Wrong Way Driving:
Assessment and Mitigation Toolkit

national highways

Revision	Purpose description	Originated	Checked	Reviewed	Authorised	Date
1.0	Final version	J.Richards	M.Pilsbury	W.Spurr	W.Spurr	09/10/2025

Introduction

This document provides advice to designers, highway operators and road safety engineers with options to mitigate undesirable manoeuvres that could lead to wrong way driving (WWD).

The term ‘wrong way driving’ is used to describe a vehicle being driven against the flow of traffic along a one-way street or carriageway. For this to occur, the vehicle must have first turned the wrong way onto the network.

Establishing how a WWD incident happened can be difficult as it is not always apparent where the initial wrong way manoeuvre occurred or why the road user made that decision, however, engagement with stakeholders may provide important information.

The cause of a WWD incident can be as a result of unintentional or intentional acts. The consequences can be severe, resulting in serious or fatal collisions.

Unintentional manoeuvres can typically be a result of:

- **Unclear highway layout** – road users may drive the wrong way where the road layout is misinterpreted.
- **Satellite Navigation systems** – road users may drive the wrong way due to prompts from satellite navigation systems. For example, where an off-slip is located in proximity of a junction, a road user may be instructed to take the next turn and incorrectly turn into the off-slip rather than the on-slip.

Intentional manoeuvres can typically be a result of:

- **Evasion** – road users may drive the wrong way to evade the police (or other road users).
- **Self-harm** – road users may drive the wrong way to cause a collision in order to self-harm.
- **Undesirable manoeuvres** – during low traffic flows or when the perceived risk of a head-on collision is reduced, road users may drive the wrong way to save time and distance from their journey.

Purpose

This document provides advice to designers, highway operators and road safety engineers on options to mitigate undesirable manoeuvres that could lead to WWD incidents.

This toolkit aims to help identify locations which may be prone to WWD incidents and to introduce mitigation measures to make road layouts intuitive to road users.

Advice provided within this toolkit is supplementary to existing guidance contained within the Traffic Signs Manual and does not override the legislative requirements of TSRGD 2016.

It is imperative that the principles of safe systems are considered when identifying and treating locations where there is a risk of WWD incidents occurring.

Funding

Funding for interventions and measures identified in this toolkit may be available via Designated Funds. Funding is dependent on the value, KSI reduction impact and nature of any proposals. Applications would also need to adhere to Designated Funds principles.

Where mitigation measures may be undertaken on and/or impact on other highway networks, it may be possible to share funding with other highway authorities.

Strategy

Safety is our first imperative at National Highways and this toolkit should be used to ensure that everyone who works with us or travels on our network will get home safe and well. We are an advocate of the Safe Systems approach and promote the Road to Zero Harm.

Safe Systems

We continue to develop our approach to the use of the system in a real-world context.

Inherent in this approach is a long-term vision that deaths and injuries arising from the normal use of the highway are preventable and are not inevitable.

The key principles of the Safe System include:

1. Safe roads and roadsides
2. Safe speeds
3. Safe vehicles
4. Safe road users
5. Post-crash response

The WWD toolkit provides practical measures that sit within the safe roads and roadsides pillar.

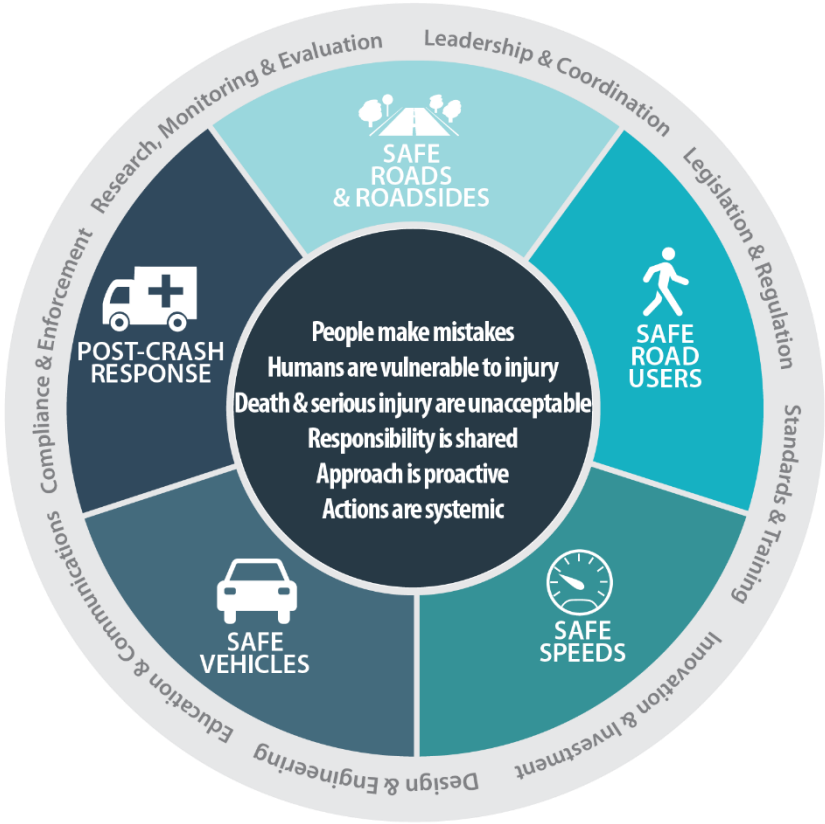

Figure 1 - Principles of Safe Systems (image credit: Agilysis)

Road to Zero Harm

Road to Zero Harm is an exciting and ambitious road safety initiative that we are championing to realise our vision, that no-one should be killed or seriously injured on the strategic road network.

Achieving this vision will benefit the country, and the families and individuals whose lives continue to be affected by collisions on our roads.

It is therefore vital that measures are implemented proactively to ensure that preventable collisions do not occur because of sites which may be prone to WWD incidents.

Identifying at risk locations

There are a number of ways that the risk of a WWD incident occurring on our network may be identified.

Historically, it is likely that collision data would have been the main source of identifying locations susceptible to WWD incidents. However, many WWD incidents will not result in a collision and therefore other sources may also need to be used to provide key evidence.

Figure 2 provides an overview of stakeholders or data that may help identify or corroborate in identifying whether WWD incidents have occurred historically.

Whether it is a stakeholder or data, each source will provide a perspective that can help identify what the issues might be. Some examples of these include:

National Highways Route Managers

Route Managers will have local knowledge of the route and may be aware of local concerns and/or previous WWD incidents occurring.

National Highways Traffic Officers

Traffic Officers are in a unique public facing position and may have attended WWD incidents which did not result in a collision or injuries recorded on STATS 19. If a route is patrolled by Traffic Officers then their insight may be invaluable.

Police

The police may have attended WWD incidents which did not result in injuries recorded on STATS19. The police may also have received information from the public, observed undesirable manoeuvres themselves or be able to provide additional insight to incidents recorded on STATS 19.

Privately Operated Facilities

A WWD incident may have been influenced away from the highway. Motorway Service Areas for instance may have unique layouts. Operators of these sites may need to be contacted to understand if they are aware of incidents occurring, or contacted to make them aware of concerns that we may have, or have received.

Customers

Customers may have witnessed near misses and reported WWD incidents to local customer enquiries teams. Therefore, contacting the enquiries team could identify locations where incidents may have occurred.

Local Highways Authorities

A WWD incident may have been influenced by factors away from the National Highways network. Local highway authorities may know of issues, risks or complaints on their network that could impact the risk of WWD incidences and therefore should be contacted.

Figure 2 - Stakeholders for identifying WWD locations

Understanding the issues

Where the risk of WWD has been identified on the National Highways network, a desk assessment should be undertaken to establish whether there is any evidence to support the need to implement mitigation measures.

Collision Data

A review of historic collision data will be necessary and the STATS19 data is usually available from the Local Area teams. WWD collisions are known to be infrequent, and therefore it is recommended to study collisions as far back as practicable. The reviewer should identify any changes which have occurred to the highway layout within the search period. Consideration should be given to whether these changes could have influenced how road users approached the junction or whether it could simply be an increase in traffic volume increasing the risk.

If it remains unclear whether a collision occurred as a result of WWD after reviewing collision data, then liaising with the local police may provide additional information.

It is important that collision analysis captures a suitably wide area beyond the immediate vicinity of the location as a collision resulting from WWD could occur some distance from the location where a road user may have initially turned the wrong way onto the network.

Controlworks Report

We log incidents which occur on our network and this data may identify locations which are susceptible to WWD, but there are some limitations:

- The Controlworks database predominantly holds information on patrolled sections of our network, this may leave a gap in data for our non-patrolled sections.
- There may be inconsistencies in how a WWD incident is categorised where the details are not clear, for example, where the vehicle joined the network.

This data may provide evidence of WWD incidents which could be used to help justify the introduction of mitigation measures at high-risk locations.

Assessing the site

A site assessment should be undertaken to help understand what physical factors may influence the risk of road users turning the wrong way onto a road.

The purpose of the site assessment is to gauge a better understanding of the risk of road users turning the wrong way based on the physical layout of the location in question. Specifically, the review will aim to determine what (if anything) could lead road users to misinterpret the layout and make a wrong turn.

Figure 3 gives examples of some of the key considerations which should be reviewed on site.

Appendix B gives an example checklist which could be used as part of a site assessment.

For this review to be effective, it would be beneficial if the reviewer has experience in the field of collision investigation and prevention.
Road safety auditors would be ideal candidates to undertake the site-based reviews, although this is not essential.

The site assessment should provide a level of understanding of the risk of road users turning the wrong way at a particular location and what features (or lack of features) may be contributing to this.

The advanced approach to the location needs to be assessed. This may involve reviewing signing and road markings on local authority network approaches to ensure road users are given clear and consistent messages throughout.

Junction arrangements, signing and road markings should be reviewed in privately operated sites, such as motorway or A-road services to also ensure road users are given clear and consistent messages.

A visit during the hours of darkness may identify issues which are not apparent during the hours of daylight, for example, whether the retroreflectivity of signs or road markings is appropriate.

It may be that having completed the site-based review, the risk of road users misinterpreting the layout and turning the wrong way is considered to be low. However, it may still be cost effective and proportionate to enhance the layout through road markings and road signs to reduce any residual risk.

If a WWD intervention is not deemed necessary, then it is recommended to keep a record of that decision.

Satellite Navigation

It is possible that road users could be inadvertently directed the wrong way onto the SRN by satellite navigation systems. There is an increased risk of this occurring where slip-roads are located in proximity of other junctions on the local highway authority network.

This risk should be considered as part of the site assessment. Drive-throughs of the site should be undertaken using different satellite navigation providers.

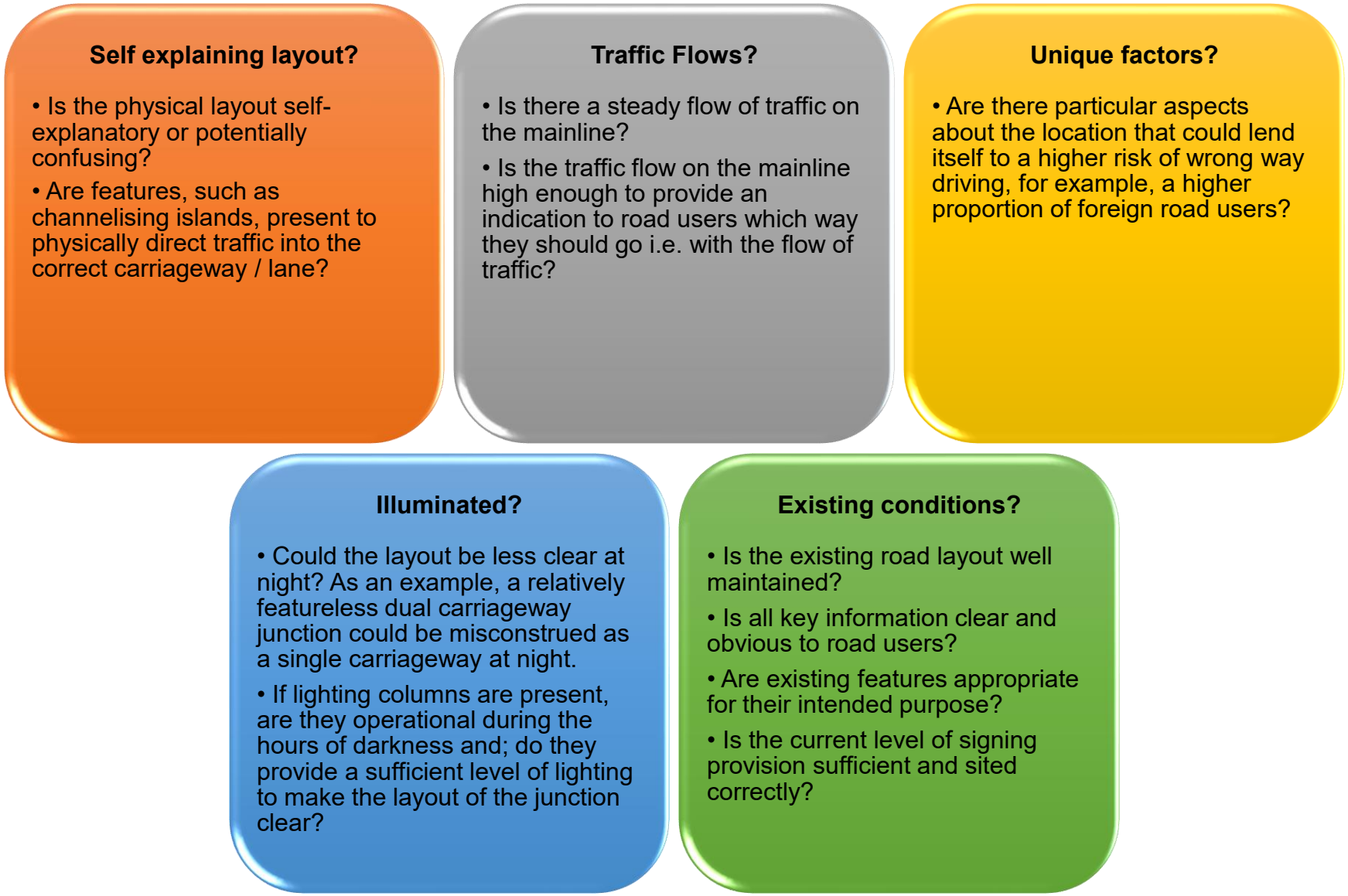

Figure 3 - Key site assessment considerations

Mitigating the risk

For locations where there is a risk of a road user turning the wrong way, an appropriate level of mitigation should be considered.

The most common and most cost-effective measures are likely to be improvements to signing and road markings. This may involve rationalising existing signage, replacing or enhancing existing infrastructure or introducing entirely new signs.

It is essential that signs are positioned to ensure that they are clear, obvious and self-explaining to road users from all approaches. Therefore, special consideration should be given to the placement and angles of all signs. Sign assemblies should be made passively safe where required.

Appendix A provides a range of options that could be used to mitigate the risks of a WWD incident.

Where signing and road marking measures are not likely to resolve a WWD problem at a location, it may be that additional and more expensive measures are required, which may include buildouts at junctions or the introduction of streetlighting.

It should be noted that there are a large range of layouts for at-grade priority junctions within the Design Manual for Roads and Bridges (DMRB). Some allow all movements in/out of the minor road while others restrict them. Appendix A includes options for all layouts and careful consideration should be taken when selecting an option to ensure that it is strictly appropriate for the location in question.

A range of further enhancement options are available for some mitigation measures, for example, if the base option is a traffic sign, the enhanced version could be a traffic sign with a larger x-height or a backing board. The designer should factor in the benefits and disbenefits of each option during the decision-making process.

Any changes to the layout of the road are likely to require a road safety audit in accordance with DMRB GG 119, and should be safety risk assessed in accordance with DMRB GG 104.

Local Highway Authorities

It is possible that measures could be implemented on local highway authority networks to mitigate the risk of road users turning the wrong way onto the SRN, for example, existing signs could be relocated or new signs introduced on the local highway authority's network to make the approaching road layout clear to road users.

While any changes would need to be discussed and approved with the local highway authority, it may be in our interest to propose changes on their site to reduce the risk of incidents on our network. Collaboration is encouraged to ensure efficient, cost-effective delivery.

Privately Operated Facilities

Where a privately operated facility, such as a motorway service area, has been identified as a possible risk to influencing a WWD incident, the operator of that site should be contacted. Working collaboratively with them, it may be in our interest to propose changes on their site to reduce the risk of incidents on our network.

Satellite Navigation

Where the risk of a WWD incident occurring has been identified as being influenced via a satellite navigation provider, contact should be made with the Safer Roads Design Team.

Appendix A – Mitigation Measures

Install 'no entry' signs:

Where a diverge meets a minor road, road users can be advised not to enter the diverge by providing 'no entry' signs. Examples of this can be seen in Figures 4, 5 and 6.

Entering the wrong way onto a diverge could be a particular risk if other junctions are nearby.

'No entry' signs require a Traffic Regulation Order.

Enhancement options could include:

1) Provision of larger roundels.
2) Provision of backing boards.
3) Signs installed at reduced mounting heights.
4) Provision of associated 'no entry' road markings.
5) Provision of coloured surfacing under the markings to enhance their conspicuity and status.
6) Provision of secondary pair of 'no entry' signs further down the slip road for resilience.

Install 'left turn' sign:

Where a minor road meets a dual carriageway, road users can be advised that they should not turn right by providing 'turn left' signs in the central reservation. An example of this can be seen in Figure 4.

Enhancement options could include:

1) Provision of larger roundels.
2) Provision of backing boards.
3) Signs installed at reduced mounting heights.
4) Provision of supplementary 'dual carriageway' plate.
5) Provision of complimentary 'arrow' road markings.
6) Provision of coloured surfacing under the markings to enhance their conspicuity and status.

	
Provide 'advanced left turn' sign: Where a minor road meets a dual carriageway, road users can be advised that they should not turn right by providing 'advanced left turn' signs in the nearside verge on the approach to the junction. An example of this can be seen in Figure 4. Enhancement options include: 1) Provision of larger roundels. 2) Provision of backing boards. 3) Provision of supplementary 'dual carriageway' plate. 4) Provision of complimentary 'arrow' road markings. 5) Provision of complimentary 'turn left' road markings. 6) Provision of coloured surfacing under the markings to enhance their conspicuity and status.	**Install 'keep left' sign:** On a two-way connector road on the approach to a dual carriageway, road users can be advised that they should not turn right by providing a 'keep left' sign on a channelising island on the approach to the junction. An example of this can be seen in Figure 4. Enhancement options include: 1) Provision of larger roundels. 2) Provision of backing boards. 3) Provision of complimentary 'arrow' road markings. 4) Provision of coloured surfacing under the markings to enhance their conspicuity and status.

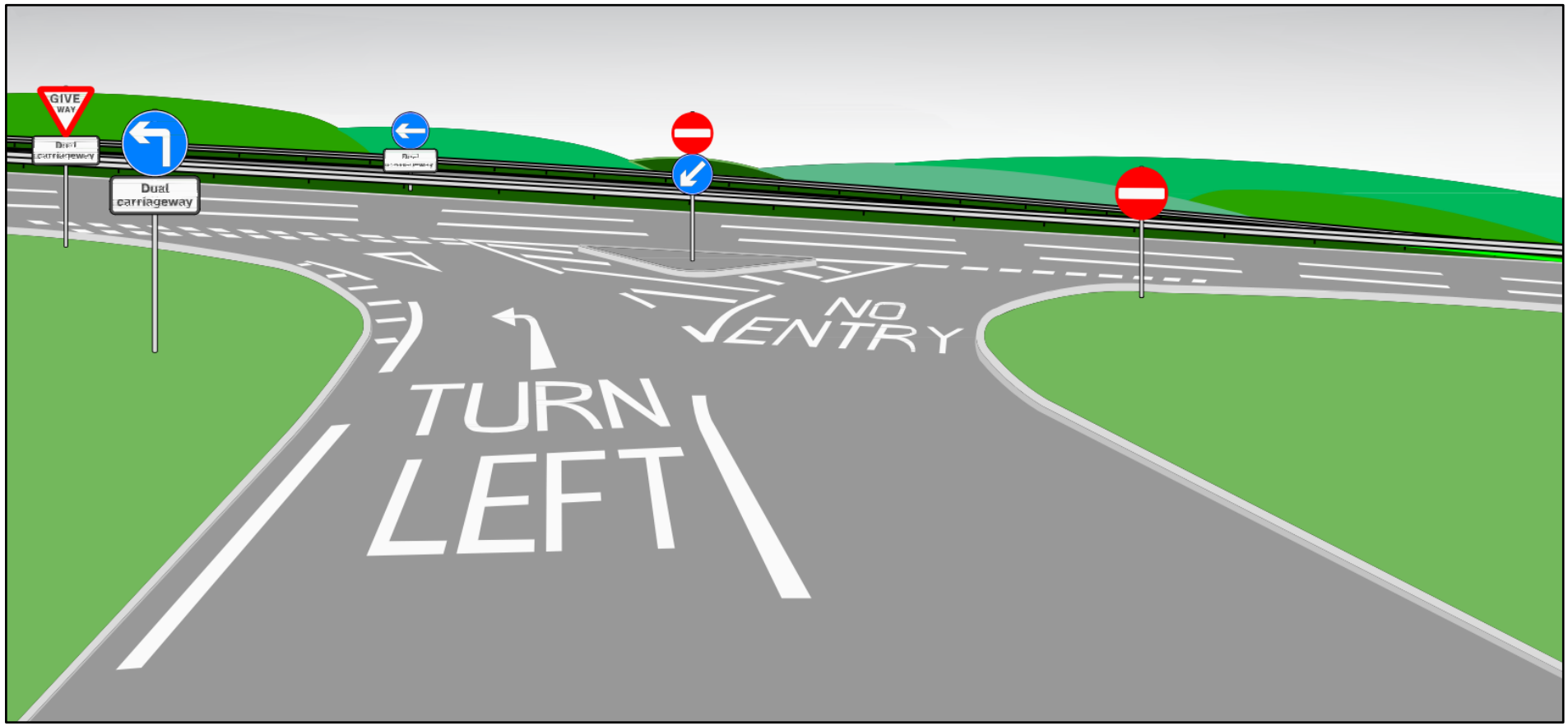

Figure 4 - example illustrating a possible layout at a priority junction on a dual carriageway

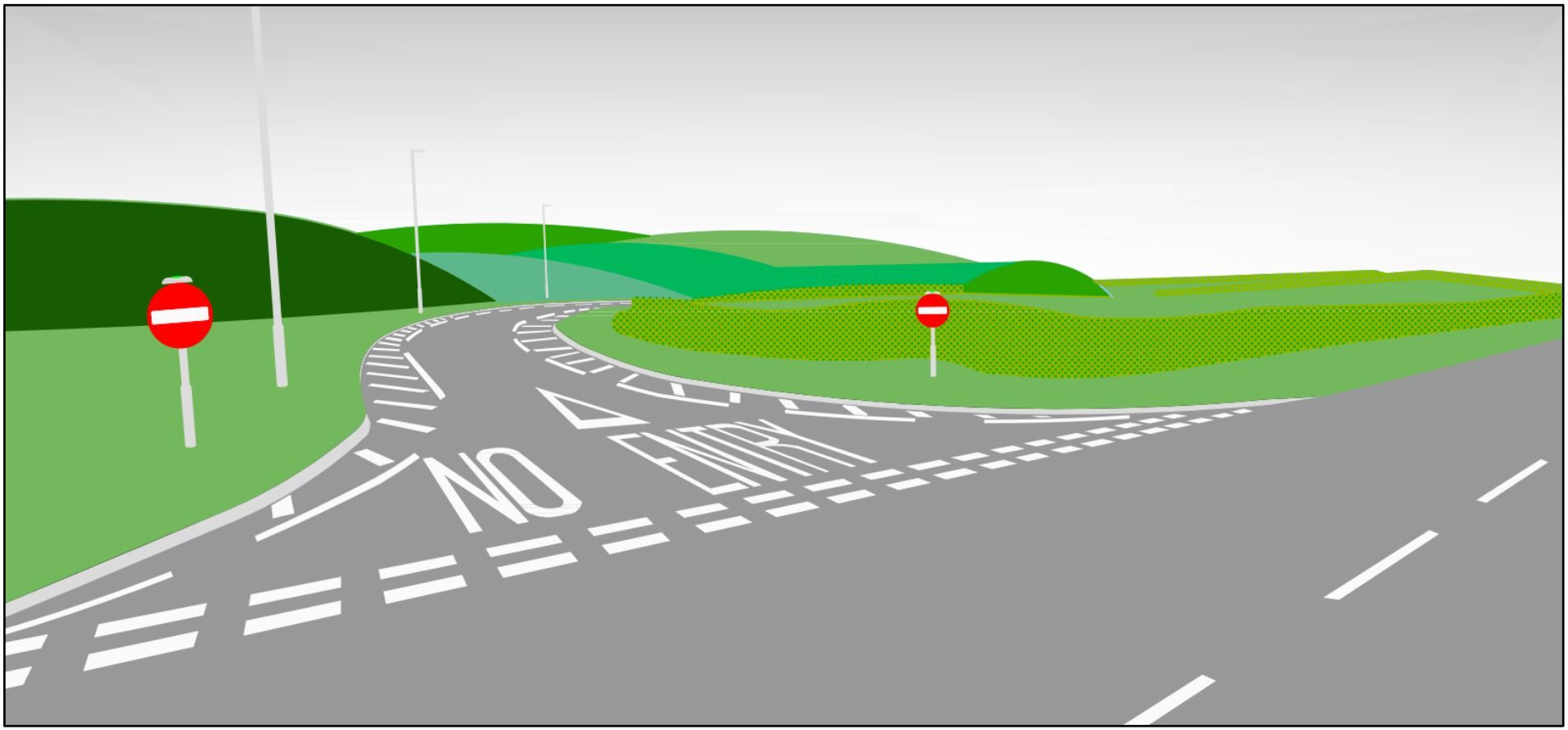

Figure 5 - example illustrating a possible layout at the end of an off-slip

		
Provide regulatory advanced direction signs where required: Advanced direction signs can be provided at (and in advance of) a major junction, these may often have to be located on the local authority road. 'No entry' roundels could be provided on a map type advance direction sign to highlight which movements are prohibited.	**Reflective post banding:** Reflective post banding can be added to a traffic signpost to make the overall assembly more conspicuous. The Department for Transport (DfT) has authorised full height, one sided reflective post banding for use on the National Highways network for the purpose of mitigating WWD. View the DfT authorisation, which prescribes the conditions for use of the banding.	**Vehicle activated signs:** This measure involves the installation of a vehicular activated sign to warn road users of the risk of WWD. A vehicle activated sign may be installed in conjunction with other measures and could be used as a secondary warning to prevent road users from continuing in the wrong direction. Such measures have been installed on the A720 Lasswade, which forms part of Transport Scotland road network.

		
Illumination and visibility: Illuminate the junction to provide road users with a clearer view of the layout during darkness. Reflective road studs or enhanced road markings may also assist road users during the hours of darkness by highlighting junction arrangements. Examples of this can be seen in Figures 5 and 6.	**Install enhanced deflection:** To physically reduce the likelihood of road users turning into a diverge, the kerbing at the end of the diverge could be physically altered, or hatching introduced. The designer should assess how implementing this option may affect the capacity of the slip road. Examples of this can be seen in Figures 4, 5 and 6.	**Prevent right turn manoeuvres out of minor road:** Upgrade or install new traffic islands to direct traffic approaching the SRN to turn left only. Provide associated ‘right turn prohibition’ and 'no entry’ signs in the mainline gap. This option could be enhanced with kerb buildouts. An example of this can be seen in Figure 7.

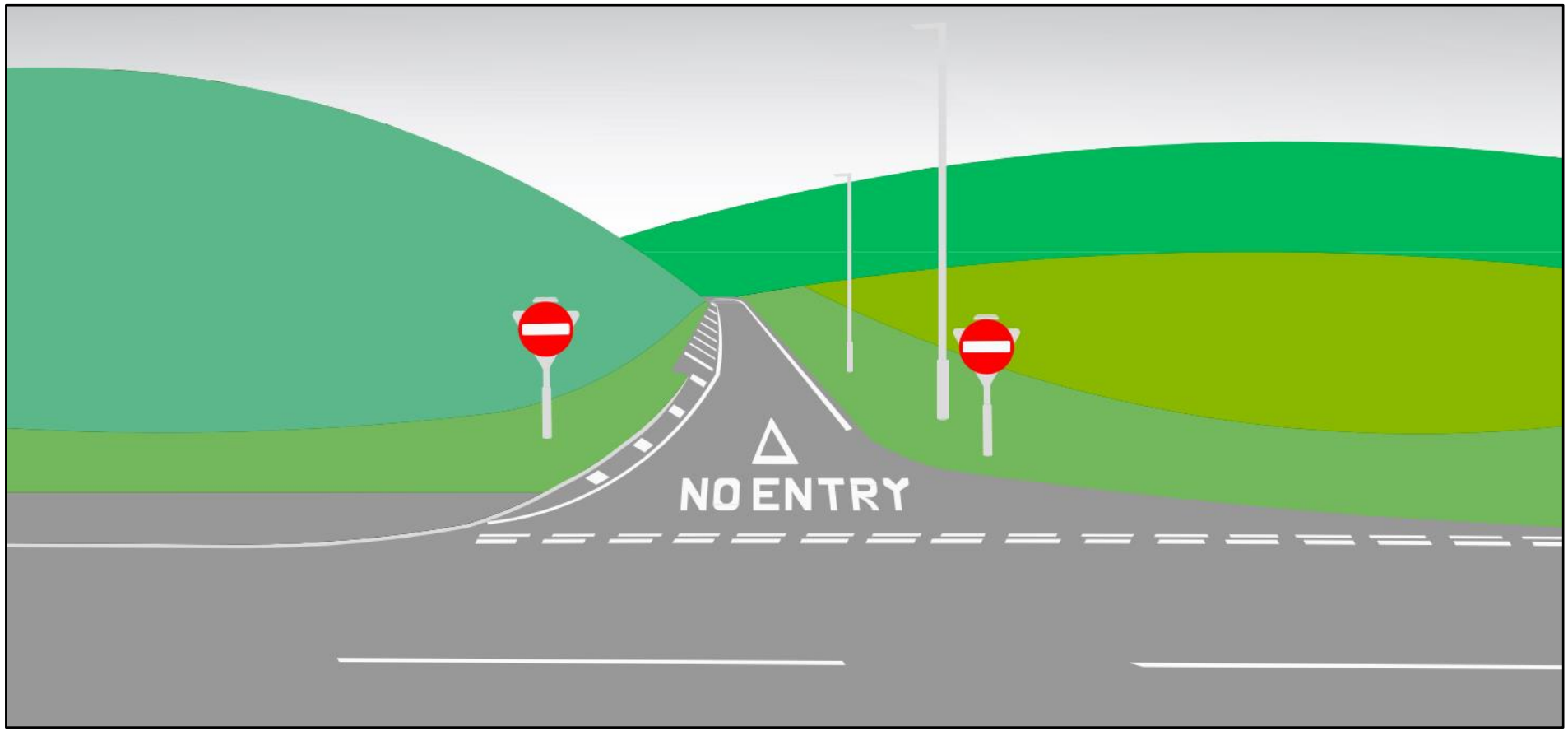

Figure 6 - example illustrating a possible layout at the end of an off-slip

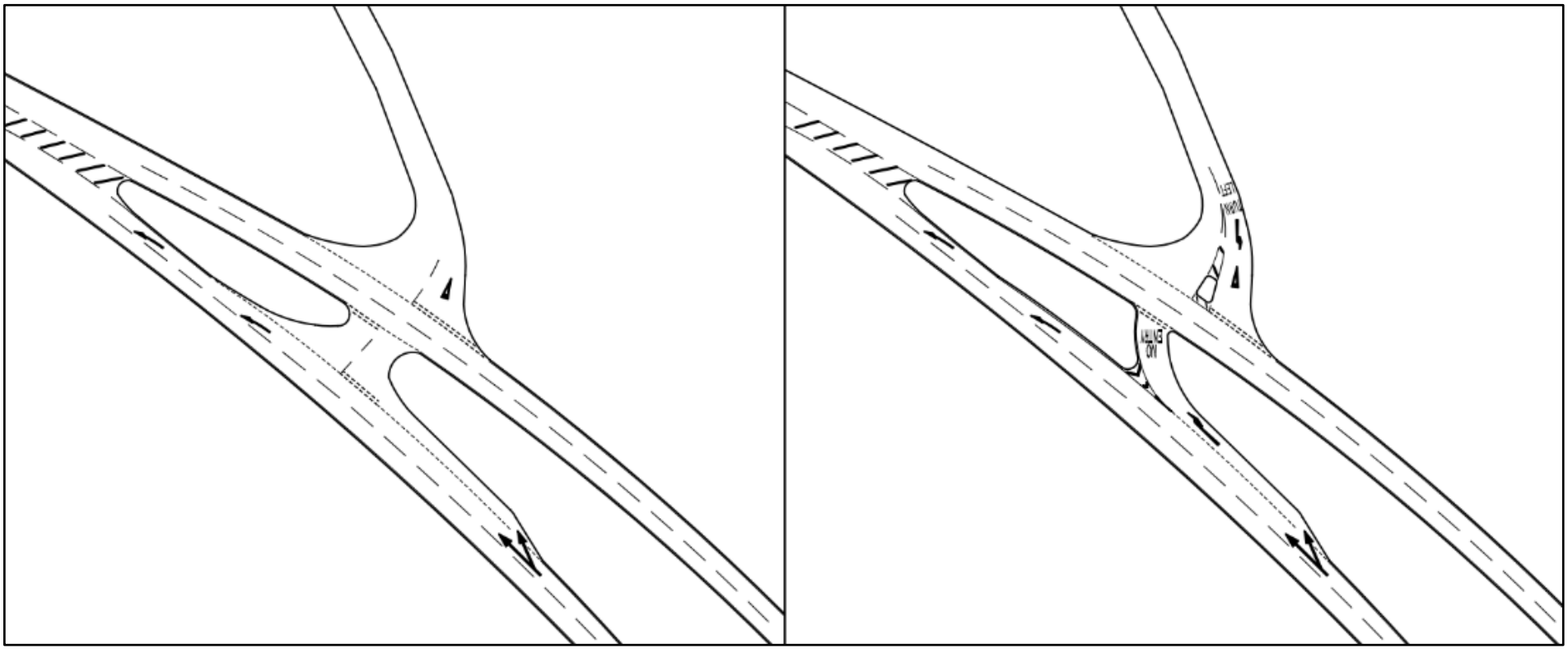

Figure 7 - example illustrating a possible layout to prevent right turn manoeuvres out of a minor road

	
Close gap in central reserve: Close the central reserve gap to create a ‘left in/left out’ junction. This option could be achieved with kerb buildouts and the installation of a vehicle restraint system in the central reserve.	**Close access/egress to SRN:** Close access entirely with kerb buildouts and civils works. This option is only likely to be feasible at junctions with low vehicle movements or alternative junctions located nearby.

Appendix B – Site Checklist

	Checklist items
Signs	Are junction signs adequate, consistent with adjacent signs and intuitive?
	Are the visibility, locations and legibility of all signs and bollards (during daylight and darkness) adequate?
	Are signs orientated correctly to ensure correct visibility and reflectivity?
	Are signs illuminated where required?
	Could signs be overlooked as a result of sign clutter?
	Could the addition of signs reduce the likelihood of WWD?
Road markings	Are junction road markings adequate, consistent with adjacent road markings and intuitive?
	Are the visibility, locations and legibility of all road markings (during daylight and darkness) adequate?
	Do the road markings clearly define routes and priorities?
	Are the dimensions of the road markings appropriate for the speed limit / design speed of the road?
	Are road markings appropriate to the location? 1. centre and edge lines; 2. hatching; 3. road studs; 4. text / destinations; 5. approved and / or conform to the regulations.
	Could the addition of road markings reduce the likelihood of WWD?

Lighting	Is lighting obscured by vegetation or other street furniture?
	Does the street lighting provide adequate illumination of roadside features, road markings to drivers?
	Is there a need for lighting, including lighting of signs and bollards?
Layout	Are bollards provided on channelising islands to instruct road users how to negotiate the layout correctly?
	Is safety fence present in the central reservation, which may indicate the presence of a dual carriageway?
	Is the layout intuitive, or are there any unusual features, which may increase the likelihood of WWD?
	Is the junction type appropriate for the traffic flows?
	Have there been any recent changes in road layout, which may increase the likelihood of WWD?
Visibility	Are all visibility splays clear of obstructions?
	Are the sight lines adequate at and through the junctions and from minor roads?
Satellite navigation	Could the visual displays on the satellite navigation systems be misleading and increase the risk of WWD?
	Could the audio instructions on satellite navigation systems be misleading and increase the risk of WWD?
	Are satellite navigation systems reflective of the current road layout?
Privately Operated Sites	Is the internal signing intuitive, or are there any features which may increase the likelihood of WWD?
	Could the provision of new features reduce the likelihood of WWD?

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