline does depend on supply chain and external installation resources, we aim to complete the rollout by the end of March 2025.

In addition, we have initiated planning for a full renewal of the onboard CCTV system. We envisage the following timeline for the full renewal, however we have not yet carried out any market engagement of prospective suppliers.

- *Ongoing until Sep 2025 – Development Work.*
- *Oct 2025 – Feb 2026 - Tender and evaluation.*
- *May 2026 – Contract Awarded.*
- *June 2026 – Jun 2030 – Design and Delivery.*

We remain committed to achieving the required improvements and will keep you updated on any further developments.

6. On 10 February 2025 TfGM reported that rollout of dashcam equipment would be completed in April rather than March 2025.

Previously reported to RAIB

Recommendation 5

The intent of this recommendation is to ensure that, as far as is reasonably practicable, systems on Metrolink trams are serviceable.

TfGM (as asset owner) and KAM (as equipment maintainer) should review the reliability, operation and maintenance of sanding equipment and CCTV on M5000 trams to ensure that they are fit for purpose.

This review should identify appropriate improvements in the maintenance regime or the equipment design which will improve their reliability. These improvements should be applied both to the current fleet of M5000 trams and for any vehicles procured for the Metrolink network in the future.

ORR decision

1. Initially the root cause of the reliability issues of the FFCCTV equipment on the Metrolink M5000 tram fleet was thought to be the hard drives. TfGM had agreed to fund new hard drives for the M5000 tram fleet, together with a software upgrade which should have increased the overall reliability of the FFCCTV system. However, the manufacturer of the equipment has not yet been able to identify the root cause of the reliability issue.

2. TfGM are continuing to work with the equipment manufacturer to develop a solution, but are also considering fitting a new system if a fix to improve reliability is not possible. In parallel, KAM have been investigating a modification to the CCTV using a 3rd party solution. Initial testing has been positive, but is at an early stage of development.

3. To reduce the risk of the sanders on the M5000 tram fleet from becoming blocked, KAM ran a trial using a different grade of sand with a lower clay content. The trial was successful, and the new sand is being introduced across the tram fleet.

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

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

Status: Open

Information in support of ORR decision

5. On 25 November 2022 Transport for Greater Manchester provided the following initial response:

TfGM have previously written to the maintainer (KAM) of the M5000 asking them to conduct a review into the reliability and availability of the forward-facing CCTV

system to help us to understand if the system remains fit-for-purpose. As part of this review, we have committed to work with KAM to establish if any control measures may be required to mitigate against any repeat failures.

So far, KAM have advised that there are multiple areas including software and hard drives that may require renewal. KAM are currently trialling a potential solution and we await the outcome of this trial. If any technical improvements are necessary, TfGM will work with KAM to implement these.

In relation to the M5000 sanding system, TfGM do not believe that there are modifications required to the equipment. However, TfGM are working with KAM to understand if the monitoring arrangements and planned maintenance activities are suitable to satisfy ourselves that there is a timely identification of any failures and to also ensure any required interventions are undertaken before vehicles are put into service. As part of this work, KAM have advised that they are conducting a trial into an alternative sand that they hope will prevent blockage in the sanders due to clay build up. This is expected to be completed by the end of April 2023.

6. On 15 August 2023 Transport for Greater Manchester provided the following update:

TfGM asked the maintainer (KAM) of the M5000 fleet to examine the use of the sanding equipment of the vehicles. Through a subsequent review KAM identified that by using a different grade of sand that the M5000's was less susceptible to sand blockages. A trial was conducted over a 6-week period which confirmed during the trial period the trams used ejected consistently more sand without hose blocks. An engineering change has been made and KAM are currently implementing the change in sand across the fleet.

We have also followed a similar review process for the reliability of the forward-facing CCTV. TfGM have accepted a renewal proposal from KAM to replace the hard drives in the trams to improve reliability and to then upgrade the software to the latest version. However, we have raised a defect with the manufacturer regarding our concern over the reliability of the most recently supplied trams and whilst this has been accepted, it is still currently subject to ongoing diagnostic checks by their engineers. A fix will be applied to the whole fleet once the defect has been resolved on the new trams. TfGM are committed to resolving this issue and we continue to seek a timely resolution to the issue. TfGM will in due course set out a timeline for how this will be resolved.

7. On 21 November 2022 Keolis Amey Metrolink provided the following initial response:

Tram Front Facing Close Circuit Television (CCTV) System

KAM has identified the main cause of the M5000 CCTV unreliability in tram batches 1-6 (vehicle numbers 1-120) as being the disc array hard drives. In collaboration with our client and network owner, Transport for Greater Manchester (TfGM), we have agreed that a renewal of these components is now required.

For batch 7 trams (vehicle numbers 121-147), a software fault has been identified that is causing CCTV reliability issues. A solution has been identified and is

currently being trialled. Following successful rectification of the software fault the disc array hard drives will be renewed across the fleet. ***We expect this to be completed by the end of September 2023.***

In recognition of the importance of CCTV footage in supporting incident investigations, as an interim measure KAM has requested additional assistance from TfGM to access highways CCTV recordings (where available) via the TfGM Control Centre and the wider Greater Manchester Combined Authority (GMCA) community (i.e. local authority CCTV teams).

Sanding system

The root cause of the tram sanders becoming blocked has been identified as the clay content of the currently used grade of sand used being susceptible to clumping. This type of sand has been used by Metrolink since the T68 fleet was in operation and is used on other light rail fleets within the UK.

KAM has found an alternative grade of sand with a lower clay content. We are now in the process of commencing a trial of this on the network which is expected to be completed by the end of April 2023. The trial period will provide will be used to establish how the new sand is performing especially during winter period. If there are no significant issues detected during the trial, we will roll out the new sand across the fleet pending application of our change control processes.

8. On 15 August 2023 Keolis Amey Metrolink provided the following update:

Tram Front Facing Close Circuit Television (CCTV) System

After thorough investigation of CCTV reliability issues, it has been determined that a full renewal of the systems hard disks is required. Transport for Greater Manchester (TfGM) has accepted this renewal proposal and has included it within their renewals and enhancements programme. KAM continues to work closely with TfGM on this resolve this matter.

Sanding system

KAM has successfully trialled an alternative grade of sand with a lower clay content to that which has been found to have caused reliability issues due to being prone to blocking within the system.

We are now in the process of completing the necessary engineering change control process before we commence with the rollout of the alternative sand across the fleet of 147 vehicles. The new sand will be installed during planned rolling stock examinations and will take approximately six months to complete.

9. On 22 September 2023, TfGM provided the following update:

TfGM are taking this matter extremely seriously and are pushing hard for a resolution to the forward-facing CCTV reliability issue. Unfortunately, resolving the problem has not been straightforward and having previously escalated our frustration and concern with the Original Equipment Manufacturer (OEM) we are now holding weekly escalation calls with the OEM to seek a satisfactory outcome.

To provide some assurance to you, on these calls we have been documenting the minutes of our meetings with the OEM, and we are able to supply this to you on

request, to evidence the complexity of the issue and our commitment to progressing matters.

At this current time, the OEM has not been able to pinpoint the root cause of the issue, despite them sending resources over from Germany in August for a week. Following this visit, the OEM have reported that they have been able to understand more about the problem and have been able to implement some initial changes to assist with identifying the cause, but it is still too early to establish when the issues will be found.

In tandem, KAM have been investigating a modification to the CCTV using a 3rd party solution. This has very initial testing within the depot and the results look positive but is at an early stage of development.

Therefore, at this time TfGM are not able to provide a timebound plan, although we acknowledge that we are now approaching a point where we may need to agree when we stop investigations and to explore looking at an entirely new CCTV system. This would be a significant decision to undertake, particularly as TfGM is a public body and the cost of this level of investment would be considerable, therefore we feel that progressing the investigative route is not only the most cost-effective route but may be the quickest method of resolving the issue, as any procurement process to purchase a new CCTV system will add time into the process. Nevertheless, we are starting to explore funding options in preparation.

We welcome the opportunity to discuss this with you further through our regular liaison meetings, but at this stage we feel that we will only be able to issue a timebound plan when either of the two options comes to fruition:

Option 1 - the OEM identifies the cause and proposes a fix, then a plan can be made to introduce this fix to the entire fleet.

Option 2 - TfGM determine that the OEM cannot resolve the defect and a plan is developed to renew the entire CCTV system. We would wish to discuss with you a proportionate cut off point for this situation, but we hope that the end of December 2023 would be a reasonable point.