

Implementing Virtual Worksite Marker Boards: A guide to enhanced possession management



www.tended.co.uk
info@tended.co.uk
+44 330 133 1195

Introduction

This guide provides a practical introduction to implementing Virtual Worksite Marker Boards (VWSMBs) as a modern solution to managing possessions during railway projects. It is designed for project managers, planners and safety leaders looking for safer, smarter, and more efficient alternatives to physical marker boards.

Historically, physical worksite marker boards (WSMBs) have been used to indicate worksite limits within a possession for On-Track Plant (OTP), On-Track Machines (OTM) and Engineering Trains. While effective, they are prone to human error and external environmental factors, whilst also posing a safety risk to those placing them.

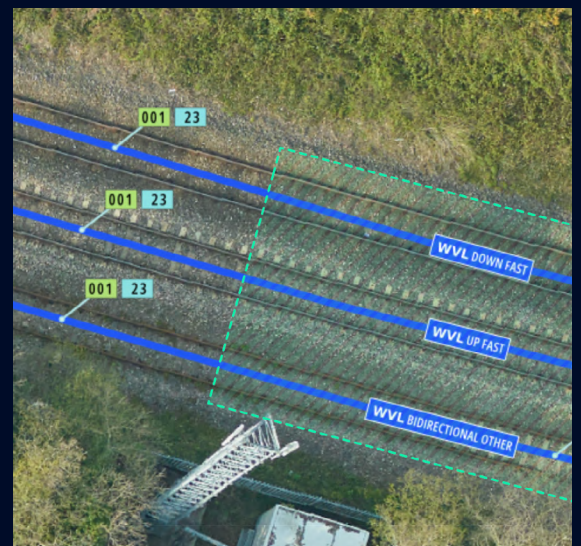
VWSMBs, enabled through geofencing technology, can help mitigate many of these issues by using highly accurate GPS data to provide a virtual demarcation of worksites.

Network Rail's continued focus on digital innovation and risk reduction creates a strong foundation for adopting VWSMBs. As the industry evolves, leveraging technology to enhance safety and efficiency has become a priority.



Key benefits of VWSMBs

- Removes the need to place WSMBs, which eliminates the risk of incorrect placement and/or non-removal.
- Increased locational and situational awareness for staff involved in the worksite.
- Reduces time to set up and take down a worksite, providing a longer work window within a possession and reducing the risk of overruns.
- Enables staff to perform other duties by reducing their time required to set up worksites.



Understanding the challenges with traditional boards

Currently, WSMBs are placed at worksite limits to signify the safe work area. It is important to note that WSMBs are only required for OTP, OTM and Engineering Trains, as personnel-only possessions already do not require WSMBs. While WSMBs have long been standard practice, they come with several challenges.



Human error

- WSMBs rely on manual placement, which introduces the risk of making a mistake or misjudgement.
- Incorrect positioning can create confusion about the actual limits of a possession or worksite.
- Misplaced boards may lead to unsafe movements onto live lines, or incidents with operational services
- Failure to remove boards after work can cause network disruption and unnecessary delays. Services would need to be halted for the removal of boards left out.



Environmental factors

- Poor weather conditions (fog, rain, snow) can reduce the visibility of boards.
- Low sun, other lights, and conditions inside the cab make physical boards easy to miss.
- At night, boards may become hard to see due to flat batteries or inadequate lighting.
- Limited visibility increases the likelihood of misinterpretation by drivers and workers.



Risks to workers

- Workers placing or removing boards must often walk close to live tracks.
- Tasks are typically performed in low light or challenging weather, increasing the risk of human error due to compromised visibility.
- Human factors like fatigue or momentary lapses in situational awareness can lead to serious incidents while placing boards.
- Even with safety protocols, the manual handling of boards near open lines remains a significant hazard.
- This risk is further amplified in DC-electrified areas, where even a single misstep could result in electrocution. The added requirement of carrying large, cumbersome boards only increases the potential for danger.

What is geofencing?

Geofencing is the application of geospatial data to create virtual boundaries around a specific geographical area. In rail, geofencing can be used to create safe working zones within a possession.

An online Dashboard is used to map out these geofences, applying Network Rail ELR and mile and chain data. Highly precise positioning devices are then assigned to these geofences and attached to people and plant onsite, alerting the moment they exit the virtual boundaries with centimetre-accuracy.



What are VWSMBs?

VWSMBs use geofencing to define worksite limits digitally, removing the need for physical boards by providing a virtual counterpart. Alerts from a geofencing device inside the cab notify drivers of the virtual boundaries, which are set 100 m away from where the worksite ends.

Tended has developed the solution alongside Network Rail's Technical Authority in an ongoing project to provide the digital demarcation of worksite limits for OTP, OTM and Engineering Trains. Tended has received a national deviation for OTP-only possessions across Scotland, England and Wales by the Rail Safety and Standards Board and the Traffic Operations Management Standards Committee.



Implementation

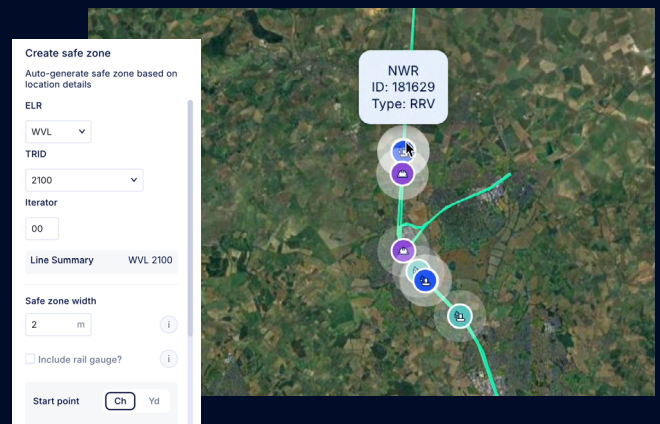
1. Identify possession types suitable for VWSMBs:

- Planned OTP-only possessions.
- Worksites where limits are not planned to be in areas likely to extremely degrade GPS performance, i.e. inside or at tunnel entrances.

2. Plan your worksite

Input ELRs and mileage data into Tended's Dashboard to define the virtual boundaries of your worksite. The limits of the geofence should be 100 m short of where the worksite marker boards would have been placed, in line with the current rule of not working within 100 m of worksite limits.

This also ensures that device alerts reduce the risk of worksite exceedance, rather than providing the warning once the vehicle has already left the worksite limits.



3. Install devices

Install the geofencing device inside the cab. Then assign these devices to the worksite planned out on Tended's Dashboard. Devices can also be provided for the Machine Controller (MC) to wear.



4. Commence work on your project

The in-cab geofencing devices will notify the driver/operator or MC when they are approaching the worksite limits via audible and visual alerts.

On the Dashboard, the ES can also monitor the movement of onsite plant and be notified if they are approaching worksite limits so that they can take appropriate action.

Watch the video to see how this works in action:



Safer and more efficient possession management

VWSMBs provide a significant step forward in the safe and efficient management of possessions on the railway. By replacing physical boards with digital, geofenced alternatives, they address long standing safety challenges, reduce operational inefficiencies, and support Network Rail's drive for innovation.



Eliminates physical marker board placement

Workers no longer need to walk near or on open lines to position or recover marker boards, removing a major source of risk for them and operational service.



Reduced exposure to hazardous conditions

Teams are not required to handle physical boards in poor weather, low light, or other difficult site environments.



Minimised human error

Digital boundaries reduce the risk of mistakes associated with misplacement, non-removal, or poor visibility of boards, all of which could potentially lead to an incident.



Greater accuracy and reliability

Centimetre-level GPS precision ensures highly accurate demarcation of worksites, and unlike physical boards, virtual boundaries are unaffected by environmental conditions.



Faster possession set-up and hand-back

With no physical boards to deploy, worksites can be established and relinquished more quickly, reducing the risk of overruns.



Significant efficiency gains

Eliminating the need to place and recover boards provides more productive time within possessions.



Freed-up staff capacity

Workers previously assigned to board placement can be redeployed to focus on other essential safety or operational duties.



Real-time monitoring

The Dashboard allows Engineering Supervisors (ES) to track the location of plant and machinery, ensuring that movements remain within defined limits.

Case study

Siemens Mobility was the first to take a worksite using Tended's new VWSMB solution, delivering measurable benefits for Siemens, Network Rail and passengers.

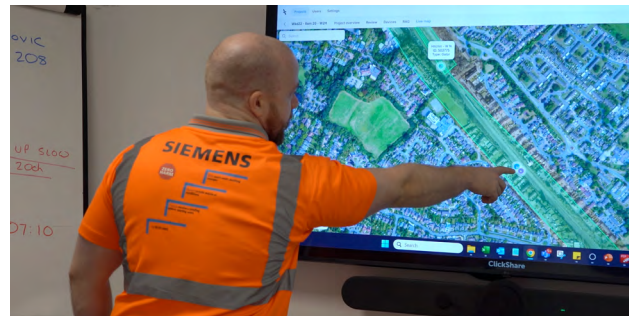
A large 30+ mile worksite, taken to conclude some key testing for the ECDP programme, was selected as the first location to use VWSMBs as Siemens required various OTP as part of the works.

Siemens engaged with the Network Rail Operations Delivery team for the route and all third parties signing in to the worksite to ensure a comprehensive understanding of how VWSMBs would be implemented.

Location: East Coast Mainline South

Date: August 2025

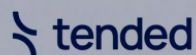
Client: Siemens Mobility at ECDP



Key outcomes

- Estimated £130k+ cost savings
- Reduction in overrun time to 18 mins from a possible 68 mins
- Time savings of approx. 50 mins from not needing to place and recover boards

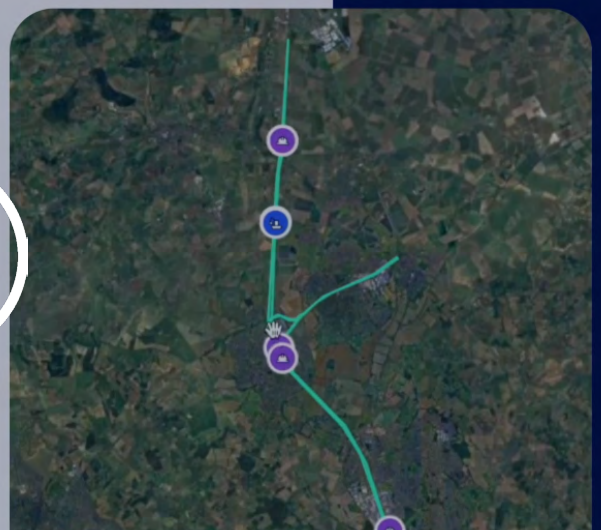
Learn more in our case study video with Siemens Mobility:



The UK's first
virtual worksite
marker board trial



In partnership with the East
Coast Digital Programme



FAQs

What will track workers do if there are no physical WSMBs for them to see?

According to the rule book, WSMBs are only required to indicate the worksite limits for on-track plant, on-track machines and engineering trains. As people-only worksites don't require WSMBs, there is no change to standard practices when it comes to how track workers identify their designated worksite limits. Geofencing devices can be used to support track worker location awareness by alerting them if they cross safe zone boundaries. This can help increase their situational awareness and provide additional guidance on the location of their worksite limits.

How often does the device alert?

The devices will only alert on the rare occasion that the operator has crossed the geofence boundary and is approaching worksite limits. Once the device is in the cab, it will remain silent so operators can forget that it's there and continue works as normal, only responding when the device alerts.

Can VWSMBs be used alongside T3A and T3D?

Yes, provided that any limitations or requirements that are part of T3A and T3D are followed.

Can VWSMBs be used on hybrid possessions?

Yes. While no individual worksite can be hybrid (e.g. one end that's physical and one end that's virtual), there can be a mix of virtual and physical worksites within the same possession.

How do I get a virtual worksite approved?

This can be done by engaging with the ops delivery team in your region and seeking approval through them. They will be able to authorise a virtual worksite so it can be entered into the WON.

When will OTM and engineering trains be included in the national deviation?

Work is starting to include these in the deviation in 2026.

What happens when I get a device alert to say that I've left the safe zone?

The geofence is designed so that you receive an alert 100 metres from where the WSMBs would be, which means operators won't have exceeded the worksite limits. In this instance, you can move back to the safe zone and either check your position or call the ES to validate your location.

How does virtual WSMBs work for planned worksite changes?

Different worksites can be started and stopped on the Dashboard depending on when the limits are authorised to be changed. With worksite visibility, the ES is able to check that plant is within the correct limits before making changes. Changes are made at the click of a button, a significant time saving compared to recovering and placing physical WSMB.

Are there any scenarios in which we can't use virtual WSMBs?

If there are any on-track machinery or engineering trains within the possession, virtual WSMBs can't be used until the deviation is updated. If any worksite limits are located within or close to the entrance of a tunnel, this may exclude them from being used as a virtual worksite due to potential positioning interferences.

Does having a tunnel within my work site exclude me from using virtual WSMBs?

No, provided that the tunnel is a reasonable distance from the worksite limits, then virtual WSMBs can still be used. The ability to track the location of vehicles accurately within the tunnel may be affected and we would not recommend using the system if your works are wholly within the tunnel.



www.tended.co.uk
info@tended.co.uk
+44 330 133 1195

Boole Technology Centre
Beevor Street
Lincoln
LN6 7DJ

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