North and Mid Wales Trunk Road Agent

Single Vehicle Operation
on 2-Lane Single Carriageways

Safety at Street Works and Road Works Code of Practice &
Chapter 8 Implementation Document

<table>
<thead>
<tr>
<th>Version</th>
<th>Final Issue</th>
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</thead>
<tbody>
<tr>
<td>Name</td>
<td>Position/Organisation</td>
</tr>
<tr>
<td>B Beachell</td>
<td>Welsh Government</td>
</tr>
<tr>
<td>B Campbell</td>
<td>Powys County Council</td>
</tr>
<tr>
<td>W Davies</td>
<td>Gwynedd Council</td>
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<td>D Hurst</td>
<td>Powys County Council</td>
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<td>K Kirkland</td>
<td>Ceredigion County Council</td>
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<tr>
<td>MW Morris</td>
<td>North &amp; Mid Wales Trunk Road Agent</td>
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<tr>
<td>D Owen</td>
<td>NMWTRA</td>
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<td>D Williams</td>
<td>Gwynedd Council</td>
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<td>E Williams</td>
<td>Conwy County Borough Council</td>
</tr>
<tr>
<td>RE Williams</td>
<td>NMWTRA</td>
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</tbody>
</table>

Prepared by: B Beachell, B Campbell, W Davies, D Hurst, K Kirkland, MW Morris, D Owen, D Williams, E Williams, RE Williams

Checked by: D Evans

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9/10/14
North and Mid Wales Trunk Road Agent

Single Vehicle Operation
on 2-Lane Single Carriageways

Safety at Street Works and Road Works Code of Practice
Chapter 8 Implementation Document

Contents

1. Introduction
2. Background
3. Risk Based Carriageway Categorisation
4. Slow Moving Single Vehicle Operations
5. Short Duration Single Vehicle Stops
6. Omnibus Temporary Traffic Orders
7. General Operational Requirements
8. Carriageway Categorisation Assessments and Site Specific Traffic Management Risk Assessments
9. Additional Requirements
10. Checking and Maintaining Sites
11. Record Keeping

Appendix A - Carriageway Categorisation Assessment
Appendix B - Site Specific Traffic Management Risk Assessment
Appendix C - Escort Vehicle/Crash Cushion Risk Assessment
Appendix D – Modified Traffic Management Plans NMWTRA SVW1A, SVW1B, SVW2A, & SVW2B.
1. Introduction

1.1 The Welsh Government is committed to improving road safety and reducing the number of fatalities and serious injuries on Welsh roads. The Programme for Government includes a commitment to target high-risk road users. Supporting this, the Road Safety Framework for Wales, issued July 2013 helps all partners to deliver effective road safety interventions targeting the right areas, in the right way, to reduce deaths and serious injuries in particular. Within this there is a commitment to improve the safety for Road Workers and this encourages Welsh Government to work closely with their supply chains to encourage a risk managed approach to activities undertaken on our behalf. This Single Vehicle Operations on 2-Lane Single Carriageways document demonstrates North and Mid Wales Trunk Road Agent’s commitment to improve safety and meet these aspirations within the Road Safety Framework.

1.2 Many routine and cyclic maintenance operations currently undertaken on single carriageways by the North and Mid Wales Trunk Road Agent (NMWTRA) Partner Authorities (PAs) on behalf of Welsh Government (WG) use slow moving single vehicles including tractors and gully emptiers. The principal maintenance operations undertaken using the above methods include such works as; grass and hedge cutting, gully emptying and jetting, white lining and road stud installation, sweeping, weed control and minor road repairs such as patching, and street lighting column maintenance.

1.3 This document only provides guidance for 2-lane single carriageways. Three or more lane sections will be dealt with on a site-specific basis.

1.4 This document only provides risk assessment guidance for the design and implementation of traffic management for maintenance operations. The actual maintenance operations must be carried out in accordance with the PA’s own risk assessment procedure and method statements.
2. Background

2.1 The revised “Safety at Street Works and Road Works Code of Practice”, often referred to as the ‘red book’, came into force on 1st October 2014 and is mandatory for works carried out by and on behalf of highway authorities. It applies to all single carriageway roads and sets out minimum requirements for the above operations within the section Mobile works and short-duration works.

2.2 ALL WORKS MUST COMPLY WITH THE REQUIREMENTS OF THE SAFETY AT STREET WORKS AND ROAD WORKS CODE OF PRACTICE

2.3 The Safety at Street Works and Road Works Code of Practice requires that site specific risk assessments are undertaken for each site. This Implementation Document provides a common approach to risk assessing traffic management for single vehicle maintenance operations in order to promote consistency of working practice across the NMWTRA area. In carrying out any individual risk assessment reference should always be made to the Safety at Street Works and Road Works Code of Practice.

2.4 In addition Traffic Signs Manual Chapter 8 – Traffic Safety Measures and Signs for Road Works and Temporary Situations 2009 provides extra guidance for the above operations. Section O8 makes specific provision for single vehicle working with requirements identified for works in areas with traffic speeds up to 30mph, 40mph and unrestricted sections of highway. (This Implementation Document should be read in conjunction with the above code of practice).

2.5 Chapter 8 Cl O8.1.5 states that for speed limits of 40mph or more, if practical and appropriate, and subject to risk assessment, consideration should be given to fitting a lorry mounted crash cushion (LMCC) to the working vehicle and/or any escort vehicle that may be employed; but also states that LMCC’s may be inappropriate on roads with poor alignment, and less than 5.5m wide, as they may create an additional hazard to road users. There are operational difficulties in introducing an escort vehicle/LMCC that create additional hazards which need to be risk assessed. The recommended control measure in the Risk Assessment in Appendix C of this document does not include the use of an escort vehicle/LMCC.

2.6 For speed limits of 40mph or more, Chapter 8 Cl O8.1.6 requires that the working vehicle shall carry a sign to diagram 7403 or, alternatively, carry a sign to diagram 610 provided an escort vehicle is used displaying a sign to diagram 7403. However, the Safety at Street Works and Road Works Code of Practice states that such signs need only be displayed if determined
necessary following risk assessment. If the Risk Assessment determines that the working vehicle shall display signs, then they must comply with TSRGD i.e. to diagram 7403 for maximum speed limit of more than 30mph and either diagram 7403 or 610 for 30mph or under.

2.7 In order to develop consistent working practices for the various highway maintenance operations across the network, the network has been categorised by PA’s and the activities organised into generic groups;

a) The single carriageway trunk road network has been assessed into one of three categories (General Sites, Moderate Sites, Difficult Sites) depending upon the route environment, geometry and the effect of these characteristics on maintenance operations.

b) The activities have been grouped into two categories: slow moving and short duration stops.
3. **Risk Based Carriageway Categorisation**

3.1 In order to provide a basis for consistency in the carrying out of maintenance operations it is necessary to categorise all routes into an operational hierarchy. Each route is evaluated in accordance with the Carriageway Categorisation Assessment (Appendix A) and is undertaken by each PA responsible for carrying out the maintenance operations in their area. This forms the highest level traffic management risk assessment on which all subsequent site specific traffic management risk assessments are based. Each route is assessed in respect of the operational characteristics of the route taking into consideration the carriageway width, verge width, visibility sight lines, gradients and traffic flows. The three categories are:

i) **General Sites:** Good visibility available for speed category of highway, with adequate verge widths or adequate alternative locations to place signage.

ii) **Moderate Sites:** Fair to Poor visibility with, carriageway widths typically less than 6.75m, with adequate locations to place signage.

iii) **Difficult Sites:** Sites that cannot be safely managed by implementation of traffic management layouts NMWTRA SVW1A/B or NMWTRA SVW2A/B (Appendix D). Difficult sites will require site specific traffic management control systems extending to lane closures with traffic control. (*Note: These sites are not covered by this implementation document.*)

The above categories are given for general guidance, and are subject to the use of engineering judgment and risk assessment dependent on particular circumstances. The carriageway features have a direct influence on the ability to carry out the maintenance operations and as the complexity of the road environment increases the impact on the maintenance operation becomes greater. These assessments and carriageway categorisations must be kept by the PA’s with electronic copies supplied to NMWTRA.
4. Slow Moving Single Vehicle Operations

4.1 Slow moving single vehicle operations involve a vehicle travelling slower than the normal traffic speed and/or making very short duration stops and carrying out some manoeuvring. These activities include operations such as; gully emptying, grass cutting, hedge cutting, white lining, road stud installation, sweeping and weed spraying. The works vehicle will be operating on the nearside of the running lane adjacent to the verge or kerb line with no possibility of following vehicles ‘under taking’ the works vehicle.

4.2 **Main Hazard;** the main hazard identified is for vehicles approaching the slower moving works vehicle from behind.

4.3 General Sites

Risk mitigation measures*

i) High visibility markings to rear of vehicle must be installed (see Cl.7.2).

ii) Amber flashing lights must be used (see Cl.7.2).

iii) Advanced warning signs must be erected on carriageway (see Drg. No NMWTRA SVW1A for minimum TM requirements).

4.4 Moderate Sites

Risk mitigation measures*

i) High visibility markings to rear of vehicle must be installed (see Cl.7.2).

ii) Amber flashing lights must be used (see Cl.7.2).

iii) Implementation of Stop / Go traffic management (see Drg. No NMWTRA SVW2A for minimum TM requirements).

iv) Weed Spraying operation may be undertaken under SVW1A due to its operational speed and will be subject to Specific Risk Assessment.

*The Risk Assessment may identify the requirement for additional mitigation measures which could include:

i) Diag. 7403 or Diag. 610 ‘Keep Right’ arrow installed on rear of vehicle.

ii) Additional warning signs erected on the carriageway, e.g. where there is limited visibility due to bends, a dip in the road or brow of a hill.

iii) Temporary Traffic Regulation Order at specific points of the route.

4.5 Difficult Sites:

Difficult sites would require site specific TM control systems extending to lane closures with traffic signal control. *(Note: These sites are not covered by this implementation document.)*
5. **Short Duration Stops**

5.1 Short duration works involve a single vehicle or a small number of vehicles (working together in close proximity) undertaking one or more intermittent stops. These activities include operations such as; patching, repair of a road marking, gully jetting, and street lighting column maintenance.

5.2 Any stop has a maximum duration of 15 minutes. Any operation taking longer than 15 minutes must implement full traffic management using stop / go or portable traffic signals as appropriate.

5.3 **Main Hazard**: the main hazard identified is for vehicles approaching the slower moving works vehicle from behind.

5.4 **General Sites**

Risk mitigation measures*

i) High visibility markings to rear of vehicle must be installed (see Cl.7.2).

ii) Amber flashing lights must be used (see Cl.7.2).

iii) Advanced warning signs must be erected on carriageway (see Drg. No NMWTRA SVW1B for minimum TM requirements).

5.5 **Moderate Sites**

Risk mitigation measures*

i) High visibility markings to rear of vehicle must be installed (see Cl.7.2).

ii) Amber flashing lights must be used (see Cl.7.2).

iii) Implementation of Stop / Go traffic management (see Drg. No NMWTRA SVW2B for minimum TM requirements).

*The Risk Assessment may identify the requirement for additional mitigation measures which could include:

i) Diag. 7403 or Diag. 610 ‘Keep Right’ arrow installed on rear of vehicle, depending upon where the activity is taking place within the running lane, e.g. for patching near centreline it may be necessary to have an arrow on the vehicle.

ii) Additional warning signs erected e.g. where there is limited visibility due to bends, a dip in the road or brow of a hill.

iii) Temporary Traffic Regulation Order at specific points of the route.

5.6 **Difficult Sites**;

Difficult sites would require site specific TM control systems extending to lane closures with traffic signal control. *(Note: These sites are not covered by this implementation document).*
6. **Omnibus Temporary Traffic Orders**

Omnibus type Temporary Traffic Orders are available to enable speed restrictions to be imposed on a more flexible program, within certain dates and over certain lengths to cover highway maintenance operations. This provides an additional mechanism for the management of highway maintenance operations.

The Omnibus type Order will be drafted to cover ‘works’, to ensure consistency with the wording in the Road Traffic Regulations Act 1984. This will cover highway maintenance operations, inspections and safety related activities. The Omnibus type Order will provide for a common temporary speed limit and may also include provision for short duration road closures;

a) 30mph temporary speed restriction.

b) 10mph and 40mph temporary speed restrictions for convoy operations.

c) Up to 20 minute short duration closures.

All temporary traffic restrictions must have legally compliant signing, which includes terminal signs, repeater signs and signing any side road junctions.

It is likely Omnibus type orders will primarily be used for difficult sites.
7. **General Operational Requirements**

7.1 **Operative Competency**

Only competent operatives, supervisors and managers should be engaged in the assessment, design, setting up, maintaining and removing of signing, lighting, guarding and temporary traffic control. The number of appropriately trained individuals (e.g. National Highway Sector Scheme 12D accreditation) must be in accordance with UKAS Sector Scheme guidelines. When placing portable traffic signals on a public highway, the operative must have a full understanding of the requirements and correct operation of the signals. Reference should be made to *An Introduction to the Use of Portable Vehicular Signals*, also known as the ‘Pink Book’.

Workforce issues relating to works carried out within the constraints of Traffic Signs Manual Chapter 8 2009, are dealt with in detail in document ‘Guidance for Safer Temporary Traffic Management’ (CSS/HA/HSE/2002) where reference to other documents giving further detailed guidance can be found.

7.2 **Works Vehicle Specification**

All works vehicles shall be suitable for purpose. Any works vehicle stopping on the highway for works purposes shall be equipped with either a roof mounted flashing amber warning light bar (comprising at least two independent light sources) or two independent vehicle roof-mounted flashing amber warning beacons, visible through 360° (Safety at Street Works and Road Works Code of Practice).

In terms of conspicuity, all works vehicle should be a conspicuous colour, e.g. yellow or white. Where feasible a non-reflective yellow colour, No. 355 (lemon) to Table 1 of BS3816:1996 is recommended.

All works vehicles shall be marked with high visibility rear chevron markings comprising alternate strips of fluorescent orange or red retroreflective material and fluorescent yellow non-retroreflective material, of not less than 150 mm width each, inclined at 45–60° to the horizontal and pointing upwards. The chevrons should cover as much of the rear-facing portion of the vehicle as possible without obscuring windows, vehicle lighting or the registration plate (Safety at Street Works and Road Works Code of Practice).

All works vehicles shall be kept clean.
All works vehicles used for installation, maintenance and removal of static traffic management on trunk roads shall comply with the specification in paragraphs O5.5.2 to O5.5.4 of Traffic Signs Manual, Chapter 8, 2009.
8. Carriageway Categorisation Assessments and Site Specific Traffic Management Risk Assessments

8.1 The Carriageway Categorisation Assessments carried out by the Partner Authorities are as described in Clause 3. This forms the highest level risk assessment and enables the maintenance operations to be planned, programmed and managed. These assessments form the basis on which all subsequent site specific traffic management risk assessments are carried out.

8.2 A Site Specific Traffic Management Risk Assessment must be carried out for all works before work begins. The categorisation of the routes and the maintenance operations is based on generic conditions and it is essential that each site is looked at individually to ensure it is compatible with the category and to determine the actual works taking place are appropriate. The traffic management risk assessment must take account of road layout and speed of traffic, the works undertaken, location, duration and restoration of work site to original state. The Site Specific Traffic Management Risk Assessment is based on the road category and maintenance operation as determined in Cl. 3, 4 and 5 and is divided into 2 parts;

- Part 1 to be completed when planning the maintenance activity and is to be completed by the Traffic Management Designer. This must ensure that the planned works are appropriate for the category of road.
- Part 2 to be completed when arriving at site prior to actual commencement of works and is to be completed by the Traffic Management Installer. This must ensure that the site characteristics are as anticipated and that it is safe to start the works as planned.

The Traffic Management Designer must be appropriately trained and experienced. The Traffic Management Installer must be a competent 12D trained operative and may be an operative carrying out the works or a dedicated traffic management contractor. The Site Specific Traffic Management Risk Assessment must be completed in addition to any site specific risk assessments for the actual execution of the maintenance operation or task as required by the PAs internal risk assessment procedures.

The Site Specific Traffic Management Risk Assessment is included in Appendix B.
9. **Additional Requirements**

9.1 Due to the nature of grass cutting / hedge cutting type operations it may cause difficulties for equestrians if they happen upon the works. Consideration should be given to temporarily suspending the works to allow equestrians to pass by safely.

9.2 Variable Message Signs can be used to provide additional warning messages.

9.3 In order to provide advance warning supplementary plates can be added to the road works warning sign. There are several approved permitted variants to Diag. 7001:

- Grass cutting / Torri gwair
- Tree cutting / Torri coed
- Hedge cutting / Torri perthi
- Ditching / Gwaith ffosydd
- Weed spraying / Chwistrellu chwyn
- Road sweeping / Ysgubo'r ffordd
- Gully emptying / Gwacau cwteri
- Line painting/Peintio llinellau
- Street Lighting/ Goleuadau Stryd

The lighting and reflectorisation of signs and supplementary plates used with them must comply with the requirements of the TSRGD.

10. **Checking and Maintaining Sites**

10.1 It is essential that the works operatives regularly check the traffic management to ensure that the signs, lighting and guarding are correctly placed are visible, in good working order and that they have not moved. Any changes required must be carried out immediately. Sites will be checked periodically by the PA’s Highway Inspectors and NMWTRA Assistant Route Managers to ensure the traffic management set up is appropriate and being maintained correctly. Any defects will be notified to the Traffic Management Installer immediately.

11. **Record Keeping**

11.1 Records of any accidents or near misses on the Trunk Road sites, with description of the situation, a cause or contributing factor if possible shall be sent to NMWTRA.
Appendix A

Carriageway Categorisation Assessment

This section must be completed by Partner Authority Responsible Officer

This assessment must be carried out for all routes. The assessment is NOT a review of design standards but a judgement of the operational capability of the route. The assessment will consider how the road characteristics impact on the maintenance operations and their traffic management requirements.

Road Number: .............................................

Section of Route (chainage/description): .................................

Route section characteristics:

(Detail the overall physical characteristics of the section of route)

Site length: ...........................m

Typical carriageway width: ..............m

Speed limit: .................................mph

Typical footway width: ...............m Footway on one side or both sides? ..............

Typical verge width: ...................m Verge on one side or both sides? ..............

Visibility along the section of route ...Good / Fair / Poor (Circle as required)

Route section features:

(Detail any features that will affect the flow of the operation, i.e. may cause additional manoeuvring, stopping or temporary suspension of the operation, e.g. termination of the verge)

Is there apparatus, street furniture in the verge that will affect operations? Yes No

Are there significant numbers of pedestrians / cyclists / vulnerable road users (e.g. near old people’s home, school): Yes/No

Are there junctions, accesses that will affect operations? Yes/No

Are there any pinch points in the carriageway / verge / footway? Yes/No

Is the verge / footway continuous through the section? Yes/No

Are there any lay-bys or hard standings that can be used by the operatives, e.g. to allow following traffic to clear? Yes/No
Awareness of traffic approaching (both directions): Yes/No
Are there adequate locations to place signs? Yes/No

Detail any further features that may affect operational capability:

Carriageway Category

(Based on the above assessment and definitions in Clause 3, select the appropriate site category below)

<table>
<thead>
<tr>
<th>General Sites</th>
<th>Moderate Sites</th>
<th>Difficult Sites</th>
</tr>
</thead>
</table>

Signature: ………………………..PA Responsible Officer Date: ___/___/___

Increasing impact on Maintenance Operation

Increasing complexity of route section

*The carriageway features have a direct influence on the ability to carry out the maintenance operations and as the complexity of the road environment increases the impact on the maintenance operation becomes greater.*
Appendix B

Traffic Management Site Specific Signing/Lighting/Guarding Assessment and checklist

Part 1: Pre-Works Traffic Management Assessment

This section must be completed by Traffic Management Designer

This site assessment must be carried out when planning the works, in accordance with the Code of Practice for Safety at Street Works and Road Works.

Prior to completing this form, the designer must read ‘Before going to site’ section of the Code of Practice for Safety at Street Works and Road Works.

Works Order / Reference: ..............................................

Road No. / Site Location: ..............................................

Site Category: General / Moderate / Difficult (Circle as required)

Work Description: e.g. patching/grass cutting/etc.: ..............................................

Activity Category: SLOW MOVING / SHORT-DURATION STOPS (Circle as required)

Expected duration: .................Weeks.............Days.................Hours

NB: For emergency works, as much warning must be given to road users as is reasonably practical and full signing, lighting and guarding must be provided as quickly as possible.

Description of Traffic management chosen:

..........................................................................................................................
..........................................................................................................................
..........................................................................................................................
..........................................................................................................................

Signature: .........................................................Traffic Management Designer (12D T7)

Date: .................................................................
Part 2: On site checklist

This section must be completed by the Traffic Management Installer (12d trained Operative)

This site assessment must be carried out on arrival at site in advance of starting works, in accordance with the Code of Practice for Safety at Street Works and Road Works.

Prior to completing this form operatives must read ‘Before going to site’ and ‘At the work site’ section of the Code of Practice for Safety at Street Works and Road Works.

Arrival at Site: Date: ......................... Time: ..............................................

For the Worksite you must check your surroundings and ensure that it is safe to start work

Traffic flows: Measured flow (veh.) in 3 minutes: ................................................

Are there significant numbers of pedestrians / cyclists / vulnerable road users (e.g. near old peoples home, school): ..................................................

---

Unusual features to be catered for: (Circle as required)

<table>
<thead>
<tr>
<th>Feature</th>
<th>Yes/No</th>
<th>Feature</th>
<th>Yes/No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bus stops</td>
<td></td>
<td>Hills/blind bends</td>
<td></td>
</tr>
<tr>
<td>Junctions</td>
<td></td>
<td>Parked vehicles</td>
<td></td>
</tr>
<tr>
<td>Pedestrian crossings</td>
<td></td>
<td>Restricted works hours</td>
<td></td>
</tr>
</tbody>
</table>

Details / others: .................................................................

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<table>
<thead>
<tr>
<th>Question</th>
<th>Yes / No</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Can the planned traffic management be installed?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Can the site be accessed safely?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Can the signs be placed correctly?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are the traffic conditions as predicted?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is the site free of any other nearby works?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are pedestrians catered for safely?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is the weather suitable for work?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
If the answer to any of these questions is No, you must contact your supervisor or manager.

If anything changes whilst carrying out the operation you must contact your supervisor or manager.

If you believe it is not safe to start work, record the reasons why and outline your concerns about the site along with any additional relevant information. These can be used for planning the work at a later date.

Signature: ............................ Traffic Management Installer (12d trained Operative)

Date: .................................
## Appendix C – Escort Vehicle/Crash Cushion Risk Assessment

### TRAFFIC MANAGEMENT (CHAPTER 8) – SINGLE CARRIAGeway Risk ASSESSMENT FORM

**LOCATION:** SINGLE VEHICLE WORKING – GENERAL SITES > 30mph

**TASK NAME:** - USE OF ESCORT VEHICLE / CRASH CUSHION/INSTALLATION OF TEMPORARY TM

<table>
<thead>
<tr>
<th>Risk Event</th>
<th>Initial Risk Priority Score: EPS X EIS = RPN</th>
<th>Control Measures</th>
<th>Revised risk Priority Score: EPS X EIS = RPN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potential for sandwich effect – passing vehicle to enter work space between escort and work vehicle.</td>
<td>EPS: 8, EIS: 1000, RPN: 8000</td>
<td>Delete escort vehicle, and adopt SVW1A/B or SVW2A/B. Pre-Works Traffic Management Assessment required to determine SVW1A/B or SVW2A/B.</td>
<td>EPS: 0, EIS: 0, RPN: 0</td>
</tr>
<tr>
<td>Traffic approaching from the rear being unaware of works vehicle.</td>
<td>EPS: 6, EIS: 1000, RPN: 6000</td>
<td>Maximise Conspicuity of works vehicle. All works vehicles used for installation, maintenance and removal of static traffic management on trunk roads shall comply with the specification in paragraphs O5.5.2 to O5.5.4 of Traffic Signs Manual, Chapter 8, 2009.</td>
<td>EPS: 3, EIS: 30, RPN: 90</td>
</tr>
<tr>
<td>Increased exposure of overtaking vehicle to oncoming traffic due to the total length of obstruction by works and escort vehicle.</td>
<td>EPS: 6, EIS: 1000, RPN: 6000</td>
<td>Delete escort vehicle, and adopt SVW1A/B or SVW2A/B. Pre-Works Traffic Management Assessment required to determine SVW1A/B or SVW2A/B.</td>
<td>EPS: 1, EIS: 100, RPN: 100</td>
</tr>
<tr>
<td>Escort vehicle reversing operations at junctions.</td>
<td>EPS: 16, EIS: 100, RPN: 1600</td>
<td>Delete escort vehicle, and adopt SVW1A/B or SVW2A/B. Pre-Works Traffic Management Assessment required to determine SVW1A/B or SVW2A/B. Separate operational risk assessment for works at junctions.</td>
<td>EPS: 0, EIS: 0, RPN: 0</td>
</tr>
<tr>
<td>Tail swing of vehicle crash cushion (6m long by 2.5m wide).</td>
<td>EPS: 16, EIS: 100, RPN: 1600</td>
<td>Delete escort vehicle, and adopt SVW1A/B or SVW2A/B. Pre-Works Traffic Management Assessment required to determine SVW1A/B or SVW2A/B.</td>
<td>EPS: 0, EIS: 0, RPN: 0</td>
</tr>
<tr>
<td>Increased road user frustration leading to erratic and dangerous driver behaviour.</td>
<td>EPS: 8, EIS: 1000, RPN: 8000</td>
<td>Delete escort vehicle, and adopt SVW1A/B or SVW2A/B. Pre-Works Traffic Management Assessment required to determine SVW1A/B or SVW2A/B.</td>
<td>EPS: 1, EIS: 100, RPN: 100</td>
</tr>
<tr>
<td>Cyclic maintenance programme extended due to reduced daily output.</td>
<td>EPS: 3, EIS: 80, RPN: 240</td>
<td>Delete escort vehicle, and adopt SVW1A/B or SVW2A/B. Pre-Works Traffic Management Assessment required to determine SVW1A/B or SVW2A/B.</td>
<td>EPS: 1, EIS: 40, RPN: 40</td>
</tr>
<tr>
<td>The reduced capacity for relief of traffic (e.g. pulling into gateway) can result in tail end shunt.</td>
<td>EPS: 15, EIS: 80, RPN: 1200</td>
<td>Delete escort vehicle, and adopt SVW1A/B or SVW2A/B. Pre-Works Traffic Management Assessment required to determine SVW1A/B or SVW2A/B.</td>
<td>EPS: 2, EIS: 15, RPN: 30</td>
</tr>
<tr>
<td>Unwieldy characteristics of escort vehicle on live carriageway limits manoeuvrability.</td>
<td>EPS: 16, EIS: 50, RPN: 800</td>
<td>Delete escort vehicle, and adopt SVW1A/B or SVW2A/B. Pre-Works Traffic Management Assessment required to determine SVW1A/B or SVW2A/B.</td>
<td>EPS: 0, EIS: 0, RPN: 0</td>
</tr>
<tr>
<td>Lack of rear visibility for escort vehicles.</td>
<td>EPS: 12, EIS: 50, RPN: 600</td>
<td>Delete escort vehicle, and adopt SVW1A/B or SVW2A/B. Pre-Works Traffic Management Assessment required to determine SVW1A/B or SVW2A/B.</td>
<td>EPS: 0, EIS: 0, RPN: 0</td>
</tr>
<tr>
<td>Reduced rear visibility for works vehicle limiting time for evasive action for errant vehicles.</td>
<td>EPS: 12, EIS: 40, RPN: 480</td>
<td>Delete escort vehicle, and adopt SVW1A/B or SVW2A/B. Pre-Works Traffic Management Assessment required to determine SVW1A/B or SVW2A/B. Restores normal rear visibility.</td>
<td>EPS: 4, EIS: 20, RPN: 80</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Average value</th>
<th>EPS</th>
<th>EIS</th>
<th>RPN</th>
</tr>
</thead>
<tbody>
<tr>
<td>EPS: 11</td>
<td>409</td>
<td>3138</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Average value</th>
<th>EPS</th>
<th>EIS</th>
<th>RPN</th>
</tr>
</thead>
<tbody>
<tr>
<td>EPS: 1</td>
<td>28</td>
<td>40</td>
<td></td>
</tr>
</tbody>
</table>

**Abbreviations used:**

- EPS – Event Probability Score – Score Ranges are 1=Extremely Unlikely, 2=Very Unlikely, 4=Unlikely, 8=Fairly Likely, 12= Likely, 16=Highly Likely (Note: Intermediate values may be interpolated)
- EIS – Event Impact Score – Score Ranges are 1=Negligible, 3=Marginal, 20=Substantial, 100=Severe, 1000=Disastrous (Note: Intermediate values may be interpolated)
- RPN – Risk Priority Number – Score Ranges are below 20=Negligible, 21-100=Acceptable, 101-1000=Undesirable, Over 1000=Intolerable
## CHAPTER 8 RISK ASSESSMENT MATRIX

<table>
<thead>
<tr>
<th>Event Impact Score</th>
<th>Event Probability Score</th>
<th>Risk Priority Number</th>
<th>Risk Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1000 Disastrous (Fatality)</td>
<td>16 Highly Likely</td>
<td>1001+</td>
<td>Intolerable</td>
</tr>
<tr>
<td>100 Severe (Serious injury / loss of limb)</td>
<td>12 Likely</td>
<td>101 - 1000</td>
<td>Undesirable</td>
</tr>
<tr>
<td>20 Substantial (Slight injury / medical attention)</td>
<td>8 Fairly Likely</td>
<td>21-100</td>
<td>Acceptable</td>
</tr>
<tr>
<td>3 Marginal (Damage to property / vehicles only)</td>
<td>4 Unlikely</td>
<td>0-20</td>
<td>Negligible</td>
</tr>
<tr>
<td>1 Negligible (Nuisance)</td>
<td>2 Very Unlikely</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 Extremely Unlikely</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Appendix D – Modified Traffic Management Plans NMWTRA SVW1A, SVW1B, SVW2A, & SVW2B.
Plan NMWTRA SWEB: Short direction slip lane to minimise on a single carriageway road.
Traffic Flow

Plan NWWTRA SWV24: Slow moving single vehicle operation on a single carriageway road
Traffic Flow

From NAVTRA SW28 - Short duration Stop then 15 minutes on a single carriageway road.