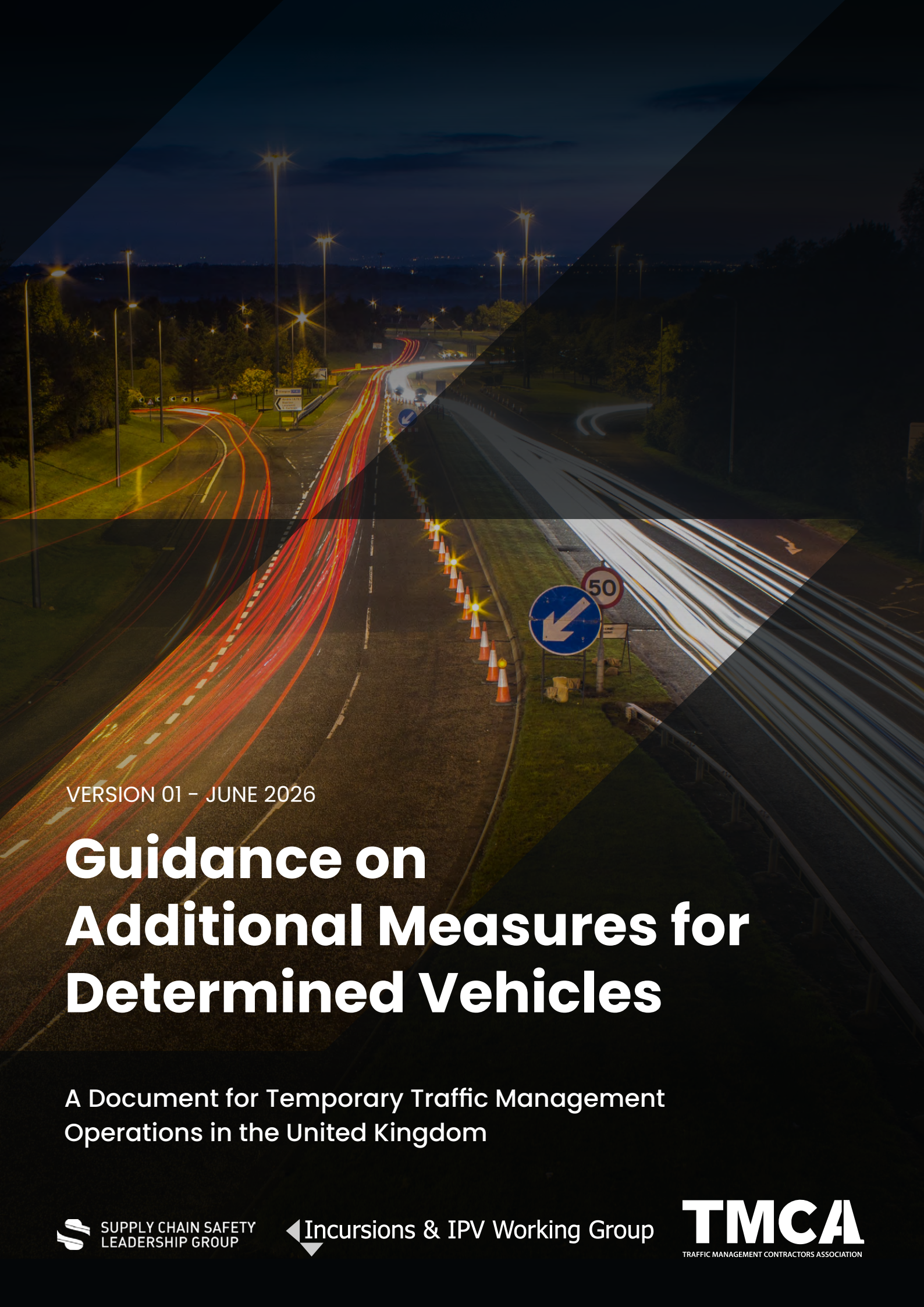




VERSION 01 – JUNE 2026

Guidance on Additional Measures for Determined Vehicles

A Document for Temporary Traffic Management
Operations in the United Kingdom

Contents

Objective.....	02
Scope.....	02
Definitions.....	03
Roles and Responsibilities.....	04
Application of This Document.....	06
Current Standards and Best Practices.....	07
Determined Vehicles.....	08
Requirements for Additional Measures.....	10
Mitigation Categories.....	12
Considerations.....	13
Site Risk Level Assessment.....	14
Your Next Steps.....	16
In Summary.....	17
Appendix 1: Decision-Making Flow Chart.....	18
Appendix 2: Suggested Resources and References.....	19



Objective

This document will provide practical guidance for anyone carrying out works on the highway considering temporary traffic management measures, including stakeholders identified under “Scope”. It will cover the use of determined vehicle mitigation (DVM) systems in secondary work zones.

This guidance aims to help parties understand how to assess and review appropriate secondary mitigation measures at work sites, in alignment with UK legislation and best practice, using risk-based assessment of the site.

Scope

This guidance is intended for use by principal contractors, temporary traffic management (TTM) organisations, site designers and those responsible for implementing or maintaining these systems on the ground.

It covers planning, selection and use of secondary mitigation systems, including:

- Roles and responsibilities in risk mitigation
- Mitigation categories and the hierarchy of control when shaping risk-mitigation systems
- Considerations in the decision-making process
- Manufacturer and user responsibilities
- Site risk level assessment for incursion management system selection.

While many principles are also applicable to permanent works, this guidance is primarily for temporary installations. This document should be used in conjunction with other industry guidance and best practice documents.



Definitions

The following terms will be used within this guidance:

	Determined Vehicle	Any vehicle that intentionally or persistently breaches a traffic management layout, despite standard controls.
	Determined Vehicle Mitigation (DVM)	Determined Vehicle Mitigation (DVM) refers to secondary mitigation measures used to reduce the risk of a determined vehicle incursion, identified through a site-specific risk assessment.
	Hostile Vehicle	Hostile vehicles are deliberately driven with malicious or hostile intent, intending to breach safety barriers and damage infrastructure or even cause casualties. This is opposed to the determined vehicle, which is often not deliberately so driven.
	Hostile Vehicle Mitigations (HVM)	Formally defined as “a protective security discipline focusing on reducing risks associated with vehicle-borne threats posed by terrorists and criminals,” i.e malicious harm vs. accidental incursions or non-malicious intent. HVM approaches are most appropriate to high-risk or crowded public work zones and critical infrastructure, and there is separate guidance for the use of HVM. There is further information available on HVM here .
	Safety Barrier	A barrier is “a structure that blocks or limits movement or access”. Without clear distinction between standard obstructive barriers, physical access control systems or delineation devices like cones, this guidance limits its use unless otherwise clarified.
	Secondary Work Zone	The area within (or behind) a primary traffic management layout, where work activities take place. Additional mitigation measures may be required here, reducing consequences from a vehicle incursion.
	Temporary VRS/Temporary Safety Barrier	A temporary VRS is one which can be deployed and removed, and that is to be in place for less than 4 years, while still meeting the relevant performance standards. This concept can also be used for standard safety barriers <i>in situ</i> temporarily.
	Traffic Delineation	Delineation systems, such as traffic cones, traffic cylinders, temporary roadmarkings, and temporary barriers, that visually separate traffic from workers. They do not contain vehicles, but define safe zones and guide driver behaviour, distinct from signage and visual deterrents.
	Vehicle Restraint Systems (VRS)	A VRS is a “system which is installed on a road to provide a level of containment for an errant vehicle, and which has been successfully tested and/or assessed to the relevant part of EN1317”. In other words, a VRS contains, redirects or decelerates vehicles that leave the carriageway to reduce the severity of impact and prevent penetration into protected zones.

Roles and Responsibilities

Under the Construction (Design and Management) Regulations 2015, all parties involved in the design and delivery of road works have clear statutory duties. In addition to these duties, Sections 2 and 3 of the Health and Safety at Work etc. Act 1974 also apply.

Section 2 gives employers the duty to ensure, so far as reasonably practicable, the health, safety, and welfare of their employees. Section 3 details the duty to ensure, again so far as reasonably practicable, that persons not in their employment (i.e. members of the public and road users) are not exposed to risks arising from the works. This means that the safety of road users and the public must also be considered, not just workers.

All dutyholders must have the necessary “skills, knowledge and experience, and, if they are an organisation, the organisational capability” to carry out the role. These roles include:

- **Client:** Any person for whom a project is carried out
- **Supplier/Manufacturer:** Any company or person supplying, designing, or manufacturing protective safety or HVM equipment.
- **Designer (inc. Traffic Management Designer):** Any person (including a client, contractor or other person) who prepares or modifies a design; or arranges for, or instructs, any person under their control to do so
- **Principal Designer:** The Designer appointed under regulation 5(1)(a) to perform the specified duties in regulations 11 and 12
- **Principal Contractor:** The Contractor appointed under regulation 5(1)(b) to perform the specified duties in regulations 12 to 14
- **Traffic Management Manager:** An organisational role that oversees the management of planned traffic control systems on site.
- **Contractor:** Any person (including a non-domestic client) who, in the course or furtherance of a business, carries out, manages or controls construction work
- **Employees:** The individuals carrying out the necessary works

Their key duties can be summarised as follows:

- **Client:** Appoints (in writing) the principals, where there is more than one designer or contractor, or must take this role on themselves. Their main legal duty is making suitable arrangements to manage the project, with health and safety considered, and regulatory authority notification for larger projects.
- **Supplier/Manufacturer:** Is responsible for ensuring provided products are suitable for the intended use or are in an appropriate category for the intended site use, and offer adequate technical information and instructions, all compliant with relevant UK legislation and standards/specifications.
- **Traffic Management Designer:** Aligns with CDM design roles as above. Their main legal duty is to eliminate, reduce, or control foreseeable vehicle incursion risk, so far as reasonably practicable through design. They must provide adequate design information to other duty holders and coordinate with the Principal Designer where appointed.
- **Principal Designer:** Plans, monitors, manages, and coordinates pre-construction/design phase health and safety. Where there are other designers, they coordinate and ensure compliance, and liaise with contractors into the construction phase.
- **Principal Contractor:** Plans, monitors, manages, and coordinates construction phase health and safety. They prepare the plan for this phase, implement it, and review it. They also ensure worker consultation and supervision, prevention of unauthorised access, and welfare needs.
- **Traffic Management Manager:** Supports CDM compliance by managing, and coordinating temporary traffic management. Their main responsibility is ensuring measures are implemented in accordance with approved designs, the construction phase plan, and applicable standards. They oversee competence, supervision, inspection, and ongoing risk control, but do not replace CDM duty holders.
- **Contractors:** A contractor must plan, manage and monitor construction work under their control so far as reasonably practicable to do it safely and without risk to health. They supervise, provide site-specific induction, ensure worker competence, and coordinate with the principal contractor.
- **Employees:** Employees' duties include following site health and safety procedures, taking due care in their work, and cooperating with the contractor and employer.

In short, each party must ensure that adequate risk assessment while using incursion mitigation systems form part of the overall safe system of work, and that they are aligned with the hierarchy of control explored later.

Application of This Document

This guidance does not replace statutory duties or formal approval requirements. It offers operational guidance for integrating secondary work zone DVM systems into safe systems of work.

It should be used in conjunction with:

- *Traffic Signs Manual – Chapter 8: Road Works and Temporary Situations*, which covers the design and implementation of TTM systems and applicable signage
- *Raising the Bar 27 – Incursion Mitigation* from National Highways, which outlines best practices for vehicular intrusions and response measures, including the Plan, Do, Check, Act approach
- *CD 377 – Requirements for Road Restraint Systems*, also lays out necessary guidelines and requirements.
- Manufacturer guidance and certification data, which offer tailored advice specific to chosen incursion mitigation systems and should align with applicable European (EN) and DMRB standards.
- *GG 104: Requirements for safety risk assessment* is contained within the Design Manual for Roads and Bridges (DMRB) and sets standards for risk management during road projects.

These offer key guidance on the primary work zone and protections, and establish best practices for mitigation.



Current Standards and Best Practices

Traffic management contractors should already be working to the baselines as set out in the CDM, Traffic Signs Manual Chapter 8 and Raising the Bar 27, alongside other relevant guidance. These help to define minimum standards and expected best practices from vehicle incursions, summarised below.

Site Design and Layout

Clear, well-signed approaches at compliant signing distances, taper lengths, and appropriate lane closures. Adequate lateral safety zones and buffers should be used as needed, to provide reaction time and room for error from the driver. There should be a robust physical primary zone layout, and using appropriate mitigation measures (safety barriers, traffic delineation, signage) as required.

Visibility and Communication

As noted, high-visibility signage should be placed in advance of the works, with lighting and retroreflective materials for night-time or low-light conditions. There should be consistent communication between workers, supervisors, operatives, and contractors to enforce situational awareness.

Traffic Control Measures

Speed management is achieved with temporary speed limits, average-speed cameras (where appropriate) and lane discipline measures, which should use standardised methods where taper protection, diversion, or closure boundaries are used. Approved vehicle-activated signs and warning systems may be justified by risk assessment.

Workforce Protection

Mandatory briefings to ensure escape routes, red-zone risks, and site-specific hazards should be used. Regular compliance inspection of traffic management layouts is essential.

Monitoring and Response

There should be clear processes for logging and reporting incursions and near misses, with clear escalation procedures, and continuous improvement based on the data.

Secondary zone and mitigation measures for determined vehicles build on this baseline, and do not replace it.



Determined Vehicles

Determined vehicles intentionally breach the traffic management layout despite the primary measures touched on above. It is a higher-risk incursion type with purposeful action behind it (vs. accidental), but not necessarily hostile, just persistent. DVM is a secondary mitigation measure.

Determined vehicles could be characterised by:

- High speed and momentum
- Lack of response to operatives' instructions or traffic measures
- Unpredictable
- Limited intervention time
- Potential for escalation

As determined vehicles do not respond to standard measures, sites may need secondary controls, such as:

- Stronger physical barriers at high-risk points
- Planned operational controls, such as relocating entry points or increasing buffers
- Enhanced early-warning systems
- Additional delineation
- Additional communication with police if there is a persistent pattern

This compares with accidental incursions, which are usually caused by:

- Distraction
- Confusion
- Poor visibility
- Misinterpretation

These drivers typically stop once the error is realised.

Blue-light, or emergency, incursions are exceptional, but typically lawful and purposeful. As a result, emergency responders most often can enter closures as needed, although there are subtleties to this outside the scope of this document. While disruptive, they are coordinated and non-malicious.

Lastly, a determined vehicle can escalate to a hostile vehicle. A hostile vehicle intends to cause harm, making them a different threat category entirely. Unlike determined vehicles, hostile vehicles intend to cause property or personal harm, or are purposefully weaponised, where determined vehicles do not have true malicious intent.



Requirements for Additional Measures

When the Chapter 8-compliant traffic management arrangements no longer offer sufficient protection against the risk of a determined vehicle, additional protections as a secondary mitigation measure are called for. It's important to realise that additional measures cannot be implemented as a way to circumnavigate poor initial Chapter 8 planning, and must be both justified and well implemented to be defensible. Otherwise, any determined driver can simply argue that they were confused by poor site design, not their own poor behavior.

Typically, evidence from heatmaps, site experience, or specific vulnerabilities heighten this need, or the risk of workers being unable to escape the consequences of a breach, e.g. being trapped in complex work zones and unable to exit timeously.

In practice, these secondary mitigation measures and DVM often arises from one or more of these factors:

Previous Incursion/Collision Data

Other available data for the site, from other projects or works or simple road use data, often reveals patterns, such as incursions, near-misses, or loss-of-control incidents. Repeated events, regardless of accidental or reckless, show the site's risk is higher than other comparable sites, and could warrant further control measures.

Incidents on Live Sites

Primary mitigation failures point to a need for secondary mitigation to be in place, even if the incident was injury-free.

High Exposure or Vulnerability

If workers, the public, or equipment will generate or receive greater than average harm if a vehicle enters the work site, secondary mitigation is called for, e.g., high pedestrian interaction, nighttime works, limited visibility, or constrained escape routes.

Environmental or Operational Constraints

Restricted space, complex layouts, or rapidly shifting road conditions may not make for ideal primary controls, and secondary measures could complement and strengthen protections.

Why Risk-Appropriate Mitigation Measures are Essential

While mitigation systems play a crucial role in protecting the site and its workers, no DVM is entirely risk-free. For that reason, the categorisation of outputs should not end with identifying risks. It must result in a set of clear, traceable decisions and controls that can be reviewed and defended should liability issues arise.

Measures implemented should be chosen using the principles of “So far as is reasonably practicable” (SFAIRP) when assessing risk. SFAIRP involves weighing a risk against time, effort and cost, determining the degree of risk control that is appropriate.

Contractors and TTM providers have a duty of care to their employees and the road user, so the systems chosen should protect both parties. There may have been unnecessary use of HVM systems

by default in recent years, such as heavy duty barrier implementation for simple sites with no underlying risk justification. After all, most incursions are not driven by malicious intent, but poor decision-making.

This means moving away from a mindset of using everything available, to one which thoughtfully uses only what is warranted by the site and its risks.

This approach not only ensures a practical, safe work zone but also encourages proactive, engaged incursion system use and protects contractors from liability concerns. They should be able to clearly document and demonstrate the site risk assessment and reasoning behind their decisions if called upon, with every potential hazard installed justified.



Mitigation Categories

Within incursion mitigation, there are 5 types of mitigation to understand:

Traffic Delineation

The visual separation of traffic and ongoing works. Delineation systems form the baseline of temporary traffic management, defining work zones and guiding driver behaviour, and are mandatory under Chapter 8 for all TTM operations. Typical strategies include cones and bollards.

These systems offer real-time monitoring of the work zone, alerting workers or the control room when incursions occur.

This includes incursion alarm systems, smart cones and motion-detection sensors. Their effectiveness hinges on correct calibration and placement, as well as their overall integration into emergency response protocols.

Detection and Alert

Visible Deterrents

High-visibility features (outside of delineation measures) improve drivers' perceptions of the restricted zones. They do not offer physical restraints, but this awareness significantly reduces unintentional encroachments. These could include fluorescent or bright fencing, signage, reflective hazard lighting or LED delineation strips.

These discourage vehicle approaches to the site. They offer both physical and psychological barriers to low-speed incursions. They include steel and concrete devices, temporary fencing and low-profile barriers.

Physical Deterrents

Physical Access Control

Physical access control restricts entry to the site to authorised personnel and vehicles. This may be critical at site entry and exit points to prevent unauthorised entry by the public, and includes gates, authorisation points and entry control systems.

Considerations

When selecting and applying DVM systems, parties should assess all factors and categorise their risk to ensure appropriate measures are introduced. Here’s an example risk matrix you could use. These additional factors will also shape your choice of secondary incursion mitigation systems.

Factor	Low-Risk Example	Medium-Risk Example	High-Risk Example
Weather	Dry, clear weather	Light rain Muddy ground	High Winds Ice
Site Conditions	Straight, open roads	Some curves Visibility limitations	Narrow Lanes Sharp Bends
Work Purpose and Hazard Level	Minor survey work, limited machinery	Moderate works with some heavy plant	Major infrastructure works, high public exposure
Work Duration	Short-term	Medium-term	Long-term
Work Phase	Static works with minimal changes	Multi-phase work needing adjusted layouts	Dynamic works with complex phasing or moving machinery
Vulnerable Users	No pedestrian access to site, isolated site	Occasional pedestrians or cyclists Residential driveways	High foot traffic Adjacent to schools, care homes
At-Risk Structures	No buildings or infrastructure within the work zone	Near public infrastructure, e.g. minor structures, cycle paths	Heritage sites Shopping areas
Site Data and History	No near-misses or incident prior	Limited minor incidents/ near-misses	Multiple high-speed incursions or serious incidents
Access	No emergency access affected	Occasional constrained access	Limited access needing careful management
Worst-Case Scenarios	Minor risk to public or workers	Moderate potential for serious injury	Potential for death/severe injury
Worker Risk	Workers can respond to early warning systems easily	Workers are moderately constrained	Workers are trapped near live traffic in case of an incursion

Additionally, all parties should be mindful of their responsibilities and accompanying risks throughout the product selection process for any DVM used. It is worth remembering that some products or solutions may affect the road surface during use, so this should be part of risk assessment and contingency planning.

As part of this process, consideration should also be given to factors such as how easily a damaged vehicle could be removed from the worksite. Slow access,

or the need for recovery vehicles, may change the risk profile. The carriageway will need to be completely cleared and in suitable condition to reopen should any DVM be used.

Decision-making must be evident and documented around why particular systems were selected, considering:

- Product certification and compliance
- Appropriate use and training
- Maintenance and inspection needs
- Insurance and liability

Site Risk Level Assessment

Once the nature of potential threats are understood, use a methodical, considered approach to both overall objectives and identified vulnerabilities, covering:

- Applicable regulations and security needs, alongside the business needs of the site
- A practical site assessment as detailed above
- A further technical assessment of the options available
- Potentially, further liaison with technical and security experts

Do note that the *GG 104: Requirements for safety risk assessment* will dictate how risks to safety must be managed during road works, and all risk assessments should be conducted in line with this guidance.

With all risks considered, assign a risk level to the site as a whole, with different appropriate responses:

1. **Low Risk:** Current Standards and best practices in primary zones should suffice.
2. **Moderate Risk:** Risks are tolerable, but further risk reduction can be applied. Further visual deterrents, detection and alert systems, and delineation are called for.
3. **High Risk:** Risks are intolerable and must be reduced. Multiple combinations of medium-risk options, physical deterrents, and physical access control are called for.

In short, moderate risk sites may require moderate interventions, and high-risk sites are likely to require full scale incursion mitigation, while low risk sites are unlikely to need more than current best practices.

Remember that assessment must also be ongoing throughout the project. Conditions and risks may change by day or project phase. The risk posed by hazards will also need to be assessed with both a RRRAP and Temporary RRRAP, as per CD 377, if there is need for both permanent and temporary road restraint systems for hazards adjacent to the live highway to be assessed.

Once an appropriate risk level for the site is established, incursion mitigation controls should be selected to align with the hierarchy of control:

1. **Elimination:** Complete removal of the hazard
2. **Substitution:** Using less hazardous alternatives
3. **Engineering Controls:** Isolating people from hazards, e.g. using DVM
4. **Administrative Controls:** Safe work procedures and signage
5. **Personal Protective Equipment:** Individual protection by worker

Elimination and substitution should always be prioritised, followed by engineering controls. Ideally, potential escalation of mitigation levels should also be planned for. This document focuses on the use of engineering controls when elimination and substitution can't be achieved.

At this stage, apply the SFAIRP principle to test whether additional controls meaningfully reduce residual risk or simply add cost, complexity or secondary hazards. DVM in the secondary zone should use logical best practices in line with quantifiable, foreseeable risk. More is not always better- for the workers, for the risk-holders, or for the public.

Each outcome of this process should produce clear, traceable outputs, including:

- **Risk Classification Record:** To summarise assessed conditions and the rationale behind the assigned level.
- **Mitigation Decision Log:** To detail the chosen systems, their intended purpose, and the reasoning for their use or exclusion.
- **Residual Risk Statement:** To outline what remaining risks are accepted and why further mitigation would be disproportionate.



Your Next Steps

Once an appropriate system has been identified through careful design and planning, parties should:

- Document decisions within the overarching Traffic Management Plan (TMP)
- Engage with selected manufacturers/suppliers early to confirm suitability and certification needs
- Conduct pre-installation checks for ground conditions, layout and to ensure all safety systems interface properly
- Brief all site personnel on TTM system use and emergency procedures, as well as their limitations, reporting lines and planned escalation of mitigation levels
- Implement regular inspection and maintenance plans, again with clear reporting lines
- Review the incursion mitigation system's performance post-deployment, taking on feedback and lessons from the site
- Ensure that all suggestions are approved/agreed with the principal contractor and other stakeholders, and used in line with the legalities of doing so.

This will help to ensure a clear, defined incursion mitigation system that the workforce understands, with clear escalation and reporting lines created to manage on-site needs and suitable risk mitigation for each site's unique profile.

Post-deployment reviews should evaluate whether selected measures were effective. Capture data such as:

- Any actual or attempted incursions or near-misses
- Site workforce feedback on the practicality of systems, and
- Any observed weaknesses in detection or deterrence.

These findings should be used to refine internal standards and support consistent decision-making across future sites.



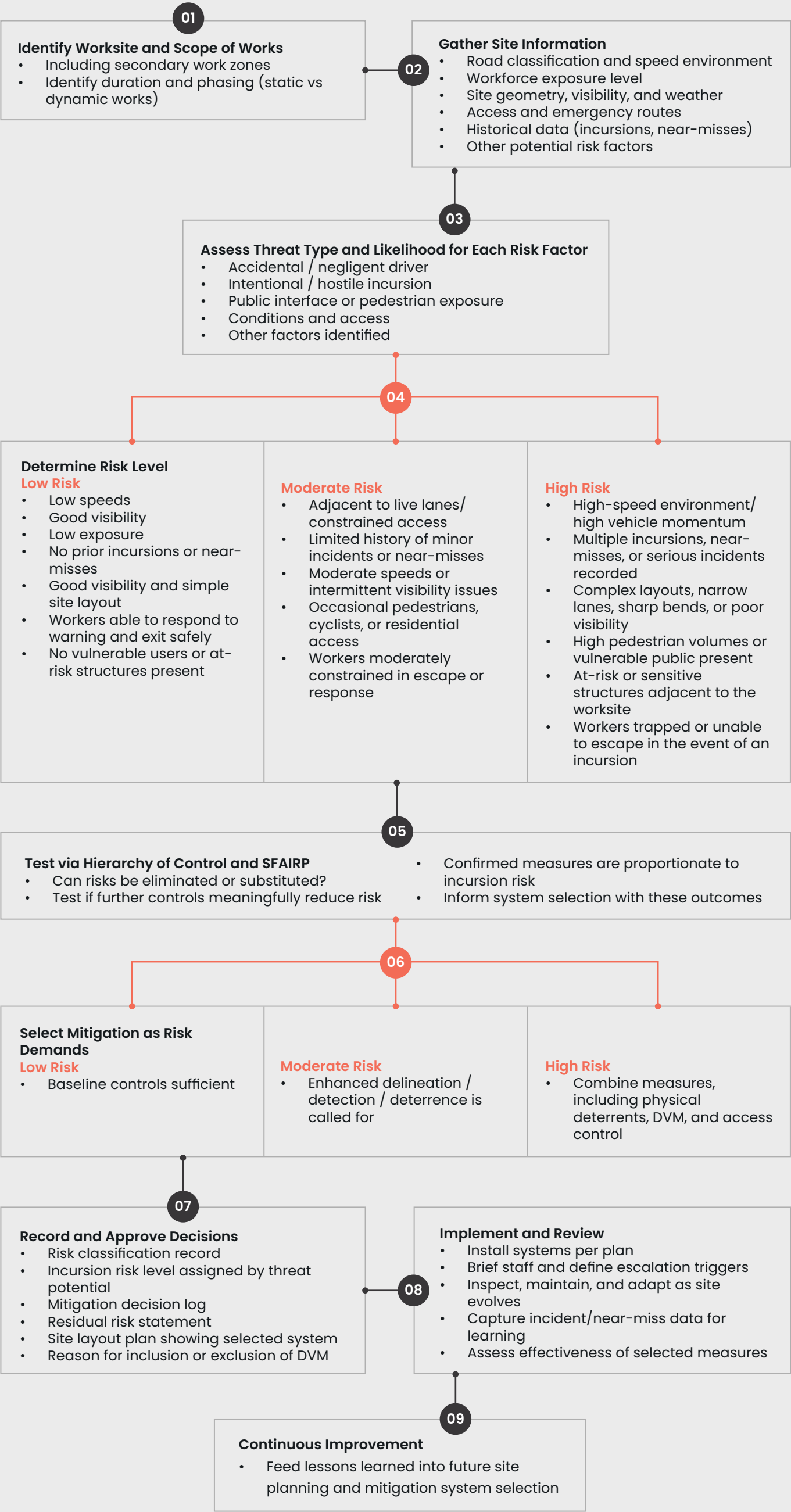
In Summary

This guidance offers a structured approach to identifying and selecting appropriate secondary incursion mitigation systems within work areas. Mitigation should always be integrated into the broader safe system of work, rather than seen as an isolated measure, and should be appropriate to the real risk level of the site.

By applying the principles of CDM 2015, DMRB, SFAIRP, and recognised sector standards, and using a risk-led decision process, parties can ensure that TTM operations are not just resilient and compliant, but safe for the worker on the ground and the public, with risk managed “within reasonable practicality”.

Further resources and technical support are available from National Highways and the Highways Safety Hub, as well as the Traffic Management Contractors’ Association. We’ve added a list of resources in the Appendix that will also assist.

Appendix 1: Decision-Making Flow Chart



Appendix 2: Suggested Resources and References

1. [Highways Safety Hub: Raising the Bar No.27 – Preventing and Managing Incursions](#)
2. [National Highways: Design Manual for Roads and Bridges \(DMRB\)](#)
3. [Traffic Signs Manual, Chapter 8, “Traffic Safety Measures and Signs for Road Works and Temporary Situations”](#)
4. [BSI Standards: EN 1317 – Road Restraint Systems](#)
5. [The Traffic Signs Regulations and General Directions](#)
6. [Health and Safety at Work etc. Act 1974](#)
7. [Requirements for Road Restraint Systems](#)
8. [Hostile Vehicle Management System Standards](#)
9. [Safety at Street Works and Road Works: A Code of Practice](#)
10. [Traffic Management Act 2004](#)



Published by:

TMCA
TRAFFIC MANAGEMENT CONTRACTORS ASSOCIATION

On behalf of:

◀ **Incursions & IPV Working Group**



**SUPPLY CHAIN SAFETY
LEADERSHIP GROUP**