Infrastructure Projects Shared Learning

Issue 17/01: January – June 2017

Introduction

This Shared Learning document details key issues and incidents that have occurred on Signalling Projects between January and June 2017; and provides the key learning points associated with them.

It is intended for distribution within the Network Rail Signalling Community and the Supply Chain; in order to raise awareness of the learning points within, and enable best practice to be applied through all of our Signalling activities.

Equipment left unsecured

Two trains struck redundant Western Region style location case lift off doors that had been left unsecured and were drawn towards the track by aerodynamic effects of passing trains.

The 221 padlocks, which were an integral part of the door design, such that handles need to be padlocked to stop them falling to the open position, had been removed as part of the project's recovery work.

One train suffered a damaged TPWS aerial, which was not identified until the next TPWS power up test of that cab. The affected train was protected by GW ATP during the time that it was running without operational TPWS.

RAIB Safety Digest 08/2017 refers.

Comply with the rules for securing doors of location cabinets when work has been completed, and check them before confirming that lines are safe and clear for the passage of trains.

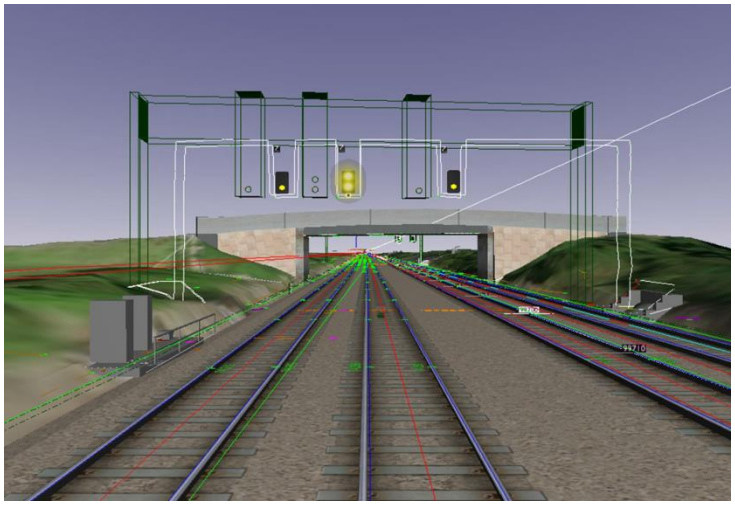
Introduce control measures during the planning of works to reduce the risks associated with unsecured location cabinet doors during or after decommissioning of the cabinets.

Use of CAD & VR models

The use of 3D Computer Aided Design (CAD) and Virtual Reality (VR) models can offer huge benefits to Projects in reducing staff hours on site and for integrating interdisciplinary design.

However, always ensure that the details are input accurately and the model is kept up to date by all parties.

In the example below, the position of the signal gantry was incorrect in the model, so when the OLE stanchions were constructed on site, they obscured the signal aspects.



Green is original CAD model. White is actual position.

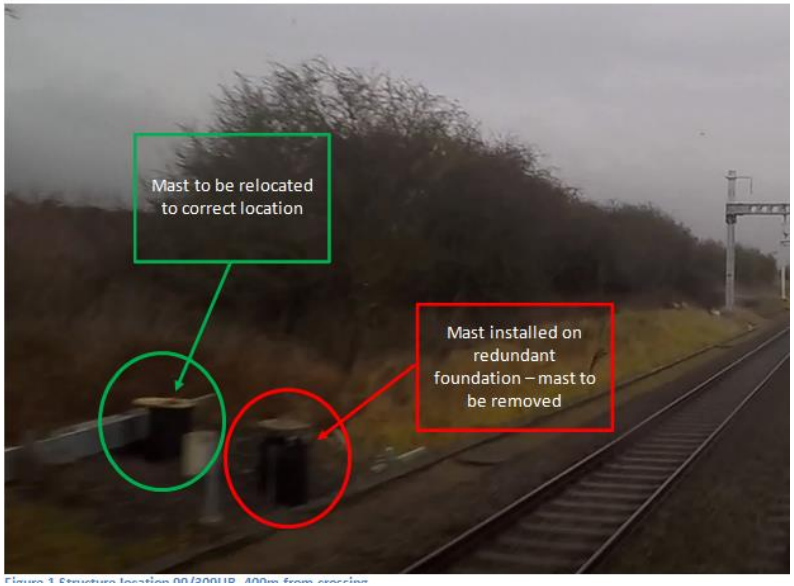
LX Obscured by Incorrectly located OLE

OLE foundation installation was carried out ‘At risk’ prior to the IDC/IDR taking place.

Impact on LX sightlines was identified during IDC/IDR of the OLE steelwork

A revised OLE foundation position was agreed and a new foundation installed.

However, the OLE mast was then installed on original (incorrect) foundation.



Always ensure that that any installation not intended for use is clearly marked, capped, or shielded (as appropriate) until such time that it can be recovered.

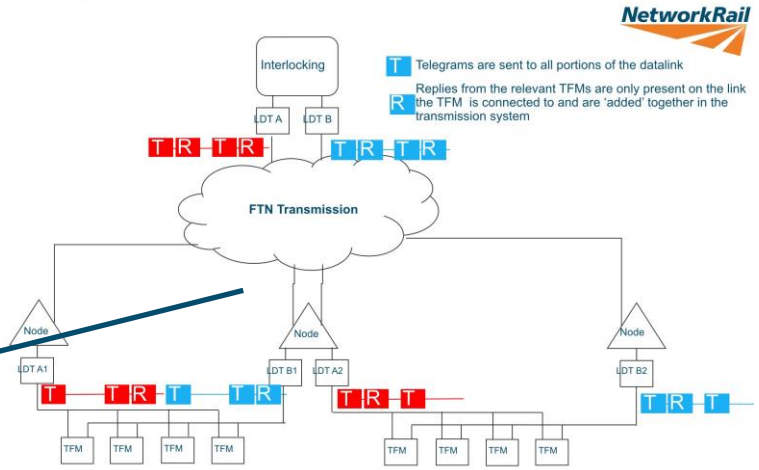
SSI Datalink Diversity in FTN

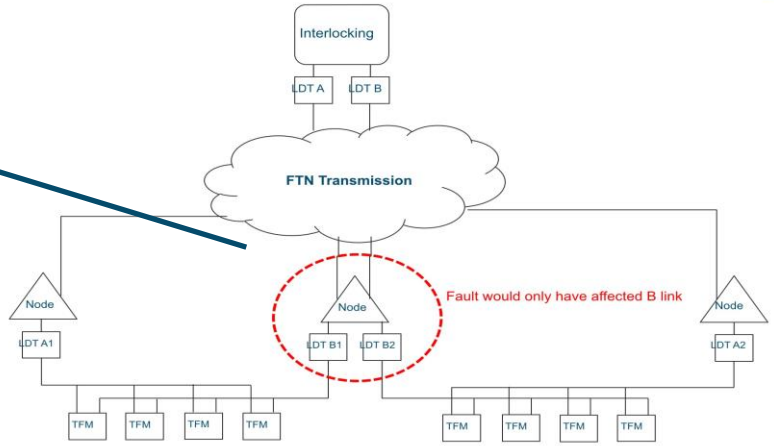
A & B links through one node (diversity in that they are also through two other nodes).

Noise applied on the transmission by this node affects BOTH links.

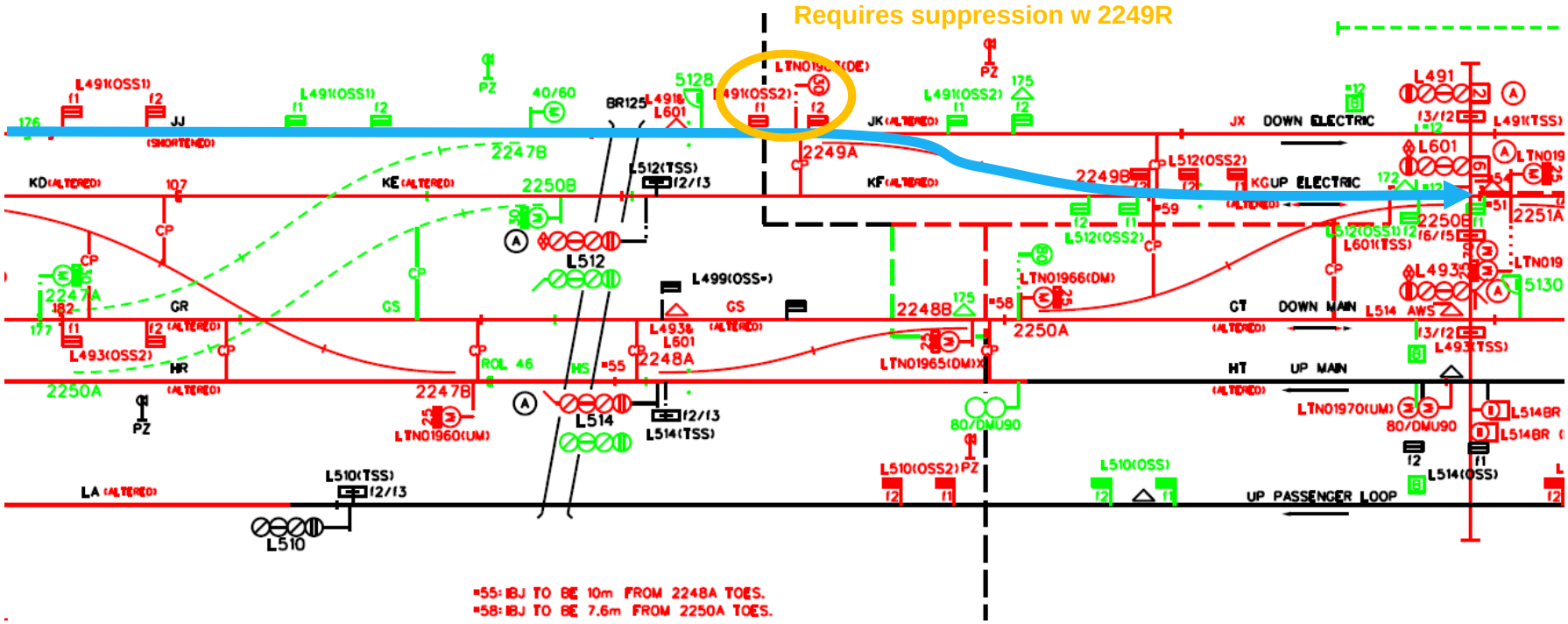
Could be averted by having either two nodes OR both A legs or both B legs through the single node.

Issue can be avoided by defining this as a requirement in the project requirements documentation and ensuring an understanding of the full system architecture.





TPWS Complex Approach



SIGNALS AND BUFFER STOPS FITTED WITH TPWS											
SIGNAL No.	LINE NAME	DIRECTION	ATTAINABLE SPEED (MPH)	DISTANCE FROM SIGNAL TO TSS LOOP (m) (-VE ON APPROACH)	DISTANCE FROM SIGNAL TO OSS TRIGGER LOOP (m)	DISTANCE FROM OSS TRIGGER TO ARMING LOOP (m)	PASSENGER SET SPEED (MPH)	FIRST CONFLICT POINT	SOD (m)	MOD AT 12%g (m)	MOD AT 9%g (m)
L491	DOWN ELECTRIC	NORMAL	*38 55 60	0 0.1	300 324.1	19 19.4	43.5 45	2256A 2261A	206 144	113 129	143 164
			43.5 40		150 179.5	13.5 14.4	31 33.5				

Freight Set Speed = 25mph

Freight trains through 2249 points reverse were getting TPWS activation due to suppression on the OSS not being provided.

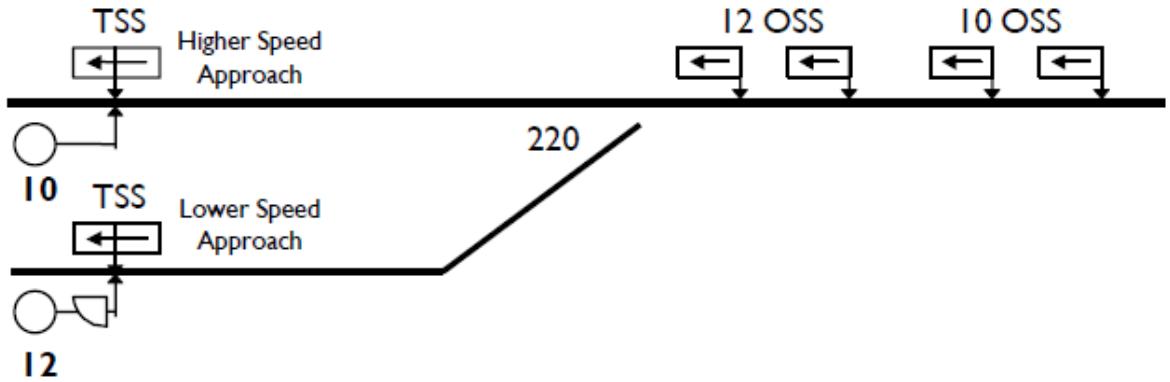
TPWS Complex Approach NR/L2/SIG/10133

Applicable guidance is detailed in NR/L2/SIG/10133:

Generally, a diverging approach will require OSS suppression for any OSS that could be passed over by a train while not approaching the signal controlling the OSS in question.

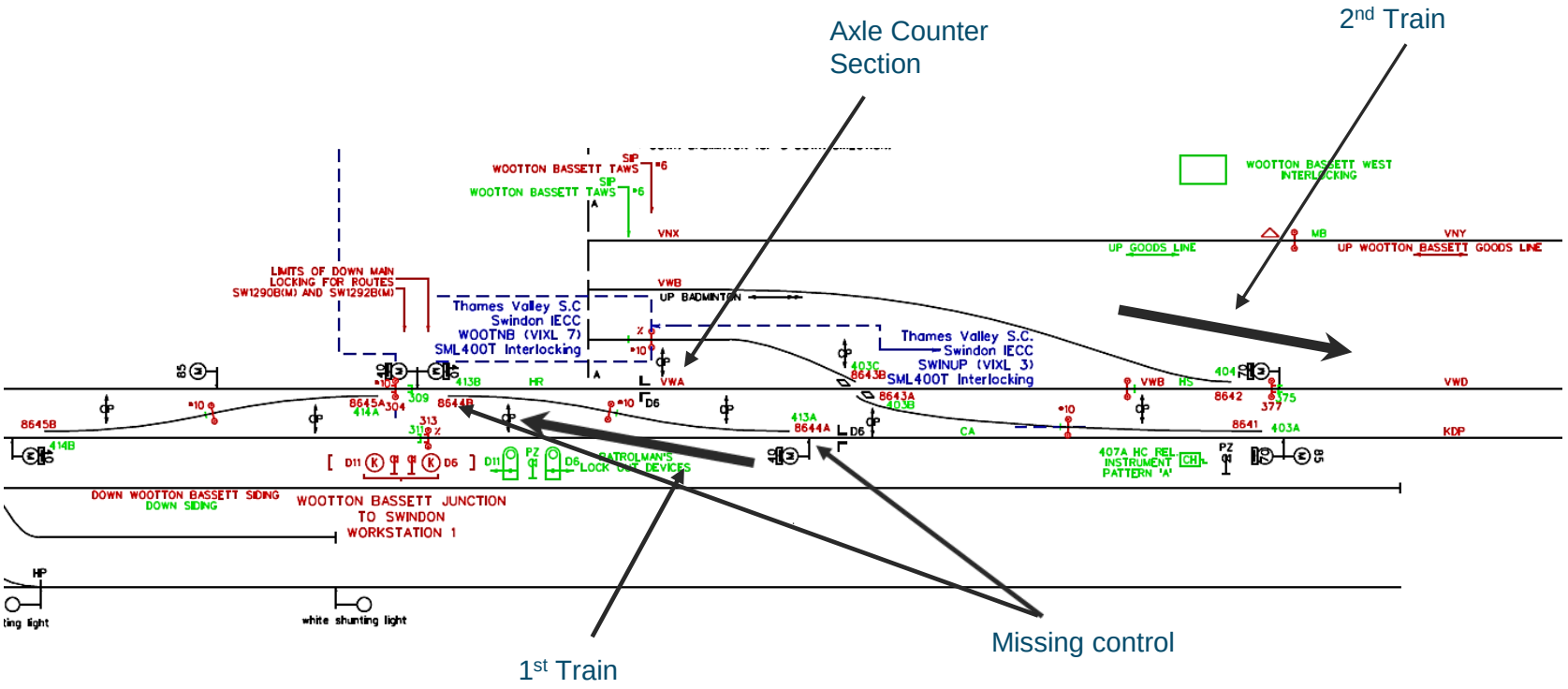
For a diverging junction where the attainable speed of the divergence is less than the set speed of the OSS it may not be necessary to suppress the transmission of the OSS.

10.7 Example 1 - Diverging Approach – Separate OSS



However, a train approach 10 signal at proceed when 2 signal is at danger is going to get tripped by 12 OSS unless the attainable speed at 12 OSS is lower than its set speed. This would create a requirement for lengthy braking curve calculations, hence it is simpler to design such that all diverging approaches require OSS suppression irrespective of the differential speeds and positions of signals on the diverging routes.

Control Tables: Missing Aspect Control

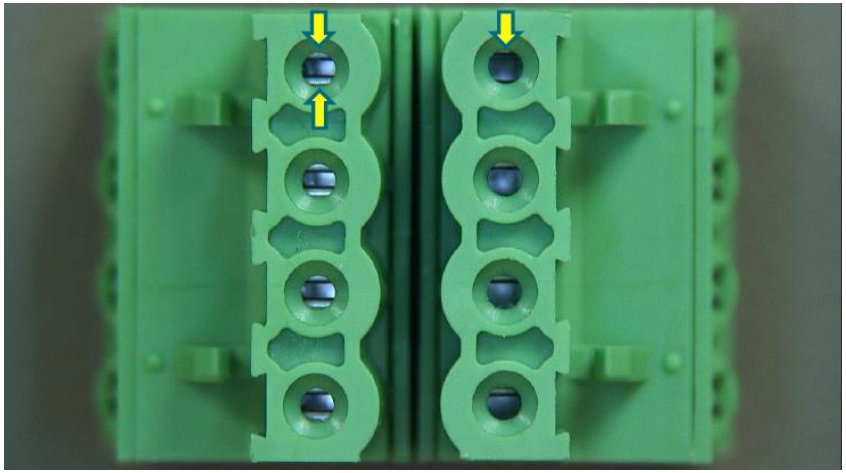


A signal changed from green to red in front of a driver whilst a valid parallel move was taking place, due to a missing aspect control. The existing control table had this control to allow such parallel moves to take place. This was not replicated in the new control tables.

When re-writing control tables, always ensure that a review of the existing controls is undertaken to ensure any unusual or novel controls are identified and assessed for inclusion within the new interlocking.

Damaged Plug Coupler

New: Both Contact Springs are Visible. **Faulty**: Only one contact spring is visible



During testing of a cable via a plug coupler, the plug coupler has become damaged causing either intermittent or no connection.

When bell testing, never do anything to expand the connectors i.e. inserting a probe. Always;

- Bell test to the screw terminal, or in its absence to the test points.
- Where the above is not feasible, a mating connector must be fitted and tested accordingly.

Other Incidents

Incorrect Signal Plates;

a) Plate incorrectly identified on SSF; discrepancy on site identified; &

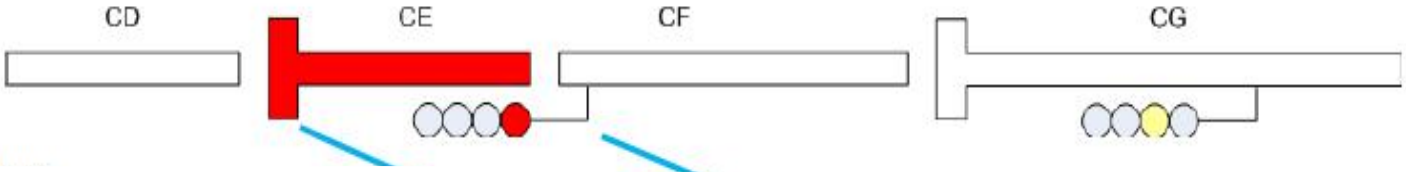
b) incorrect signal plate provided *(Non passable auto signal plated as an automatic).* The plate was correctly identified on the signal sighting form, however, it was assumed that the form was incorrect, and the project was commissioned with no test log raised against the difference identified.

Always ensure that where any discrepancy between approved design documentation and construction are identified, appropriate action is taken to confirm the correct requirement.

Two different interlocking types operated a VDU control toggle in a different way causing a Signaller to repeatedly apply a control, rather than remove it as intended.

The system operated as designed, however this difference in operation was not understood by the end user. Always ensure an operational review is undertaken when the system architecture is known, so that differences in system interfaces are understood and accepted, otherwise ensure changes are made to align how they operate.

Scheme Plan Clarity

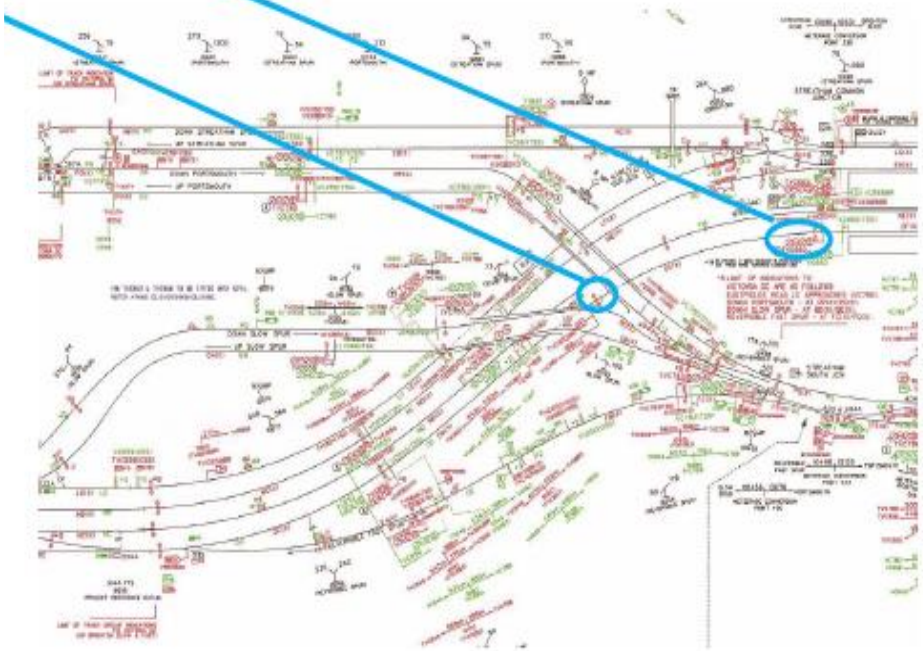


A separate overlap track on an auto-signal , missing from a commissioned interlocking, manifested itself as a result of being omitted from the control tables. The error in the control tables was not spotted during the checking, data design or testing processes, with the issue being identified by the signaller.

Although this was a very simple arrangement and control, the presentation of the information on the scheme plan appears to have contributed to the overlap control being missed.

An industry-wide exercise is being led by the Network Rail Signalling Innovations Group to look at de-cluttering scheme plans and tailoring them to the end user.

Designers are required to think about the end user of their designs to ensure the information they are presenting is as clear as possible. Where appropriate recoveries should be put on a different level in the design, so “red only” copies can be produced for interlocking designers.



Unintended Consequences

SPT positioning

Can you see the banner repeater?

Reading the route indicator may be a problem

Not ideal positioning

Temporary fence obstructing signal

The impact of both construction work and the final equipment arrangement should be assessed as part of the design stages and considered in the IDC (Inter-Disciplinary Check) process to ensure it meets the needs of the end user, doesn't impact operational performance, or introduce unacceptable safety risk.

Further Information

For any further details or information please contact:

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