Guide to Temporary Traffic Management Part 10

Supporting Guidance

Austroads

Guide to Temporary Traffic Management
Part 10: Supporting Guidance

Sydney 2021

Guide to Temporary Traffic Management Part 10: Supporting Guidance

Edition 1.1 prepared by: Thuan Nguyen

Edition 1.1 project manager: Chris Koniditsiotis

Austroads' Guide to Temporary Traffic Management (AGTTM) details contemporary temporary traffic management practice for application in Australia and New Zealand. It provides guidance for the planning, design and implementation of safe, economical and efficient temporary traffic management designs. This Guide recognises the level of variability of the road environments for which guidance is provided. The guidance provided in AGTTM is intended to encourage a consistent level of planning that supports the streamlined safe progress of work. It applies to all works on roads and near roads, in addition to off road development and other activities that interact with and impact on the road environment.

AGTTM has been developed based on best practice temporary traffic management practice in Australia and New Zealand, to assist road authorities to meet their existing legislative responsibilities for workplace and public safety.

Part 10 provides information on a range of topics to support the information contained within the other parts of this AGTTM. The information includes, risk management processes, review, inspection and road safety audit of worksites, events and emergency works.

Keywords

Temporary traffic management, risk management, road safety, roadworks

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Austroads Ltd.
Level 9, 570 George Street
Sydney NSW 2000 Australia

Phone: +61 2 8265 3300

austroads@austroads.com.au
www.austroads.com.au

About Austroads

Austroads is the peak organisation of Australasian road transport and traffic agencies.

Austroads' purpose is to support our member organisations to deliver an improved Australasian road transport network. To succeed in this task, we undertake leading-edge road and transport research which underpins our input to policy development and published guidance on the design, construction and management of the road network and its associated infrastructure.

Austroads provides a collective approach that delivers value for money, encourages shared knowledge and drives consistency for road users.

Austroads is governed by a Board consisting of senior executive representatives from each of its eleven member organisations:

- Transport for NSW
- Department of Transport Victoria
- Queensland Department of Transport and Main Roads
- Main Roads Western Australia
- Department for Infrastructure and Transport South Australia
- Department of State Growth Tasmania
- Department of Infrastructure, Planning and Logistics Northern Territory
- Transport Canberra and City Services Directorate, Australian Capital Territory
- The Department of Infrastructure, Transport, Cities and Regional Development
- Australian Local Government Association
- New Zealand Transport Agency.

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1. Introduction

1.1 Purpose

Managing the risks associated with providing an optimal level of safety for persons working in or near traffic and the impact of road work on road users, road congestion and the general community, is a significant issue for road agencies and industry. Road agencies and industry have a legislative requirement as an employer of construction, operational and maintenance services to provide a safe work environment and to manage the risks of working in or near traffic through current jurisdictional Work Health and Safety (WHS) requirements, regulation, training and roadwork planning.

The Austroads Guide to Temporary Traffic Management (AGTTM) details the contemporary temporary traffic management practice of member organisations. In doing so, it provides guidance to designers in the production of safe, economical and efficient temporary traffic management designs. This Guide recognises the level of variability of the road environments for which guidance is provided. The guidance provided in AGTTM is intended to encourage the consistent planning, design and implementation of temporary traffic management across Australia and New Zealand while also supporting the streamlined safe progress of work. It applies to all works on roads and near roads, in addition to off road development and other activities that interact with and impact on the road environment.

The purpose of the AGTTM is to provide guidance and supporting material that:

- supports the ability of road agencies and industry to meet their WHS requirements and lead to improved safety outcomes at road worksites
- improves the standard of temporary traffic management in Australia and New Zealand through consistency of application which assists road users to recognise and understand temporary traffic management, thereby improving their behaviour and safety
- aims to reduce the rate of incidents occurring at worksites
- improves the ability of road authorities and industry to manage the increasing frequency and variety of activities that are being undertaken on and near the road
- allows continuous industry review to maintain best practice.

This purpose is achieved through:

- providing direction for all matters relating to the planning, design and implementation of temporary traffic management
- facilitating improved adaptation to changes in technology and practices through being reactive to changes and being able to readily include new innovations
- providing guidance focused on the users of this Guide
- providing road agencies and industry with uniform practices whilst carrying out works on or near roads.

The benefits associated with uniform guidance broadly accepted by jurisdictions and industry include:

- guidance and training that appropriately develop designers with the skills necessary to develop and deliver safe traffic management at road worksites
- reduced impost on industry working across jurisdictional borders
- improved harmonisation of road worksites across jurisdictions providing improved consistency for road users, including vulnerable road users such as pedestrians and cyclists. This is targeted at improving road user behaviour, safety of road worksites and reducing impact on road congestion and the general community.

1.2 Structure of AGTTM

The structure and content of the Austroads Guide to Temporary Traffic Management is discussed in AGTTM Part 1: Introduction. Within the AGTTM, the terminology that applies is detailed in Table 1.1.

Table 1.1: Guidance terminology

Guide	The description for the complete Austroads Guide to Temporary Traffic Management including all 10 Parts
Part	The description for the individual documents within the Guide. This document is Part 10 of the Austroads Guide to Temporary Traffic Management
Section	The description for a numbered section within each Part of the Guide. This is Table 1.1 placed within Section 1.2 of Part 10 of the Austroads Guide to Temporary Traffic Management.

Within this Guide, reference may be made to other parts of the Austroads range of publications such as the *Guide to Road Design* and the *Guide to Traffic Management*.

In the context of the other guides within the Austroads range of publications, this Guide is restricted to matters relating to TTM practice and refers only briefly to issues more appropriately addressed in other Austroads Guides. It is recognised it is difficult, if not impossible, to discuss many aspects of TTM practice without reference to traffic management, road design and/or safety issues. The view is taken that within the AGTTM, any such advice should be brief and be supported by references to other Guides for the appropriate guidance as required.

The scope of the AGTTM is broad, addressing requirements and recommendations for protecting road workers and all road users, including vulnerable road users, from hazards, road traffic and other impacts of road works across a range of situations that may include:

- urban and rural environments
- motorways, major arterial roads, local roads, roads in built-up areas, roads in open road areas and unsealed roads
- all variations of road use by cars, heavy vehicles, public transport, motorcycles, cyclists and pedestrians
- day and night works
- changing road and weather conditions.

The structure of the AGTTM is described in Figure 1.1 and in Table 1.2.

Figure 1.1: Structure of the Austroads Guide to Temporary Traffic Management

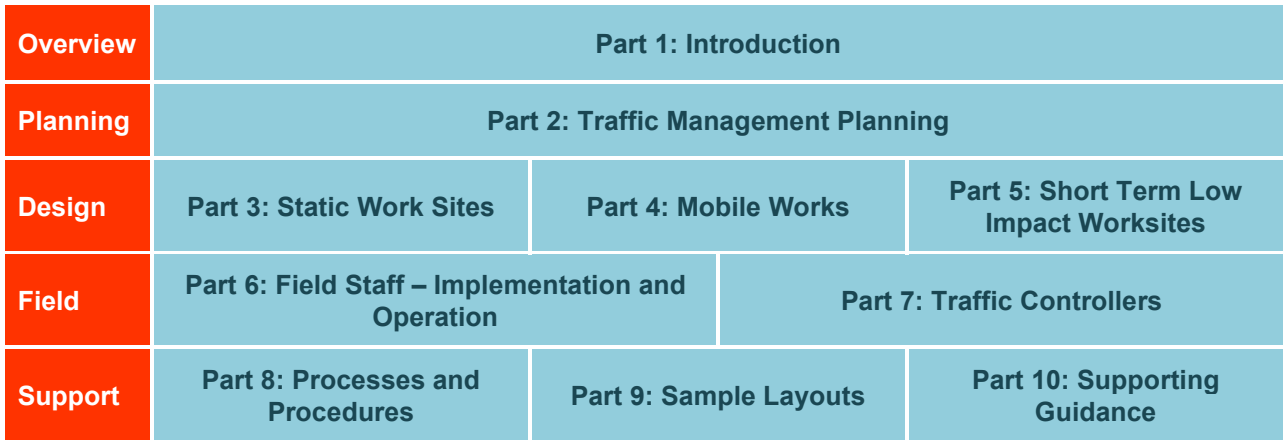


Table 1.2: Parts of the Austroads Guide to Temporary Traffic Management

Part	Title	Content
Part 1	Introduction	• Introduction to the discipline of TTM practices • Breadth of the subject and the relationship between the various Parts of the Guide • Legislative relationships • Links to related jurisdictional documentation • Definitions
Part 2	Traffic Management Planning	• Broad strategies and objectives to provide effective TTM to ensure the safety for all road users is maintained • Guidance on the safety of workers and other road users • Examples and key considerations for planning of TTM at road worksites • Process for planning and documenting TTM
Part 3	Static Worksites	• Guidance on the design of temporary traffic guidance schemes at static worksites • Process to decide what static worksite set up is appropriate to implement (including devices used)
Part 4	Mobile Works	• Guidance on the design of temporary traffic guidance schemes at mobile works • Process to decide what mobile works set up is appropriate to implement (including devices used)
Part 5	Short Term Low Impact Worksites	• Guidance on the design of temporary traffic guidance schemes at short term low impact worksites • Process to decide what short term low impact worksite set up is appropriate to implement (including devices used)
Part 6	Field Staff – Implementation and Operation	• On site risk assessment • Installation and removal of TTM schemes • Operation and monitoring of TTM schemes • Record keeping
Part 7	Traffic Controllers	• Training competencies • Instructions on practices • Control devices that can be used
Part 8	Processes and Procedures	• Road network classification • Power, roles and responsibilities • Forms and procedures • Model contract specification • Training competencies
Part 9	Sample Layouts	• Example layouts of static worksite conditions • Example layouts of mobile works conditions • Example layouts of short term, low impact conditions • Example layouts for staging plans • Worked example for a multi-stage project
Part 10	**Supporting Guidance**	• **Risk management processes** • **Review, inspection and road safety audit of worksites** • **Events** • **Emergency works**

1.3 Scope of Part 10

AGTTM Part 10 provides guidance to road authorities, road infrastructure managers, any party conducting works on or near a road, and all persons involved in planning, designing, implementing, managing and completing TTM works.

Guidance is provided to support the other parts of the AGTTM on a range of topics relating to TTM. This Part includes the following topics:

- risk management
  - process for undertaking risk management
  - application to TTM at road work sites
  - best practice process.
- review, inspection and road safety audit of worksites
  - process for undertaking reviews, compliance inspections and road safety audits at road worksites
  - application to TTM at road work sites
  - best practice process.
- events
  - specific processes and issues for the development of traffic management plans and traffic guidance schemes for events.
- emergency works
  - definition of emergency works
  - risk assessed process for relaxations to the TTM requirements for static work sites to be applied in an emergency.

1.4 Application of Part 10 to New Zealand

Readers in New Zealand should note the following in application of Part 10 of this Guide:

- the layouts described in Section 5.3 and in the accompanying figures are based on layouts applied within the Australian context. For layouts applied within New Zealand, refer to the New Zealand Code of Practice for Temporary Traffic Management.

1.5 Definitions

Refer to AGTTM Part 1 for a full list of definitions which apply to this Part.

2. Risk Management for TTM

2.1 General

Risk management is a widely adopted and well accepted process in Australia and New Zealand. It has been a primary process for a wide range of safety related functions for many years, particularly in the area of work health and safety.

Within the context of risk management, the distinction between a hazard and a risk must be understood.

Hazard is any aspect that can cause harm or damage to humans, property, or the environment. In the context of TTM, a hazard is focussed on any item or event that affects the safety of road workers or road users.

Risk is the probability that exposure to a hazard will lead to a negative consequence. Importantly a hazard poses no risk if there is no exposure to that hazard. Risks can include a range of other items that are risks to a project but may not be a safety risk.

Within AGTTM, risk management is focussed on the operational safety risk associated with traffic and the risks associated with traffic flow and impact to local business and residents. It is expected that those responsible for the overall works will consider other risks including:

- legal
- environmental
- financial (cost)
- political
- reputational
- quality.

These other risks are not discussed further in AGTTM. However, risks associated with TTM may need consideration within these other risk topics. For example, TTM can create environmental risks, may impact on the financial risks to a project and so forth. In this case, the person preparing the risk management plans for the other risks may seek the necessary input from the TTM team.

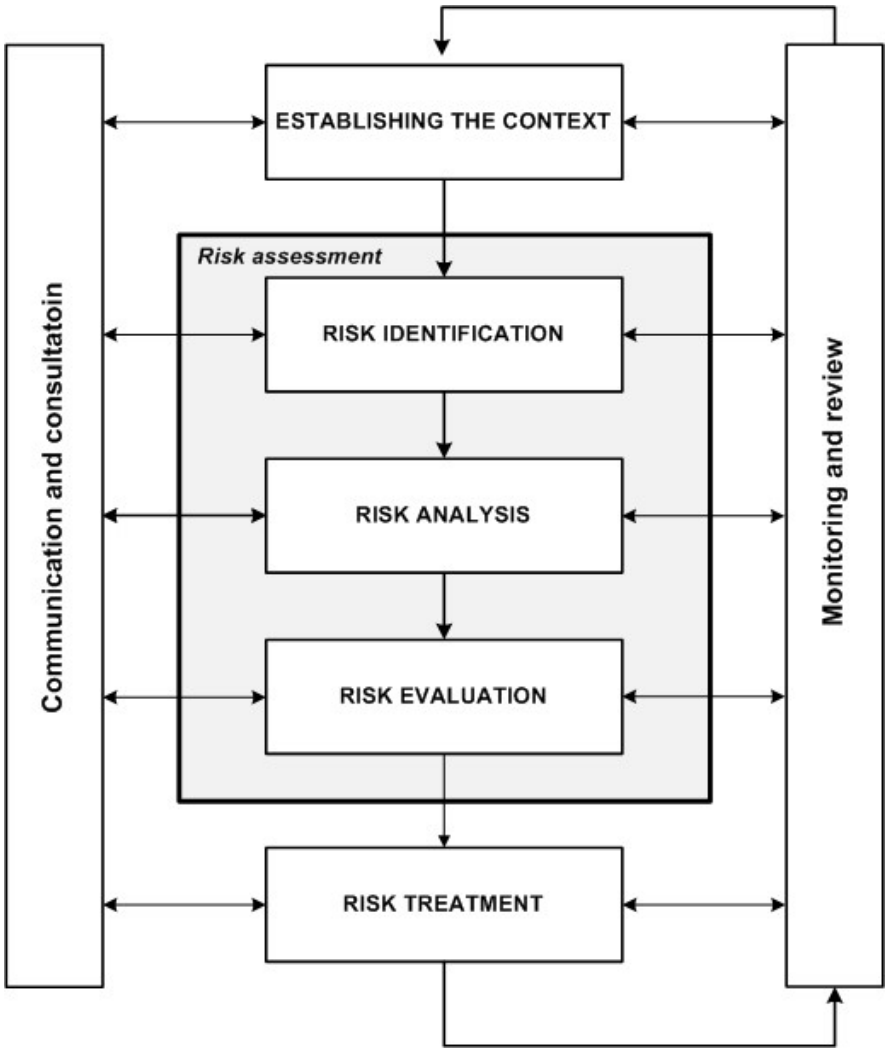
Information and advice for risk management is covered to provide a uniform approach to the management of risks for TTM worksites and the application of traffic guidance schemes. Model guides are provided that can be used by practitioners to assess the risks for the preparation, design and safety of road work sites and the governing traffic management plans and supporting traffic guidance schemes. The guidance in this Part represents the minimum requirements for undertaking risk management for TTM and reference should also be made to risk and hazard management systems required by the Principal and Road Infrastructure Manager.

2.2 Overview

The risk management process discussed in AS/NZS ISO 31000:2018 is represented by the process flowchart in Figure 2.1.

AS/NZS ISO 31000:2018 defines risk as an ‘effect of uncertainty on objectives’ and goes on to describe risk as often being ‘characterised by references to potential events and consequences, or a combination of these’ and further it ‘is often expressed in terms of a combination of the consequences of an event and the associated likelihood of occurrence’.

Figure 2.1: Risk management process – overview



Source: ISO 31000:2018

AS/NZS ISO 31000:2018 defines risk management as 'the culture, processes and structures that are directed towards realising potential opportunities whilst managing adverse effects. This then requires that a person accountable for managing the risk 'coordinates activities to direct and control an organisation with regards to risk'.

There are three core components to the risk management process as defined by the Standard. These are:

- establishing the context
- risk assessment, which is comprised of identifying, analysing and evaluating risk
- treating the risk.

Operating across these three components, and interacting with them at multiple levels, is the additional risk management components of communication/consultation and monitoring/review.

Each of these components of the risk management process has an important relevance to TTM at road work sites.

2.3 Application to TTM at Work Sites on Roads

The application of risk management for TTM at road works is appropriate at all levels of planning and operation, from the minor and routine schemes through to large scale and complex road work sites.

Figure 2.1 identifies “establishing the context” as an important first step of the risk management process. The context of risk management for TTM at road work sites may be summed up as managing safety and work productivity. The context for TTM at road work sites includes the road and traffic environment; it involves members of the public as road users who are travelling through and past the road work site; it includes site personnel, day labourers, contractors and the traffic controllers themselves; and it must consider the nature of the work to be undertaken, the scheduling of key tasks and the need to manage the disruption that is caused to the traffic flow.

This context permits the identification of a broad range of risks that road agencies, designers, project planners and work site managers must consider when preparing traffic management plans.

Road works requiring TTM may be divided into a number of types such as static work or mobile work. The extent of TTM measures that need to be planned and implemented is often determined by such factors as:

- period of operation
- type and extent of works being undertaken
- road (operating) environment where the works are to occur including factors such as:
  - the prevailing traffic volume
  - sign posted speed limit approaching the road work site
  - prevalence of vulnerable road users (pedestrians and cyclists) including children and the elderly.

2.4 Elements of Best Practice

A model risk management process for TTM at road work sites was developed as an outcome of Austroads (2012) and based on Victoria’s Roads Management Act (2004) which contains a comprehensive discussion of the relevant issues. The information in this section presents a best practice model for risk assessment for TTM at road work sites.

2.4.1 A model risk management process

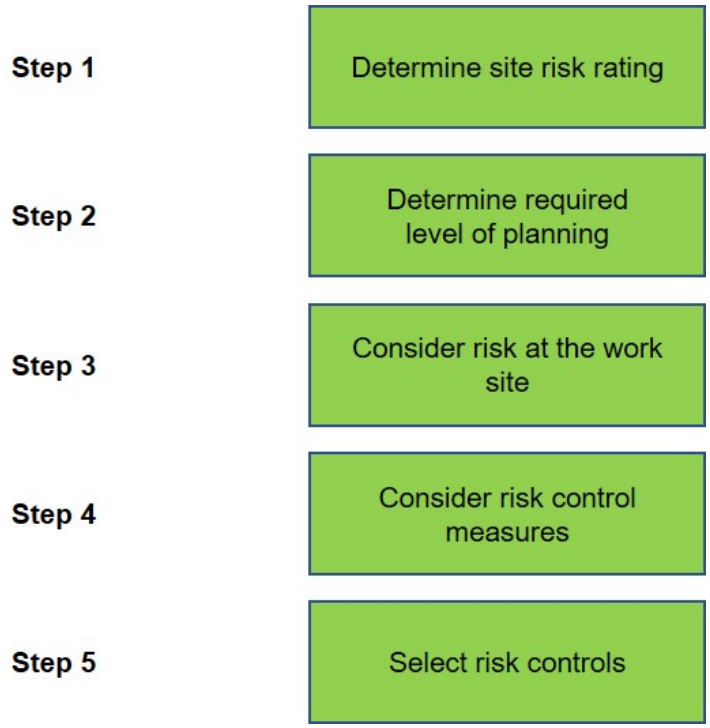
The elements of a best practice risk process steps are illustrated in Figure 2.2 with further information for each step detailed in the following sub-sections.

At road work sites, a risk exists for both workers and road users from an uncontrolled interaction between passing vehicles and the road work site/activity, or an uncontrolled interaction within passing traffic due to the road work site/activity. These risks exist for all road users including motorists, motorcyclists, pedestrians, cyclists and of course workers associated with the road work activity, and consideration of risks should be given from the perspective of all.

Managing risk requires the consideration of two components of risk, the likelihood of an event occurring and the consequence of that event occurring.

Typically, the consideration of these risk factors (likelihood and consequence) occurs via a risk matrix, the outcome of which will assist to identify a measure of the level of risk associated with the defined event.

Figure 2.2: Temporary traffic management at work sites process steps -risk management



Source: Austroads (2012), modified from Victorian Government (2004).

Road environment factors that contribute to risk at road work sites include the:

- proximity to passing traffic (particularly the clearance between the traffic stream and the road work site, workers and any plant or machinery)
- speed of the traffic stream, including cyclists, passing adjacent to or through the work site
- traffic volume and composition
- presence, movement paths, the number and types of vulnerable road users
- type of work activity
- operating hours of the road work site and the associated TTM
- changes to the traffic arrangements
- site access and egress
- upstream and downstream traffic conditions
- geometry of the road approaching and past the work site (e.g. sight distance, curve radii etc.).
- road condition
- weather conditions.

The application of the model process and the key tasks it defines are discussed in more detail in the following steps.

2.4.2 Step 1 – Determine the site risk rating for planning of TTM

The site risk rating considers the road environment where the work site is to be established and seeks to determine if a low or high risk exists for workers without any protective measures or special management of the traffic stream. That is, this initial assessment considers the in-situ conditions of the proposed work site to determine if it represents a low or high risk to road users and workers.

The level of site risk can then be used to determine the degree of planning required to reduce the risks present in the context of the work, i.e. the period of operation, the type and extent of works being undertaken and the road (operating) environment.

The site risk rating for planning of TTM may be determined using the site risk matrix in Figure 2.3. The input parameters for the site risk from the matrix are:

- speed zone (existing, signposted)
- road category (refer AGTTM Part 8 for description of road categories)
- lateral clearance between workers and the traffic stream.

Figure 2.3: Determining the site risk rating for planning

Site risk rating						
		Clearance between traffic lane and workers				
		< 1.2 m	1.2 – 3.0 m	3.0 – 6.0 m	6.0 – 9.0 m	> 9.0 m
Posted speed limit and road type	40 km/h					
	Category 1 road	Medium	Low	Low	Low	Low
	Category 2 road	Medium	Low	Low	Low	Low
	50 km/h					
	Category 1 road	Medium	Low	Low	Low	Low
	Category 2 road (urban)	High	Medium	Low	Low	Low
	60 km/h or 70 km/h					
	Category 1 road	High	Medium	Low	Low	Low
	Category 2 road	High	High	Medium	Low	Low
	80 km/h or 90 km/h					
	Category 1 road	High	High	Medium	Low	Low
	Category 2 road	High	High	High	Medium	Low
	Category 3 road	High	High	High	Medium	Low
	100 km/h or higher					
	Category 1 road	High	High	High	Medium	Low
	Category 2 road	High	High	High	Medium	Low
	Category 3 road	High	High	High	Medium	Low

A low risk site will generally require less planning and preparation to manage the identified risks. A high risk site will require decidedly more planning and preparation to reduce the risks to acceptable levels.

It should be noted that selection of this site risk for planning of TTM simply represents a starting point for the protection of workers from traffic. The overall risk rating will also include a range of other parameters which consider the risk created for pedestrian, cyclists and other road users. These other factors should also be considered to determine if an alternative higher or lower risk rating is applicable.

2.4.3 Step 2 – Determine the required level of planning

The level of planning and the amount of documentation produced to prepare and implement a traffic management plan and traffic guidance schemes will initially be determined by the site risk rating. This risk rating will also determine the potential for the use of generic TGS for repetitive activities as detailed Table 2.1.

Table 2.1: Level of TMP required and use of generic TGS

Step 1 Site Risk Rating	Level of traffic management planning	Generic TGS suitability	Site specific TGS
Low	Required but minimal	Generally, directly suited for most maintenance and construction activities with minimal amendments	Will be required to be developed to ensure the safe and efficient treatment for • more complex sites • sites impacting other road user groups such as pedestrians and cyclists
Medium	Required to assess the risks associated with working in proximity to traffic and identify restrictions regarding use of generic plans.	Generally, remain suitable for most maintenance activities	
High	A comprehensive traffic management plan must be prepared prior to the use or development of TGS for the works and should seek to eliminate or reduce risk to acceptable levels.	May remain suitable for routine maintenance activities in accordance with a TMP specifying all necessary restrictions for their use	Will be required for all other activities not specifically identified as being suitable for use of generic TGS

The development of generic TMPs and TGSs are described in AGTTM Part 3 with the application described in AGTTM Part 8. Many organisations may develop generic TGSs with a selection and risk process to be applied. Once selected, the generic TGSs may often be applied with only minor adjustment within the approved authorisation for a Traffic Management Implementer (TMI) to then establish them to be deemed ‘site suitable” for implementation at road work sites.

2.4.4 Step 3 – Consider risk at the work site

A review of all risks associated with a site and the work activities should be undertaken, factoring in the type of work activity, time of day of the operations, presence of vulnerable road users, changes to the traffic arrangements, site access and egress, upstream and downstream traffic conditions etc. This process may result in a review of the site risk rating and a change in the level of planning that is required.

Key consequences to consider include:

- injury to workers
- injury to motorists and motorcyclists
- injury to pedestrians and cyclists
- vulnerable road users where alternative routes may create personal safety and security issues, particularly at night.

When planning TTM for road work sites, other consequences that are not directly safety based should also be considered. These include:

- impact on local businesses and residents
- effect on traffic flow and congestion, particularly during peak traffic periods
- effect on services such as public transport and emergency services

- the effect of traffic detours on adjoining properties, traffic flow and movement of vulnerable road users, particularly when local streets may be utilised as a detour route
- Network wide risks arising from diversion by traffic avoiding the locality of the worksite.

Table 2.2 lists common work site events, their causes and the consequences and can be used to identify the range of risks that may be present at a site. This list is not exhaustive, and the risk management process should ensure that the risk assessment considers any additional risks not listed.

Table 2.2: Common risks at road work sites

Risk Event	Cause	Consequence
Penetration of the work site by a vehicle	• Failure to comprehend or observe TTM signs • Failure to navigate the traffic guidance scheme • Inadequate controls – direction, speed reductions, lane drop merge etc. • Failure to comply with controls – direction, speed reduction etc.	Injury to workers, drivers and passengers Property damage and other financial losses
Worker strays onto live roadway or clear zone	• Inadequate delineation • Inadequate clearance • Inadequate procedures • Inadequate controls	Injury to workers, drivers and passengers
Establishment/changing/ dismantling traffic arrangements expose workers to traffic	• Poor planning and preparation for works • Inadequate instructions for workers • Inadequate controls	Injury to workers, drivers and passengers
Construction and delivery vehicles entering, traversing and exiting the road work site, particularly over-dimensioned vehicles	• Poor planning and preparation for site access/egress • Inadequate instructions for vehicle operators • Inadequate control of site traffic	Injury to workers, drivers and passengers
Obstacles on work site	• Untidy work site • Work site left unattended • Improper attention given to traffic • Improper attention given to pedestrians and cyclist traffic	Injury to motorists or motorcyclists Injury to pedestrians or cyclists
Failure to navigate through the work site	• Poor signing • Inappropriate signing • Inadequate delineation • Inadequate control of traffic	Injury to motorists, motorcyclists or cyclists Property damage and other financial losses
Works vehicle impacting on motorists or motorcyclists	• Inadequate signing • Inadequate delineation • Inadequate instructions for workers • Inadequate controls	Injury to motorists, motorcyclists or cyclists
Failure by pedestrians / cyclists to navigate through the work site, or poor route definition through/past the work site	• Poor signing • Poor lighting • Inappropriate signing • Inappropriate route through/past the work site • Inadequate path surface, width or obstructions on the path • Inadequate ramps at changes from path to road • Inadequate delineation or separation from other traffic • Inadequate delineation or separation from the work site	Injury to pedestrians or cyclists

Risk Event	Cause	Consequence
Increased exposure for vulnerable road users to traffic	• Poor planning of crossing points for vulnerable road users • Inappropriately long diversions result in vulnerable road users entering road unsafely	Injury to pedestrians or cyclists
Significant traffic delays/congestion	• Poor planning of traffic management arrangements • Failure to cater for works and TTM • Worksite event	Excessive lost time to motorists, commuters and public transport services
		Property damage and other financial losses

Source: Modified from Victorian Government (2004).

The risks should be assessed by determining how much harm or damage they can cause, or how much impact they can have on road users, adjacent residents or businesses (consequence) and how likely they are to result in harm or negative consequences (likelihood). This analysis is based on all the identified controls being in place, with their established degree of effectiveness.

Likelihood is the chance of something happening and can be established using the example likelihood measures as detailed in Table 2.3.

Table 2.3: Risk matrix – likelihood descriptions

Likelihood	Description
Almost certain	• Expected to occur in most circumstances or • Expected to occur at least 8 in 10 times the event or action occurs, i.e. more than a 80% chance of occurrence or • Will probably occur with a frequency in excess of 10 times per year.
Likely	• Expected to occur multiple times during any given year or • Expected to occur between 8 in 10 and 1 in 10 times the event or action occurs, i.e. between a 10% to 80% chance of occurrence or • This risk is known to occur often but less than 10 times per year
Possible	• Expected to occur once during any given year or • Expected to occur between 1 in 10 and 1 in 100 times the event or action occurs, i.e. 1% to 10% chance of occurrence or • This risk is known to have occurred on occasions
Unlikely	• Expected to occur once every 1 to10 years or • Expected to occur between 1 in 100 and 1 in 1000 times the event or action occurs, i.e. 0.1% to 1.0% chance of occurrence or • This risk could occur but not often
Rare	• Not expected to occur in the next 10 years ie less than once every 10 years or • Expected to occur less than 1 in 1000 times the event or action occurs, i.e. less than 0.1% chance of occurrence or • It is unusual that this risk occurs, but it has happened

Source: Modified from Roads and Maritime Services (2018).

Consequence is the outcome resulting from a risk being realised. The appropriate consequence rating may be selected using the consequence measures contained in Table 2.4.

Table 2.4: Risk matrix – consequence descriptions

Rating	Traffic Impacts	Vulnerable road user (VRU) Impacts	Property Damage Impacts	Safety and Health Impacts
Insignificant	• Hourly traffic flow per lane is equal to or less than the allowable lane capacity detailed in AGTTM03. • No impact to the performance of the network.	• No impact to paths or routes.	No property damage	No treatment required
Minor	• Hourly traffic flow per lane is greater than the allowable road capacity and less than 110% of the allowable road capacity as detailed in AGTTM03. • Minor impact to the performance of the network.	• Minor impact to paths or routes. • Some exposure to rough surfaces in the work site. • Minor additional exposure to road traffic.	Minor property damage	First aid treatment required
Moderate	• Hourly traffic flow per lane is equal to and greater than 110% and less than 135% of allowable road capacity as detailed in AGTTM03. • Moderate impact to the performance of the network.	• Moderate impact to paths or routes. • Rough path surfaces. • Exposure to shallow excavations and manual workers / tools. • Moderate additional exposure to road traffic and additional road crossings.	Moderate property damage	Medical treatment required or Lost Time Injury
Major	• Hourly traffic flow per lane is equal to and greater than 135% and less than 170% of allowable road capacity as detailed in AGTTM03. • Major impact to the performance of the network.	• Major impact to paths or routes. • Unformed path surfaces. • Exposure to deep excavations and work plant. • Major additional exposure to road traffic and multiple additional road crossings.	Major property damage	Single fatality or major injuries or severe permanent disablement
Catastrophic	• Hourly traffic flow per lane is equal to and greater than 170% of allowable road capacity as detailed in AGTTM03. • Unacceptable impact to the performance of the network.	• Unacceptable impact to paths or routes. • No suitable alternative route. • Exposure to deep excavations and multiple heavy plant items. • Major additional uncontrolled exposure to road traffic.	Total property damage	Multiple fatalities

The consequence/likelihood risk matrix in Table 2.5 can be used to identify the level of risk for each event identified at the proposed work site.

Table 2.5: Consequence / likelihood risk matrix

		Likelihood				
		Almost certain	Likely	Possible	Unlikely	Rare
Consequence	Catastrophic	Very high	Very high	High	High	Medium
	Major	Very high	Very high	High	Medium	Low
	Moderate	High	High	Medium	Low	Low
	Minor	High	Medium	Low	Low	Low
	Insignificant	Medium	Low	Low	Low	Negligible

Based on the consideration of the risks in Table 2.5, if any risks are determined to fall within the Very High, High or Medium categories then the site risk rating should be revised to High and the level of planning reviewed accordingly. This then requires the Traffic Management Designer (TMD) to revisit and assess the traffic management options from the planning stage rather than attempting to address and mitigate each risk individually. The suggested treatment approach is described in Table 2.6.

Table 2.6: Suggested treatment approach for risk levels

Risk	Suggested treatment approach	
Very high	Unacceptable. Must be corrected.	Significant and urgent action is required to eliminate the safety risk or reduce the consequence or likelihood of the risk and overall risk exposure.
High	Should be corrected or the risk significantly reduced, even if the treatment costs are high.	Immediate action is required, and effort must be made to ensure that the safety risk is eliminated so far as is practicable or minimised so far as is practicable if elimination is not reasonably practicable.
Medium	Should be corrected or the risk significantly reduced, if the treatment cost is moderate, but not high.	Action is required and effort must be made to ensure that the safety risk is eliminated so far as is practicable or minimised so far as is practicable if elimination is not reasonably practicable.
Low	Should be corrected or the risk reduced, if the treatment cost is low.	A level of safety risk that requires monitoring and review to ensure that the safety risk remains at this level.
Negligible	No action required	Safety risk has been determined to be so low that no further action is required. In this case the consequence is considered to not result in any injury to any person.

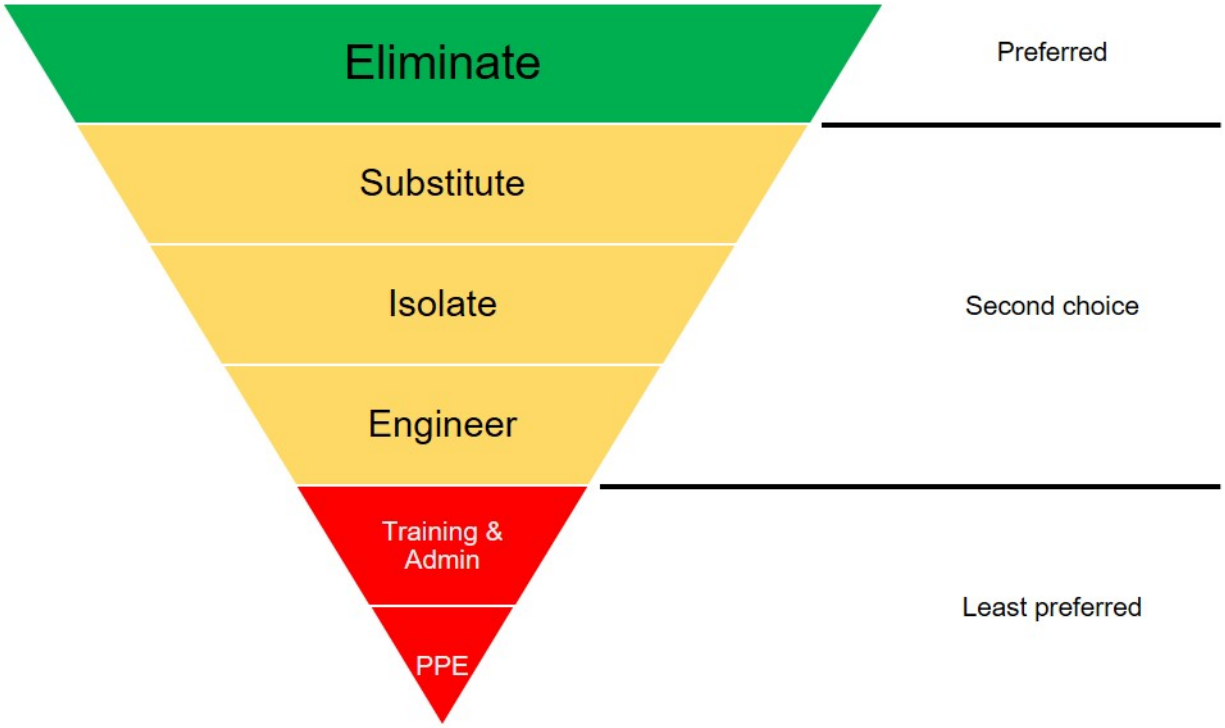
2.4.5 Step 4 – Consider risk control measures

Once the range of risks associated with a road work site are identified, consideration can be made as to how they can be reduced. The starting point in the consideration of the appropriate control measures should be to not expose workers or the public to an uncontrolled environment. Hence the first consideration should be to eliminate the risk before any subsequent consideration of alternative measures. In any project there are competing objectives, and this is no less the situation when considering hazard control measures to manage risk. For TTM guidance schemes associated with road works, the key objectives include maximising safety for road users and workers at the site; minimising the disruption and delay to motorists and ensuring the cost of the TTM arrangements is commensurate with the overall project value.

A common approach for treating risk is the hierarchy of controls. This method considers risk control measures in a hierarchical manner, and thus provides a mechanism that allows project managers to make judgements based on the competing objectives mentioned above.

The hierarchy of controls approach groups control measures under one of six categories that describe the ability to control the hazard and thus reduce risk are shown in Figure 2.4.

Figure 2.4: Hierarchy of controls



Source: Modified from Roads and Maritime Services (2018).

For some risks, certain levels of control may not be available, practicable or feasible, while for other risks combinations of controls may achieve the best outcome to reduce risk. In addition, different solutions may be selected for different parts of a job or at different times. In all cases there are a range of considerations that need to be made when determining the optimum outcome, including the severity outcome of the risk, the nature of the works and the cost of implementing the countermeasure.

Equally, the lower order countermeasures such as training, administrative and PPE should be readily available and cost-effective in the vast majority of situations; however, these are generally considered the least effective countermeasures to reduce risk.

Table 2.7 provides further description on the hierarchy of controls and example TTM mitigations:

Common road work site risks have been developed and are presented in Table 2.8 along with broad control measures, grouped under the applicable tier of the control hierarchy. Where a particular risk is not described in Table 2.8 then the application of the hierarchy of controls method can be readily applied to assist completing the risk management process for the site.

Table 2.7: Example TTM mitigations

Control	Description	TTM Control Example
Eliminate	The most effective control measure involves eliminating the hazard and associated risk. The best way to do this is by, firstly, not introducing the hazard into the workplace. Eliminating hazards is often cheaper and more practical to achieve at the design or planning stage of a product, process or place used for work. In these early phases, there is greater scope to design out hazards or incorporate risk control measures that are compatible with the original design and functional requirements. It may not be reasonably practicable to eliminate a hazard if doing so means that you cannot make the end product or deliver the service. If you cannot eliminate the hazard, then you must minimise as many of the risks associated with the hazard as reasonably practicable.	Redirecting traffic "Around the work area" to eliminate the risk of traffic impact on workers or implementation of contraflow to eliminate the risk of traffic impact on traffic controllers.
Substitute	Substitute the hazard with something safer. This may not remove all the hazards associated with the process or activity and can introduce different hazards, but the overall harm or health effects will be lessened.	Portable traffic control devices to substitute the requirement of a traffic controller working in or near traffic.
Isolate	Isolate the hazard by physically separating the source of harm from people by distance or barriers. For example, restrict contact with plant and equipment, lock hazardous chemicals away and only use them under strict controls	Undertaken by the use of "Through the worksite" and "Past the worksite" arrangements and appropriately rated safety barriers.
Engineer	Look for technological solutions that reduce risk, eg use machines to do work that would be hazardous to humans, or use more modern plant with in-built safety features	Truck mounted attenuators to protect workers in place of a typical work vehicle.
Training and Admin	Develop and document safe methods of work e.g. safe work procedures or safe work method statements and provide appropriate training, instruction and information to reduce the potential for harm	Developing safe methods of work e.g. safe work method statements, providing appropriate training and instructions and police enforcement etc.
Personal Protective Equipment (PPE)	Personal protective equipment (PPE) reduces workers' exposure to the hazard. PPE includes safety gloves, protective eyewear, earmuffs, hard hats, aprons, safety footwear and dust masks. PPE is the last line of defence and must be used in conjunction with one or more of the other control measures.	Hi Vis equipment and clothing, hard hat and safety boots etc.

Source: Roads and Maritime Services (2018).

Table 2.8: Common worksite risks and TTM control measures

Safety hazard/risk factors	Hierarchy of control		
	Consider the practicability of controls, from left to right. Select the most practical given the circumstances and the level of risk. Record the reason if a higher-level control is not considered practicable.		
	Elimination/substitution	Engineering/isolation	Administrative/behavioural
Clearance to traffic (between the lane carrying traffic and the work area)	Road closure Detour Side-track	Safety barriers Lane closure Vehicle crash attenuators	Speed restriction Warning signs/VMS Delineation of travel path
High speed traffic through the worksite	Road closure Detour Side-track	Safety barriers Lane closure Portable traffic signals Vehicle crash attenuators	Speed restriction Warning signs/VMS Traffic controller
Poor advance sight distance to the worksite (<200 metres)	Road closure Traffic diversion	Safety barriers Lead and/or tail vehicles	Extra advanced warning signs/VMS Speed reduction Delineation of the travel path Traffic controller
Poor observance by motorists of directions/instructions	Road closure Traffic diversion	Lane closure Portable traffic signals	Speed reduction Police presence on site Extra signs/VMS Reassessment of information provided
Narrow pavement width with no escape route (< 2.9 metres width)	Road closure Traffic diversion	Safety barriers	Speed reduction Delineation of travel path
Presence of workers at the worksite	Road closure Traffic diversion	Safety barriers Increase separation from vehicular traffic	Speed reduction Warning signs Delineation of travel path and worksite
Excavation adjacent to traffic (>300 mm deep within 1.2 m of traffic)	Road closure Traffic diversion	Different construction method Safety barriers	Speed reduction Delineation of travel path
Presence of unprotected hazards within clear zone	Road closure Traffic diversion	Safety barriers	Speed reduction Delineation of travel path
Rough or unsealed road surface due to roadworks	Road closure Traffic diversion		Speed reduction Warning signs/VMS
High volume of traffic through the worksite (>10 000 vehicles per day)	Road closure Detour Side track	Safety barriers Lane closure Portable traffic signals	Speed reduction
High volume of heavy vehicles through the worksite	Road closure Detour Side track	Safety barriers Lane closure Portable traffic signals	Speed reduction
Works vehicles entering/leaving the worksite		Safety barriers Lane closure Portable traffic signals	Speed reduction Warning signs/VMS Delineation/control of access points
Cyclists/pedestrians through the worksite	Alternate pathway Close traffic lane for use by cyclists / pedestrians Eliminate impacts on pedestrians/cyclists	Adequate separation of shared road space	Speed reduction Warning signs/VMS Delineation from other traffic

2.4.6 Step 5 – Select risk controls

The final step of the formal risk management component of the TTM process is to select the risk control measures to be developed in the TMP and TGSs and applied to the road work site.

For TTM at road work sites a range of general controls are available to select from, including:

- road closure
- sidetracks
- lane closures, traffic diversions and detours
- safety barriers
- construction speed zones
- signs, markings, temporary traffic control signals, variable message signs etc.

The application of these general controls (or combinations of them) to any particular site will be determined by the site and traffic conditions and constraints and the level of risk posed by the risks identified earlier in the process.

Once a TGS has been prepared, it should be reviewed on-site by the personnel who have prepared it and those who will implement it and work at the site. This site review should ensure that all aspects of the site operation and management of traffic to, from, through and past the site have been considered and are appropriately addressed.

2.4.7 Documentation of risks

The risk management process should be captured and documented with all risks considered. Best practice in risk management documentation includes the following:

- Risks identified in the planning and design phase are to be documented in a risk register by the TMD responsible for the design. Risks should be documented in a complete risk register within the TMP and also captured in the specific risk register for each TGS where there are a number of TGS for a project.
- Risk management often requires the balancing of competing risk outcomes to establish the best net risk outcome. For example, providing TTM protection for a short duration task may reduce the risks for road workers but increases the risk exposure for TTM workers. The net risk outcome should be documented to describe the reasoning behind the selected protection measures.
- Documented risks should be relevant to the task and the worksite. Only relevant risks should be captured against each TGS to minimise the chance for a risk register appearing inappropriate for the task. For example, risks relating to night works should not be documented on a TGS for tasks only occurring during daylight hours.
- Generic risk management forms that contain a large number of irrelevant risks can become a ‘tick and flick’ exercise which does not assist users in fully considering relevant risks at a site.
- Risk management may not be able reduce all risk to low and some risks assessed to be medium or high may remain following the development of the TMP and the TGS. These are referred to as residual risks and must be clearly documented with appropriate monitoring and actions to be followed if the risk appears likely to occur during TTM operation.
- The appropriate owner required to monitor and respond to each risk should be identified during the documentation of the risk register.
- The TMI responsible for the site must review the risk register for the TGS prior to the implementation of the TGS. At this time any additional risks identified at the site should be added to the risk register and appropriate TTM measures identified.

- Any risks identified in the risk register that eventuate should be documented and the outcomes of the event detailed.
- Any unforeseen risks that arise should be documented and the outcomes of the event detailed.
- Risk outcomes captured during a project should be reported to the TMD and captured within the company risk systems for further development of the appropriate consequence and likelihood ratings for each risk.

3. Review, Inspection and Road Safety Audit

3.1 General

In the Australian and New Zealand road and traffic context, reviews and inspections of road designs and the built environment for deficiencies that may affect the safety of road users are well defined.

The application of road safety audit principles to TTM schemes is less widely adopted. A construction phase road safety audit should be considered for all works involving complex traffic arrangements or staged works, or both. The Austroads *Guide to Road Safety Part 6: Managing Road Safety Audits* (2019a) and *Guide to Road Safety Part 6A: Implementing Road Safety Audits* (2019b) detail best practice for Australia and New Zealand.

Review and inspection for TTM at road work sites is also mentioned in the guides and codes of practice for several jurisdictions, primarily in the context of compliance audits (or in some jurisdictions, compliance safety inspections). The approach suggested by each jurisdiction varies and depends on the complexity and duration of the TTM.

Auditing is discussed in AS ISO 31000:2018 and is identified as an important component of the monitor and review phase of the risk management process. The link between risk management and the reviews, inspections and road safety audits of TTM at road work site schemes is shown in Figure 3.1.

Review processes may be applied at the planning and design phases in the development of the TMP and TGS and at this phase a design stage road safety audit may also be required. Inspection and road safety audit processes are applied at the implementation phase of a TTM scheme. The extent and timing of the reviews, inspections and road safety audits will be influenced by the size, scope and complexity of the TMP and the TGSs that are developed.

Like any similar process, the findings and recommendations should be fed back into the TMP and the TGS risk management and design process so that appropriate changes can be considered and then applied to improve worker and road user safety.

3.2 Application to TTM at Road Work Sites

Four types of reviews, inspections and road safety audits are associated with TTM at road work site operations. These are generally described as follows:

- planning and design phase:
  - suitability review
  - roadworks TMP & TGS design stage road safety audit.
- implementation phase:
  - compliance safety inspections
  - roadworks implementation stage road safety audit.

As a continuation to the TTM at road work sites risk process shown at Figure 2.2, the planning and design phase review and road safety audit of the TMP and TGS may be undertaken at Step 7 of Figure 3.2 to assess safety at the planning stage. Both compliance safety inspections and implementation phase road safety audits are applicable at Step 9 to ensure the site is established in accordance with the approved TMP and TGS (compliance safety inspection) and is safe for the prevailing road conditions and work site requirements (road safety audit). Figure 3.2 extends from the process at Figure 2.2, illustrating the steps relevant to review and inspections.

Figure 3.1: Risk management and the review and inspection process

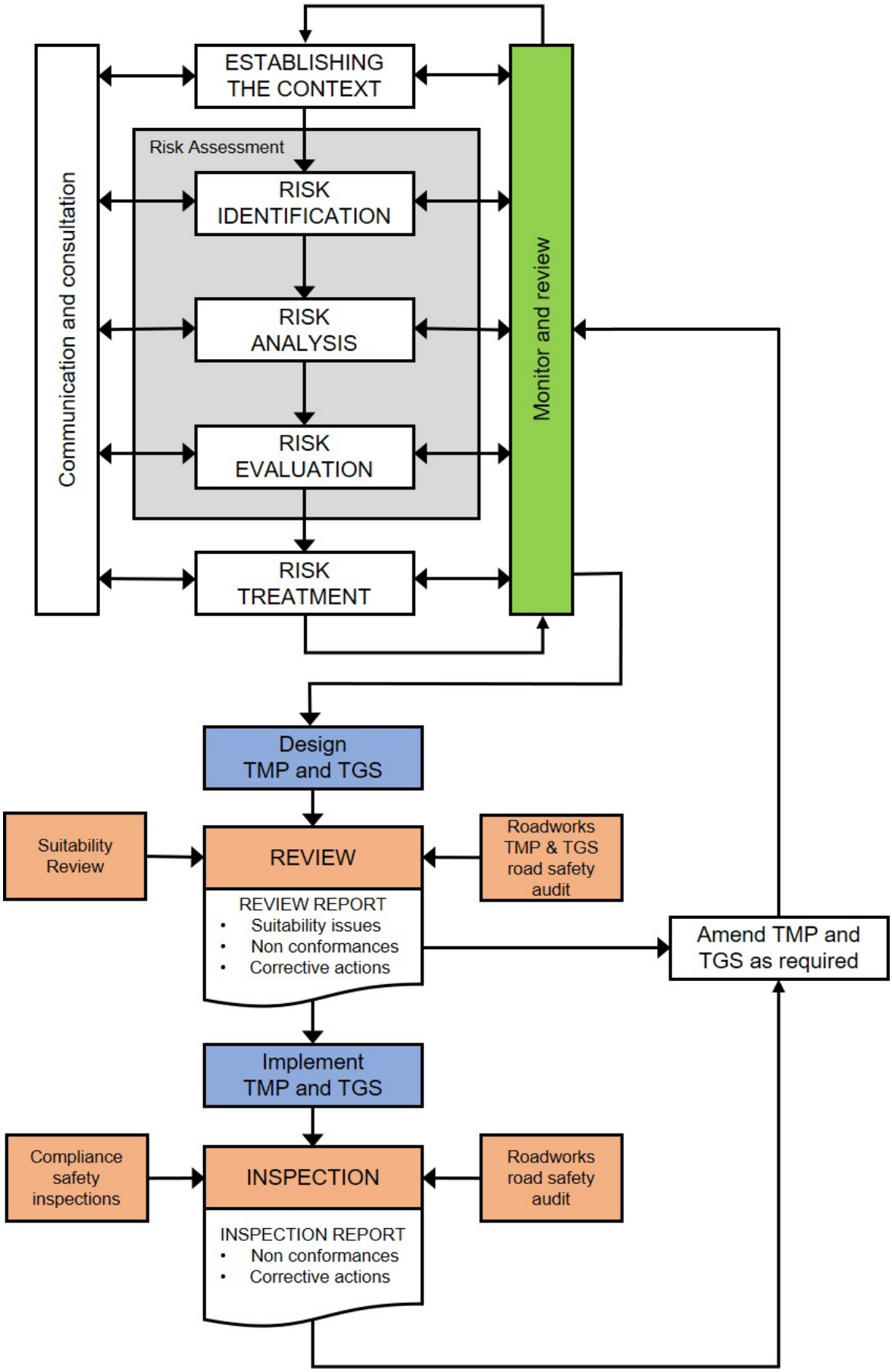
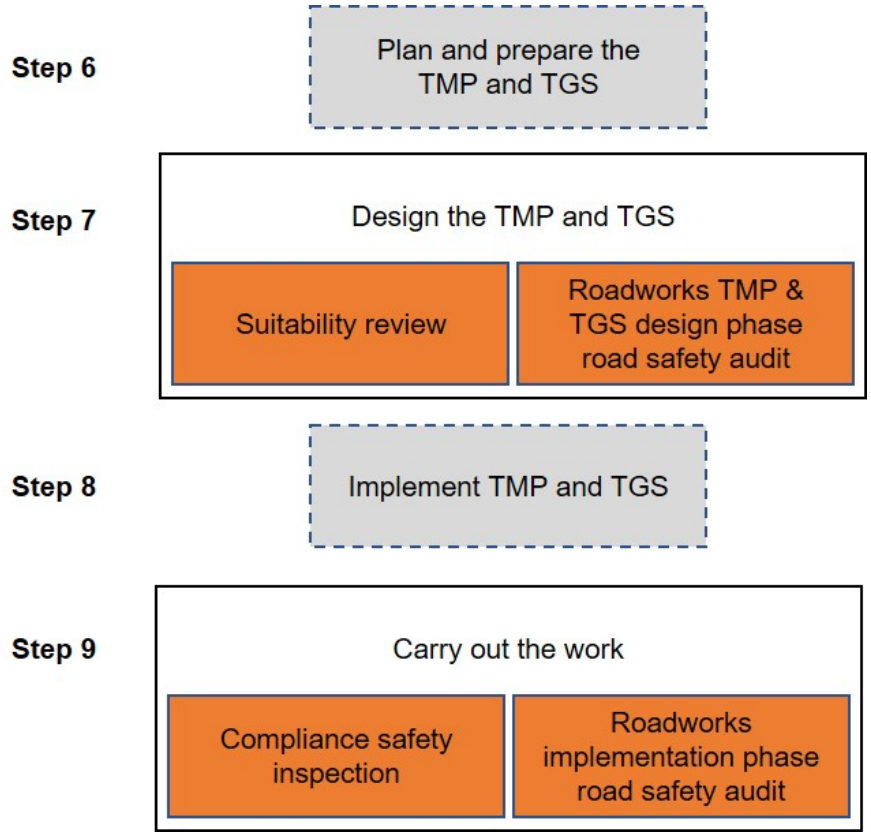


Figure 3.2: Temporary traffic management at work sites process – review, inspection and road safety auditing



Source: Modified from Victorian Government (2004).

While having several common points of consideration, suitability reviews, roadworks design phase and implementation phase road safety audits, and compliance safety inspections approach the review of a TGS from quite different perspectives; and none should be undertaken with the expectation that it can be substituted for the other.

A suitability review of a TMP is a procedure which can be applied to all phases of a roadworks traffic scheme development and is a systematic and independent examination of the extent to which the proposed TMP addresses specified requirements and provides a measure of the projects capability in meeting those requirements.

3.2.1 Compliance Safety Inspection

The description of compliance safety inspections that is adopted in AGTTM states that compliance safety inspections:

> *'…are undertaken to verify compliance with a traffic management plan when in operation…'. (The Victorian Road Management Act, 2004)*

Since the process adopted for these types of inspections is to confirm compliance against an adopted TMP and TGS, they generally take the form of a checklist and typically require an assessor to record a Yes/No/Not Applicable or Acceptable/Not Acceptable/Not Applicable rating. Space is often available for notes or comment to outline where a departure has been found and why this may have occurred and to also permit a description of any follow-up action that may be required.

Details such as the time and date of the inspection should be recorded for future reference and are a part of good record keeping practice.

3.2.2 Road Safety Audits

Austroads (2019a) defines road safety audits as:

> *…a formal examination of a … traffic project in which an independent, qualified team reports on potential crash occurrence and severity which may result from the introduction of the project.*

While road safety auditors may use a checklist when undertaking an audit, the report that is produced will be a more comprehensive review of the site compared to completing a checklist for compliance or non-compliance issues. Like all road safety audits, the skill and experience of the audit team is important to ensuring coverage of the safety issues that may arise due to the altered traffic situation. A road safety audit report will likely be comprised of photographs of safety issues, identification of non-conformances and may often contain recommendations for the Principal contractor to consider. Non-conformance issues will include matters beyond non-compliance with a standard or an adopted TMP and TGS. Upon review, which should include a risk assessment component, there may be a need to alter either, or both, the TMP and the TGS (and hence site arrangements) so the safety issues can be adequately addressed by eliminating the hazard or reducing the risk to an acceptable and manageable level.

The Austroads Guide to Road Safety Part 6 (2019a) identifies specific stages in the lifecycle of a road project when a road safety audit may be conducted. These are typically described as follows although in the application for TTM, only a selection of these audit phases may be required or undertaken:

- feasibility audit
- preliminary design audit
- detailed design audit
- construction / roadworks audit
- pre-opening audit
- post opening road audit.

The Austroads Guide to Road Safety Part 6 (2019a) also identifies a road safety audit as a formal examination of an existing road or road related area in which a qualified team report on the crash potential and likely safety performance of the location, (formerly known as an ‘Existing Road Safety Audit’)

It is best practice to consider the development and implementation of a TMP and accompanying TGS as a road project in its own right, which may be the situation on large-scale, long-term projects and therefore the stages described by Austroads may be applied as it would for any road infrastructure project. A degree of practicality will largely determine when and at what stage a road safety audit can and should be undertaken for any TGS. Many works and road work sites may be short term, routine and operate under live traffic conditions or the nature of the works such as verge maintenance, linemarking and the like may involve a mobile work site. In these instances, a preliminary or detailed design stage audit may not be warranted or even feasible. However, for large-scale and long-term schemes, a planning and design phase in the project will permit, and warrant, a preliminary or detailed design stage audit to occur.

Once established, all but the very simplest and shortest of duration TTM schemes will permit a road safety audit to be applied. On long-term projects and those schemes with multiple stages, more than one road safety audit should be considered. A comparison of the need for, and key aspects of compliance safety inspections and road safety audits is provided in Table 3.1.

Table 3.1: Comparison of compliance and road safety audits

	Compliance safety inspections	Road safety audits
Recommended application / frequency		
Works duration < 1 day	May be undertaken • Typically, inspections will be undertaken on a selection of sites for common activities to assess general system and company compliance	Not typically undertaken
Works duration 1 day – 3 months	Should be undertaken • Dependant on the factors listed below on when to inspect	May be undertaken • Dependant on the degree of impact on road operations
Works duration > 3 months	Should be undertaken • At all sites	Should be undertaken • At all sites
When to inspect / audit…		
	• At the start of works • At each major change to the TMP such as may occur in staged works • During day and night operation • When unexpected significant disruptions occur to traffic • At the request of site safety or WHS representative	• Following preparation of the TMP and/or TGS – prior to works commencing (detailed design audit) • At each major change to the TMP such as may occur in staged works (pre-opening / post opening audit) • During day and night operation • At the end of the operation of the TMP (can be incorporated into a pre-opening audit)
Items to consider…		
	• Safety of workers, road users and the public at work site • Signs, road marking, temporary safety barriers, lighting and facilities for pedestrians and cyclists are implemented as per the TGS. • Traffic compliance with the implemented traffic management plan • Access to abutting properties • Effect of the works on surrounding land use • Differences in weather conditions • Traffic flow and road congestion to determine how the traffic is flowing	• Safety of workers, road users and the public at work site • Appropriateness of speed restrictions, signs, road markings, temporary safety barriers, lighting and facilities for pedestrians/cyclists • Traffic compliance with the implemented traffic management plan • Traffic volumes and composition • Aspects of the traffic management plan arrangements that may confuse road users travelling through the work site • The operation and safety in adverse weather conditions • Conflicts between permanent and temporary features • Speed and geometry of the road • Roadside hazards due to works – plant, excavations, removal of existing barriers or re-alignment of traffic to suit works • Accident history of the work site (may identify specific issues arising due to road works and temporary operations) • Risk of end-of-queue collisions
Report format		
	• Checklist with standard questions seeking Yes/No/Not applicable response • Free-form comments can be made describing any non-compliance matters • Action required to address any non-compliance with the approved TMP and TGS	• Checklist available as a guide to auditors to ensure relevant aspects are reviewed • Written report, typically with supporting photos of safety non-conformance issues • Recommendations/suggestions to address safety non-conformances typically provided for consideration by client • Adoption of any recommendations / suggestions not mandatory

Source: Modified from Victorian Government (2004).

This comparison demonstrates that compliance safety inspections and road safety audits share a number of key components; both are assessing and reporting on the safety of TTM measures at road work sites. However, it may also be seen that road safety audits require a different perspective on several elements and additional components need to be considered by the audit team, as compared to compliance safety inspections.

A further distinction between these is at the reporting and actioning level. A site will either comply or not comply with an approved TMP and approved supporting TGS and this is examined and reported on by a compliance safety inspection. However, compliance with an approved scheme does not necessarily mean it is safe for all road users, which is the primary perspective of a road safety audit. A road safety audit may recommend a change to a site arrangement and the TMP and approved TGS to improve the safety of a particular aspect.

The format of compliance safety inspections is relatively quick and simple to apply, and checks may be undertaken by site supervisors on a daily and weekly basis as a means of recording and confirming that signs and devices are in place and in accordance with the approved TGS. The frequency of compliance safety inspections will depend to a large degree on the complexity of the traffic management arrangements and the term of operation of the TTM measures that have been put in place.

A simple example to demonstrate the different perspectives of compliance safety inspections and road safety audits of road work sites is provided through the series of road work sites illustrated in Figure 3.3 and Figure 3.4. A compliance safety inspection of the site illustrated in Figure 3.3 will confirm the concrete road barriers are, or are not, placed in accordance with the approved TGS, either on the TGS drawing itself or through a link to a design drawing detailing how and where the barrier is to be installed. By contrast, in this example, a road safety audit would identify that the concrete road barrier, in the first photograph, is poorly aligned and presents a hazard to motorists due to the lack of end treatment and the break in the barrier resulting from the placement over the median kerb. By adjusting the barriers for the height of the kerb, as shown in the second photograph, the risk to passing motorists is considerably reduced while the work site remains appropriately protected. In both cases the barrier should be offset from an edgeline or behind the kerb to ensure the edge of the traffic lane is clearly delineated.

Figure 3.3: Example road work site treatment – barrier location

(a) Incorrectly located barrier with insufficient flare may pass compliance inspection that barrier is placed as per TGS but road safety audit would determine the barrier location and installation to be unsafe

(b) Correctly located barrier with sufficient flare away from approaching traffic.

Source: Austroads (2019b).

Figure 3.4: Example barrier type and installation identified by road safety audit as unsafe

Source: Austroads (2019b).

Similarly, the site illustrated in Figure 3.4 poses a number of road safety hazards to passing motorists, even though the TTM measures are generally installed as per the approved TGS. For instance:

- The interface between the concrete and plastic roadside barriers is poorly installed, with the barriers being incorrectly overlapped and thus risking a vehicle being directed into the end of the concrete barrier (the correct arrangement may or may not be noted on the TGS).
- The plastic barriers are not correctly connected to each other and there is the risk of a vehicle breaching the barrier and entering the work site.
- The end treatment of the concrete median barrier risks causing a vehicle to roll or launch upon impact.
- The old linemarking on the existing pavement is not adequately removed or obscured and this may cause confusion to motorists, particularly in wet weather when old linemarking may appear more prominent than new linemarking.

3.3 Elements of Best Practice

The training and certification process for people involved in TTM at road work sites is quite different to that required of certified road safety auditors. Both audits and compliance inspections need to be undertaken by suitably competent and experienced people who understand the role and limitations of each process and the respective reporting requirements.

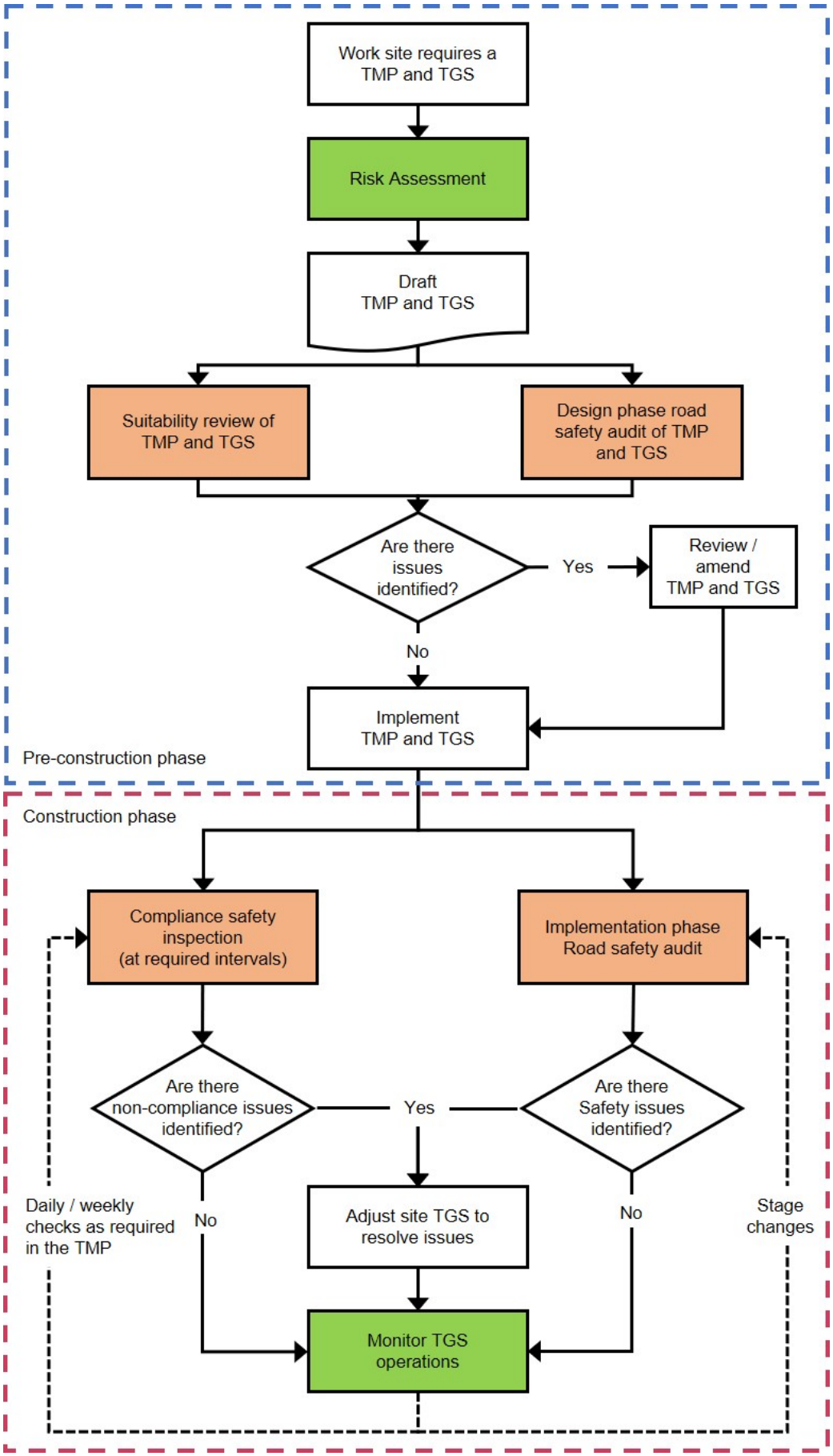
Personnel involved in the review, inspection and road safety audit of TTM at road work schemes must understand both the context and the role the processes play in site management and safety for workers and road users. Figure 3.5 details a process flow chart which outlines where a compliance safety inspection and a road safety audit, and any subsequent actions, fit into the TTM at road works process.

Reviews and inspections will typically be undertaken by a person or team with suitable skills and experience in TTM and with the relevant TMI (practicing or non-practicing) or TMD (practicing or non-practicing) qualifications. The requirement for reviews and inspections, and the skills and qualifications of the individuals required, are typically outlined within the contract specifications. Alternatively, a person undertaking a review or inspection may be appointed directly by the Road Infrastructure Manager (typically the road authority) or by the Principal Contractor accountable for the site. In all cases the reviewer / inspector should be independent of the designer and the project manager so that the TMP and TGS is viewed with “fresh eyes”.

Road Safety Audits must be led by a trained road safety auditor and will be undertaken by a team with a suitable mix of skills and experience relating to road safety, road design, traffic management and TTM. The requirement for road safety audits is also typically outlined within the contract specifications and the skills and qualifications of the individuals required will be in accordance with Austroads (2019a).

The best practice components associated with compliance safety inspections and road safety audits for TTM at road work sites are discussed below.

Figure 3.5: TTM auditing and inspection process



3.3.1 Suitability reviews

The purpose of the suitability review is to identify any traffic management issues that have not been identified or resolved in the TMP prior to the TMP being implemented. This review should be made against:

- AGTTM
- Australian Standard 1742.3 / NZ CoPTTM
- jurisdictional traffic management policies and application guidelines
- project specifications
- road environment factors identified on site.

In reviewing the suitability of a Traffic Management Plan, the reporting procedure is not intended as a re-design of the traffic management but to outline potential or pre-existing road safety or traffic operational issues and establish a basis upon which a design could produce an acceptable solution.

The review process also recognises the need to identify any work environment conditions or management practices that can potentially pose hazards to the workers and other personnel at the worksite.

The format for documentation of a suitability review is similar to that for a road safety audit.

Suitability reviews should be undertaken at the following stages of a project:

- prior to implementation
- re-reviewed prior to subsequent implementation stages to apply learnings from previous stages.

3.3.2 Compliance safety inspections

Compliance safety inspections are an important component of best practice and management. Only through a process of checking against the adopted TGS can the road agency be certain that a base level of safety has been established. Two levels of compliance safety inspections may be applied to a road work site, being:

1. site supervisor compliance (operational) safety inspections
2. independent compliance safety inspections.

Site supervisor compliance safety inspections are recommended at the following stages for a project.

- following implementation of the TGS
- for each major TGS change or traffic switch
- aftercare arrangements, particularly when the work site is unattended and TTM unsupervised:
  - at the end of the work shift to ensure that warning, advisory and TTM measures are properly in place to manage traffic and site safety overnight
  - again, at the commencement of the next day's shift to:
    - ensure that overnight measures have remained in place
    - check whether an unreported incident may have disturbed any of the TTM measures
    - ensure that night-specific measures are covered or switched to appropriate day-time measures, where applicable
  - for long-term works inspections may be required through night-time to ensure appropriate measures remain in place
- significant long-term disruptions
- unexpected changes in traffic arrangements

- where work sites operate on a continual basis:
  - at the handover for the incoming shift
  - at night to ensure modifications are appropriate to the operation of the site overnight.

Inspections are only required for those stages that are relevant to the works being undertaken. For example works occurring in a single shift generally will not require inspections for aftercare.

Independent inspections should ideally be conducted at the commencement of a scheme and for significant long-term disruptions.

A key component of an independent compliance safety inspection is a review of the record keeping and paperwork associated with a site TMP and TGSs. For instance, documenting daily changes in speed limit and other regulatory signs, reports of traffic incidents and any follow-up investigation and recommended action, changes in the TMP or TGS and the results of previous compliance safety inspections and audits should all be reviewed for compliance with the procedures adopted by the jurisdiction.

A pro-forma independent compliance safety inspection checklist for a typical work site operation has been developed and is provided in Appendix A.

This checklist is derived from similar checklists contained in the manuals and codes of practice for state jurisdictions. Not all parts of the checklists may be applicable for all TTM guidance schemes, however the information is provided to ensure completeness of a best practice process, and non-applicable sections should be noted as such at the time of the inspection.

When non-compliance issues are identified they must be reported to the relevant site management for review and action. The outcomes of a compliance safety inspection may be relatively simple to address, with action required to ensure site arrangements are in accordance with the approved plans, assuming the changes improve safety. Where changes to comply with the approved plans detract from the level of safety for road users and site personnel, then the TMP and TGS should be reviewed and any issues documented. A revised TMP and TGS may need to be developed or, after an appropriate risk based assessment, the site layout may need to be altered to comply with the approved plan.

For smaller and routine works, a regime of compliance safety inspections should be undertaken based on a proportion of all jobs undertaken dependent on the risks associated with the works and the previous contractor compliance. It is generally expected that compliance safety inspections are conducted across the operations of a company on a daily basis. The sites selected must be based on consideration of the complexities of the sites, the length of time for operations, and any particularly high traffic volume / high risk sites.

3.3.3 Road safety audits

Best practice requires that the road safety auditing and compliance process not start and end with the adherence to an adopted plan. The adopted plan must be checked to ensure that it is suited to the road environment where it is to be applied and accounts for the traffic conditions that are reasonably expected to occur throughout the operation of the plan. Road safety audits and the process described in Austroads Guide to Road Safety Part 6 (2019a) and Part 6A (2019b) are a good means of fulfilling this broader requirement to provide a safe road environment, even for TTM measures.

Two levels of road safety audit are applicable to TTM guidance schemes at road work sites. These are:

- road safety audits of roadwork traffic schemes
- road safety audits for roads open to traffic.

The application of each of these audits to a TTM guidance scheme is identified in Figure 3.5. The method for conducting these audits and reporting the findings, recommendations etc. is the same as that applied to the road safety audit of any road project, and this is described in the Austroads Guide to Road Safety Part 6A: Implementing Road Safety Audits.

The range of matters that should be considered when conducting a road safety audit of a road work site is outlined in Table 3.1. This is by no means exhaustive, but it covers the main areas of common concern at road work sites. A road safety audit checklist in Austroads Guide to Road Safety Part 6A provides a comprehensive range of items to consider when auditing a road work site and is recommended as a prompt to auditors of safety issues to consider.

Safety issues identified in an audit report for either the design or operational stages should be identified with a relative risk ranking. A relative risk ranking permits the audit team to communicate their assessment of the level of risk of the safety deficiency or non-conformance and thus can be used to identify the urgency of action.

A commonly used scale of risk ranking for road safety audits includes:

- intolerable
- high
- medium
- low.

Guidance for determining an appropriate risk ranking can be given by using the risk matrix in Austroads Guide to Road Safety Part 6A, together with the accompanying suggested treatment approach matrix.

The outcomes and recommendations of a road safety audit may warrant careful consideration before any changes are implemented. A design audit at the planning stage may identify a safety concern that requires a review of the proposed TGS or possibly a review of the work and traffic processes in order to adequately address the safety concerns.

Where a change in work and TTM is required then it is important to ensure that other safety issues do not arise for both workers and road users.

An audit of a scheme already being implemented, may require a review and alteration to the adopted TGS. Appropriate approvals provided by site management and the respective road authority with input from a TMD will likely be necessary, depending on the degree of changes and their effect on traffic.

Road safety audits should be undertaken at the following stages of a project for a major project. For smaller and routine works, a regime of road safety audits should be undertaken based on a proportion of all jobs and dependent on the risks associated with the works and the previous contractor compliance:

- following implementation of the TGS
- for each major TGS change or traffic switch
- aftercare arrangements
- significant long term disruptions
- unexpected changes in traffic arrangements.

4. Events on Roads

4.1 General

A special event (in traffic management terms) is any planned activity that is wholly or partly conducted on a road, requires special traffic management arrangements, and may involve large numbers of participants and/or spectators. Examples are marathons, fun runs, cycling events, parades, marches and street market days. The definition also applies to events conducted in their own venue if the event requires special traffic management arrangements.

Road Infrastructure Managers typically require that the impact of events on the road network be carefully considered and managed.

Organised events that impact on the safe and efficient use of roads by motorists, cyclists and pedestrians, including emergency services, can create potential hazards and delays that can give rise to injury or damage resulting in loss, litigation or prosecution if reasonable care is not taken by event organisers to protect both road users and those involved in the events.

The management of events that impact on roads requires consideration of all road user needs and obligations, and attention should not focus just on the management of vehicular traffic through, past or around the site of the event.

Within the context of this section, the Event Organiser is defined as the person or organisation who is responsible for organising the event. They have a duty of care towards those persons who attend the event to ensure that they are not exposed to risks from a public liability perspective. This is in addition to their responsibilities under the Australian WHS and New Zealand HSW Acts.

There are a wide range of event types and the classification of events is typically defined by each jurisdiction. Details with regards to the classification of events and the submission requirements for each event type should be obtained from the jurisdiction in which the event is to be held. The classification of events typically includes a range of considerations such as:

- the location of events, either on-road or at private venues
- events that are
  - static, such as street markets, festivals, sporting events and concerts
  - non static events such as cycling, running, triathlons, parades and vehicle races / rides
  - race events whether vehicle races or other types
- the type of road impacted, for example local streets, arterial roads, town centre, CBD roads
- the estimated crowd size
- disruptions
  - to traffic and transport systems
  - to the non-event community
- events that require the suspension of traffic regulations.

The consideration of TTM in this Part of AGTTM for events on roads is limited to guidance for the developer of the Event TMP and TGS. Information with regards to jurisdictional policies and procedures as well as the costs, public consultation, submission timeframes and approvals should be sourced from the relevant jurisdictions.

4.2 Principles

Public safety requirements include an assessment of hazards, risks and control measures. It may encompass matters such as crowd control, traffic management, erection of warning signs and safety barriers, management of dangerous goods (such as fuelling and storage of petrol), race control and safety measures in the event of serious accidents.

The purpose of the risk management within the context of the traffic management plan is to ensure that an assessment of the traffic risks is carried out and appropriate steps are taken to manage those risks. Assessing traffic risks is part of managing all risks for the event.

From a traffic and transport perspective, a special event TMP needs to:

- ensure the safety of all road users including event participants, spectators and organisers
- ensure the safe separation of event spectators, participants and volunteers from traffic and where possible isolating the event space from traffic
- provide adequate advanced warning of changed road conditions to all road users (motorists, pedestrians and cyclists) and apply uniform procedures for traffic management at events that can be easily recognised and understood by road users
- manage the reduced capacity of the road system
- minimise the traffic impact on the non-event community & the emergency services, ensuring smooth traffic flow
- consider any needs for hostile vehicle mitigation (typically in association with Police requirements)
- minimise costs.

4.3 The Event TMP

The requirements for planning and design of TTM for works on roads as described in this AGTTM can generally be similarly applied to TTM at events. However, there are obvious differences in the nature of the activities taking place that need to be brought to the attention of road users. It should also be noted that jurisdictions may allow some relaxations from the full requirements of this AGTTM for the development and content of the TMP and TGSs for events. Conversely, the increased level of risk to large numbers of event participants or to crowds may require TTM treatments and devices (for example hostile vehicle prevention devices) in excess of that typically required for a worksite.

An event Traffic Management Plan sets out the inputs, planning and design of traffic management arrangements required to facilitate an event with consideration of all relevant traffic impacts. While an event TMP may serve many purposes, it should primarily be used to ensure that an event can be safely implemented with appropriate consideration and management of risks. A range of stakeholders may need to provide input and / or approval of event TMPs. The size and complexity of traffic management arrangements should be used as an indicator for the level of detail required in the event TMP.

Preparation of the event TMP is the responsibility of the designer. For complex events, the event TMP may be included as a subsidiary document to the Event Management Plan; however, from the perspective of understanding traffic risks and traffic activities it must stand alone.

The core elements of the event TMP should explain (and document where applicable) how the following topics have been considered:

- summary of the event details
- contact details for relevant personnel
- a description of the event

- traffic management planning (refer to AGTTM Part 2) detailing:
  - inputs
  - scope
  - risk management (in addition refer to Section 2 of this Part)
  - impacted road user and community groups with particular consideration of emergency vehicle access, parking provisions and the needs of persons with disabilities
  - options analysis
  - event staging plans
  - summary of the traffic management elements of the plan
- Traffic Guidance Schemes (TGS) (refer to AGTTM Parts 3 and 4) describing:
  - the use of traffic control devices such as signs and barriers
  - indicate if any section of a road is closed detailing all detour routes, warning and directional signs.
  - implementation and removal
  - monitoring and record keeping
- traffic controllers and event traffic marshals
- spectator provisions relating to traffic including parking, crowd control and spectator movements where they relate to impact on road operations
- notification and communication
- incident management
- post event evaluation
- consultation and approvals.

The TMP should be developed in accordance with this AGTTM with particular attention to any specific requirements defined by the relevant jurisdiction(s). The event organiser is responsible for arranging the development of the event TMP through a suitably qualified person and organisation.

The amount of details and information to be provided in an event Traffic Management Plan can vary depending on the nature and complexity of the traffic management arrangements.

4.4 Event Traffic Marshals

Some jurisdictions have a qualification for an event traffic marshal which may be a volunteer or other individual with training limited to being specific to the event being undertaken. This then reduces the need to engage specialist traffic management companies to undertake relatively straight forward tasks associated with some events. The use of Event Traffic Marshals (or similar) is determined by the individual jurisdictions and reference should be made to the relevant jurisdiction where the event is to be conducted.

4.5 Event Traffic Management Signage

Australian Standard AS1742.3 and NZ CoPTTM detail a range of event specific signs that can be applied instead of typical roadworks signs. The designer of the event TMP and TGS should be aware of these signs and their application.

4.6 Risk Factors for Events

Events on road may involve the risk of injury to participants (for example, collision between a participant and a vehicle) and members of the public (for example, a pedestrian could be hit by a cyclist participating in an event). When determining measures to be implemented to manage these risks, the relevant input factors and how each of them influence the probability and consequence / severity of risk should be considered. In addition to the risk factors that are considered for works on roads, key input factors that may assist with evaluating event traffic management risks include:

- number, flow rate and speed of participants / spectators
- event duration
- length of event in proximity to traffic
- separation from traffic.

Examples of risks that are specific to events that need to be considered are included in Table 4.1.

Table 4.1: Typical risk considerations for event traffic management planning

Event type	Typical risks
Static events	• vehicle access (particularly at event start / end) • pedestrian access (particularly at event start / end) • crowds in proximity to general traffic (for example, queuing at points of entry) • pedestrian / vehicle conflict at access points or on the perimeter of the event • motorist distraction (for example, fireworks, LED screens) • parking and circulation (to prevent queuing on public roads) • local access • providing emergency access to events and maintaining emergency access to other properties
Cycling events	• rider behaviour - inexperienced cyclists - compliance with road rules / risk taking when in a racing or group riding mindset - interaction with pedestrians on shared use paths • driver behaviour - courses with low driver expectation / awareness of cyclists - overtaking / impatience • environmental factors - vehicle speeds, dusk / dawn visibility, vehicle mix, shoulder conditions - pavement condition (including pot holes, and edge breaks) - pinch points, crossing locations, verge and refuge space • design factors - course routes not reflecting normal priority; for example, crossing from a side street.
Pedestrian / running events	• driver expectations for encountering pedestrians (at locations where they are not typically present) • visibility of participants (on or crossing roads) at dawn and dusk • conflicts between participants and other pedestrians / path users • the capacity of existing verges, islands and refuges to accommodate the expected concentrations of participants • course routes on paths that cross driveways • participant awareness of general traffic (particularly if attention is focused on the event).
Parades / marches	• driver distraction (for example, around novelty parades) • network impacts in dense built up areas • participant behaviour around general traffic • property access (resulting in vehicles entering closed carriageways). • impact of detours

Event type	Typical risks
Convoys and vehicle touring	• unsafe overtaking manoeuvres (by non participants) around long convoys as a result of driver impatience • loss of integrity of the convoy (that is, 'breaking up'), where it includes vulnerable road users • touring drivers stopping on shoulders and exiting vehicles to regroup or coordinate movements (increasing exposure to traffic collisions) • groups of touring vehicles attempting to pull out into traffic together without waiting for appropriate gaps in traffic (in an attempt to 'keep together').

5. Emergency Works

5.1 General

For workers attending emergency work sites it is recognised that it will generally not be possible to set up TTM that is fully compliant with the design guidance provided in Part 3 of this AGTTM. In these situations, there remains a requirement to ensure the safety of road workers and the public as much as is reasonably practicable.

This section specifies procedures for the control of traffic to provide as safe an environment as possible for road workers and road users prior to fully compliant TTM being installed.

In this AGTTM works conducted in an emergency are those:

> *'works resulting from an actual or imminent threat to the safety of persons or traffic or the disruption of an essential service, or which destroy or damage, or threaten to destroy or damage, any infrastructure, property or the environment arising from a situation relating to the presence of road infrastructure, utility services or public transport infrastructure within the road reserve.*

Situations which typically require the use of these procedures include those situations involving:

- live power or gas leaks
- critical repairs to essential services
- substantial road damage
- large objects on a road.

In this AGTTM, the provisions in this section are not considered appropriate for:

- those activities that are generally known, for example such as streetlight replacement, which is not generally considered to be an emergency situation
- general maintenance activities where generic TGS should be available, or where the short term low impact works practices in AGTTM Part 5 would apply
- activity which may seem to be urgent but are not considered to be an emergency in accordance with the definition above
- those organisations undertaking regular activities at unplanned locations, for example such as traffic signal repairs. In this case those organisations are expected to have a contingency plan and a set of generic TGSs that can be applied for the majority of situations allowing the installation of compliant TTM in those cases
- organisations providing incident response, breakdown clearance services or assistance who are also expected to have set safe work practices and generic TGSs that can be applied for the majority of situations.

While initial and short-term measures will, in many cases, be taken by police, the primary traffic management of the site and the follow-up control and protection measures for longer-term situations will often be provided by the road infrastructure manager or contractors working on their behalf.

For those organisations on standby for emergency works, specific work methods and procedures for attending emergency closures or part-closures should be developed because:

- of the urgency which will usually be necessary to deploy resources
- the task frequently being outside working hours.

In the case of emergency works, the safety of road users and workers on the worksite is paramount. Therefore, some traffic delays or congestion can be accepted during the works or whilst the TTM are being deployed. However, possible adverse effects on traffic (including public transport) should be assessed in planning any traffic management measures. A number of road infrastructure managers and utility infrastructure managers have prepared incident or emergency response plans for dealing with emergency works. Where such plans (which may involve Police assistance in the control of traffic) are available, these should be used in preference to the generic traffic guidance schemes as provided for in this Part.

The work units likely to be allocated to these tasks should be trained in the use of these provisions and the safe work procedures should include the following:

1. Duties of workers attending the site.
2. Modified duties where there are initially, insufficient workers available for optimum control of the site, for example, the need for a single Traffic Controller to control traffic in two directions.
3. Procedures for contacting police, emergency services, back-up assistance from the road authority and any other needed help, including when usual communication (mobile telephone) is not available or not working.
4. Equipment that is to be ready at all times on potential callout vehicles.

A hierarchy of response for an emergency situation is described in sections 5.2 to 5.4.

5.2 Initial Response

Initial attendance at an incident site will often be by police, fire or emergency responders trained and equipped for incident management. They will not necessarily remain on site for the entire duration of the incident and subsequent rectification works.

The initial response will typically be achieved using whatever equipment / devices are available to the first responders. This treatment should be increased as quickly as possible to those recommended in section 5.3 as further equipment and resources are available at the site.

5.3 Interim Response

Where a road infrastructure manager or contractor work unit assists with traffic management, or takes over from police or other emergency service units, the following must apply to Category 1 and Category 2 roads:

a) Minor partial road closure

For closures where traffic can continue to flow in both directions (two-way road), or at least one lane in each direction is open (divided road), a vehicle with a vehicle-mounted warning device must be placed to shadow the closure at one or both ends of the incident site as necessary.

b) Major partial road closure

For closures where traffic is restricted to one-way movement past the incident site, the vehicle as per (a) above and Traffic Controllers must be provided at both ends of the site. Where the posted speed limit is more than 60 km/h, high priority must be given to the provision of advance signs

i. TRAFFIC HAZARD

ii. Traffic Controller Ahead / PREPARE TO STOP.

c) Complete road closure

The requirements of (b) above together with barricades across the entire roadway must be provided

As far as practicable, the positioning of the closure point in (b) and the barricade position in (c) should be at least a distance in metres equivalent to the posted speed from the incident site (eg in a 80km/h zone the distance should be 80m from the incident site), and Traffic Controller positions placed so as to be visible to approaching traffic for a distance in metres equivalent to at least twice the posted speed.

On Category 3 roads it is expected that the initial response may be similar to that detailed in Section 5.2, but the higher level of resources and devices typically available would mean that for the interim and follow up response, there would generally be detailed contingency plans in place. This is due to these higher risk environments supporting the increased availability of emergency responders, the earlier visibility of any incident through constant monitoring, and pre-developed contingency plans. Reference to the RIM should be made for the appropriate emergency response for Category 3 roads.

Typical location of devices for interim response protection purposes is shown in Figure 5.1. The treatments detailed in this section represent the absolute minimum interim response and addition items such as, coned taper behind the vehicle, speed limit signage, use of permanent VMS etc. should be considered where available.

5.4 Follow Up Protection

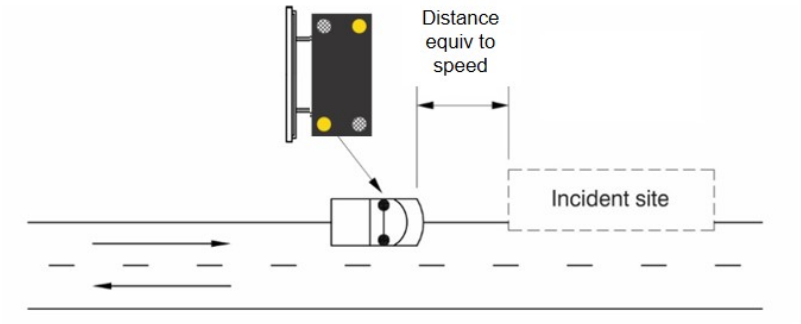
Follow-up protection must comprise the setting up of a static work site in accordance with AGTTM Part 3. Examples of timetables for follow up protection are detailed in Table 5.1, however there are many variables during emergency works and the appropriate timeframes should be in accordance with jurisdictional and/or Road Infrastructure Manager requirements.

Table 5.1: Example timeframes for follow up protection

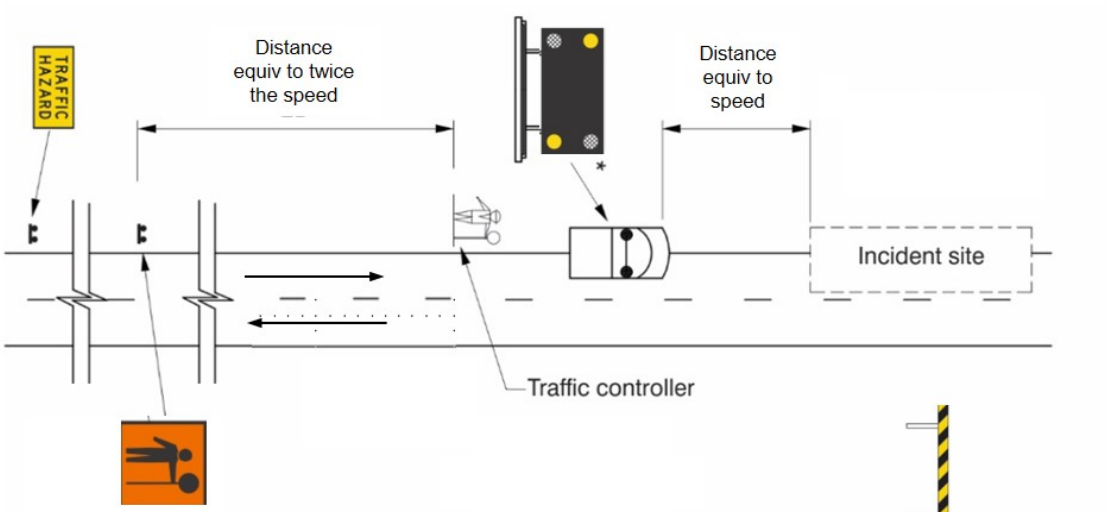
Road Category	Example timeframes
Category 1	As soon as it is identified the closure or part-closure will be required for a period longer than four hours an immediate decision should be made to initiate follow up protection which must be commenced and implemented as quickly as practicable and not delayed longer than two hours with the following exception • On roads in remote areas with traffic volumes less than 1500 vpd, follow-up measures may be delayed until support resources can reach the site but not for periods in excess of 12 hours
Category 2	As soon as it is identified the closure or part-closure will be required for a period longer than two hours an immediate decision should be made to initiate follow up protection which must be commenced and implemented as quickly as practicable and not delayed longer than one hour with the following exception • On roads in rural areas follow-up measures may be delayed an additional hour per 100km from the nearest town with suitable TTM crews available.
Category 3	In accordance with the operational requirements of the Road Infrastructure Manager. On these roads follow-up protection typically includes the use of TMA vehicles and other infrastructure.

In all cases the development of a Traffic Management Plan is likely to be impractical; however, responders on site should apply a checklist of typical issues and risks contained within a Traffic Management Plan and be able to address these issues as they become evident with input from a TMD professional.

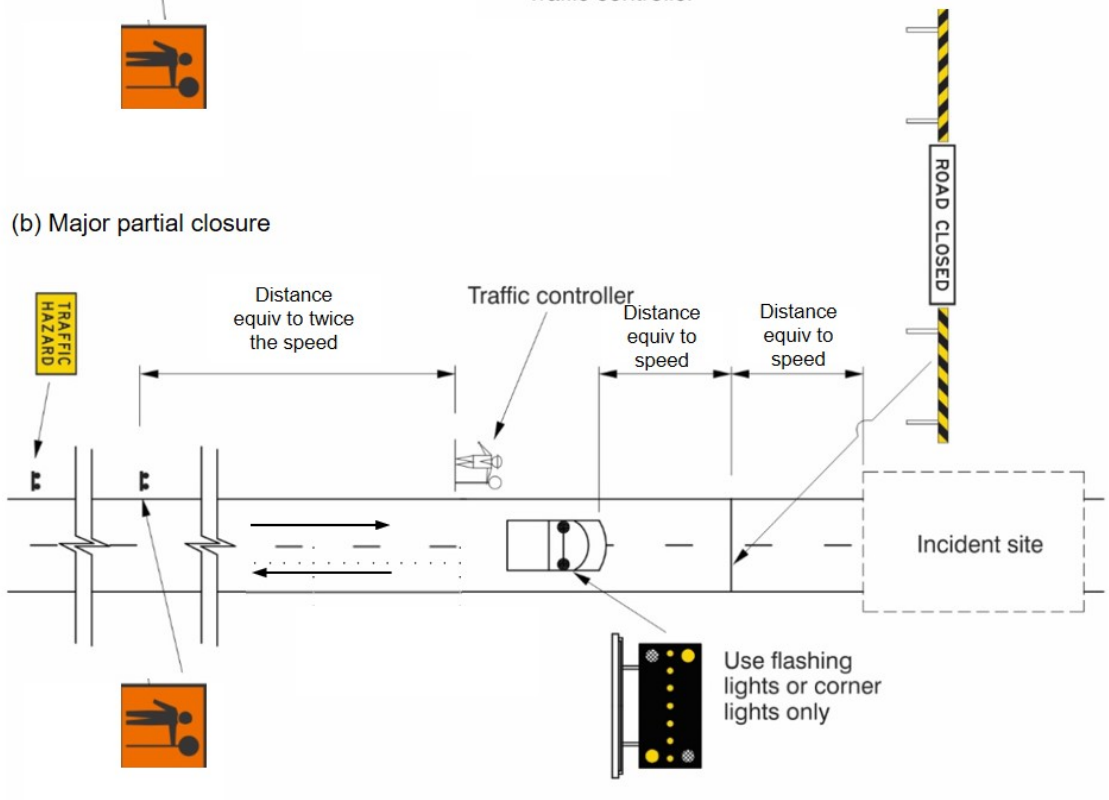
Figure 5.1: Interim response at an incident site



(a) Minor partial closure



(b) Major partial closure



(c) Complete closure

Note: Layout is Australian specific - see COPTTM for NZ equivalent

Source: Queensland Department of Transport and Main Roads (2019).

References

Austroads 2012, *Implementing National Best Practice for Traffic Control at Worksites – Risk Management, Audit and Field Operations,* AP-R403-12**,** Austroads, Sydney, NSW.

Austroads 2019a, *Guide to Road Safety Part 6: Managing Road Safety Audits,* AGRS06-19, Austroads, Sydney, NSW

Austroads 2019b, *Guide to Road Safety Part 6A: Implementing Road Safety Audits,* AGRS06A-19, Austroads, Sydney, NSW

New South Wales Road and Maritime Services 2018, *Traffic control at work sites - Technical Manual,* NSW Government, Sydney, NSW

New Zealand Transport Agency 2018, *Traffic Control Devices Manual Part 8: Code of practice for temporary traffic management (CoPTTM),* New Zealand Transport Agency, Wellington, New Zealand

Queensland Department of Transport and Main Roads 2019, *Manual of Uniform Traffic Control Devices Part 3: Works on Roads,* Queensland Government, Brisbane, Queensland

Safework Australia 2019, Model *Code of Practice: How to manage work health and safety risks,* 10 December 2018, viewed 28 July 2019, <https://www.safeworkaustralia.gov.au/book/model-code-practice-how-manage-work-health-and-safety-risks#4-step-3how-to-control-risks

Victorian Government 2004, *Road Management Act 2004: Code of Practice: Management of Road and Utility Infrastructure in Road Reserves, Victorian Government Gazette, no. S 268*, 17 December 2004, viewed 22 Sept 2010, <http://www.gazette.vic.gov.au/gazette/Gazettes2004/GG2004S268.pdf

Australian and New Zealand Standards

AS1742.3 Manual of Uniform Traffic Control Device: Part 3 – Works on Roads, Standards Australia, Sydney, NSW.

AS/NZS ISO 31000:2018 *Risk Management Guidelines,* Standards Australia, Sydney, NSW.

Appendix A Compliance Inspection Checklist

COMPLIANCE SAFETY INSPECTION CHECKLIST	
Date: ……	**Time: ……**
Inspector: ……	**TMI / TMD certificate no: ……**
Office/contractor: ……	**Site supervisor: ……**
TGS number: ……	**TGS modified: Y / N**
Road/bridge name: ……	
Location: ……	
Type of work: ……	
Duration of work: …….. days	**Time/s of work: ……**
Road configuration: ……	

Rate the check items in the following manner:

✓ Acceptable ***X*** **Not acceptable** **N/A Not applicable**

Additional comments and information can be recorded at the end of the checklist pro-forma.

No.	Check item	Acceptable/Not Acceptable or N/A
1	**Record keeping**	
1.1	Are records being kept and available on site for TGS, roadwork speed zones etc.?	
1.2	Other	
2	**Traffic Guidance Scheme (TGS)**	
2.1	Is there an approved TGS on site?	
2.2	Have signs and devices been set out as per the TGS?	
2.3	If modifications have been made are they approved and marked on the TGS?	
2.4	Is the TGS relevant for the works in progress?	
2.5	Has the appropriate permit or licence to occupy the road been issued and is it being complied with?	
2.6	Are the correct requirements implemented regarding safe clearances to workers and traffic approach speeds?	
3	**Temporary speed limit (TSL)**	
3.1	Is the TSL appropriate for the site and authorised?	
3.2	Are records being kept of the times of TSL installation?	
3.3	Is the TSL properly established with respect to: • minimum length • signposting (zone and advanced warning) • appropriate step-down from prevailing speed zone • conflicting speed zone signs and markings covered/removed • TSL signs adequately covered when not in use?	
3.4	Are pre-work speed zone signs and markings properly covered or reinstated?	
3.5	Other	
4	**Traffic controllers (TCs)**	
4.1	Are traffic controllers (TCs) appropriately located and established for day/night operations as applicable? • accredited • PPE etc.	
4.2	Is the traffic speed to TCs restricted to a max of 60 km/h?	
4.3	Is the sight distance to approaching traffic adequate?	
4.4	Do TCs have a clear escape route?	
4.5	Has provision been made to prevent end of queue accidents?	
4.6	Are signs associated with the TCs, in place and appropriately displayed and covered or removed when not required?	
4.7	Other	
5	**Signs and devices**	
5.1	Are all signs and devices (including barrier boards, cones and bollards) installed in accordance with the approved TGS and considered appropriate for the site conditions and arrangement?	
5.2	Are all signs and devices (including barrier boards, cones and bollards) in good condition, of the correct size and spacing and placed on frangible mounts?	
5.3	Are the signs and barrier boards clearly visible and not affected by other signs, plant items, vegetation, shade, light glare etc?	
5.4	Are sign faces in compliance with AS1742.3 and have Class 400T retro-reflective material as required by AS1742.3?	
5.5	Are there any contradictory or superfluous signs, devices or markings?	
5.6	Have the needs of pedestrians been provided for?	

No.	Check item	Acceptable/Not Acceptable or N/A
5.7	Have the needs of cyclists been provided for?	
5.8	Are all property accesses to the site controlled?	
5.9	Other	
6	**Safety barriers**	
6.1	Have the correct barriers been selected for the site and are they installed correctly? • as per the approved TGS • appropriate speed zone • end protection • appropriately overlapped/interfaced with other barrier types	
6.2	Where non-rigid barrier systems are used as safety barriers, is work behind the barrier prohibited from the deflection zone?	
6.3	Are water filled safety barrier elements full of water?	
6.4	Is the safety barrier erected as designed (incorporating end protection)?	
6.5	Other	
7	**Flashing arrow sign (FAS)**	
7.1	Have all FAS been appropriately located?	
7.2	Is it the correct size sign with the specified lamps?	
7.3	Is it being used in the correct mode of operation?	
7.4	Other	
8	**Variable message sign (VMS)**	
8.1	Is a variable message sign being used, as specified?	
8.2	Is the message related to the road or bridge works?	
8.3	Are there no more than 4 words per screen and no more than 2 screens on display?	
8.4	Is the sign located in a safe position?	
8.5	Other	
9	**Portable traffic control devices (PTCD)**	
9.1	Are the PTCD formally approved for use? (This may be included on the TGS approval)	
9.2	Is the approach speed of traffic reduced to 60 km/h or less?	
9.3	Is minimum sight distance of 150 metres provided?	
9.4	Have the PTCD been correctly sighted and established? • Minimum sight distance • Appropriate approach speed zone • Correct signs and markings	
9.5	Are procedures in place to review the end-of-queue when PTCD are operating?	
9.6	Other	
10	**End-of queue**	
10.1	Has an assessment of expected queue length been undertaken/documented and adequately managed? • around road bends • at intersections • over crests	
10.2	Other	

No.	Check item	Acceptable/Not Acceptable or N/A
11	**Workers on foot near plant**	
11.1	Have workers working within 3 metres of plant been trained/briefed/tool-boxed on requirements of AGTTM?	
11.2	Where workers working within the area of influence of revolving plant, are satisfactory risk controls in place?	
11.3	Has a VMP been developed?	
11.4	Are spotters being used near reversing plant or delivery vehicles?	
11.5	Other	
12	**Works traffic – vehicle management plan (VMP)**	
12.1	Has a VMP been approved and provided? Written VMP must be prepared in 100 km/h zones.	
12.2	Has the person authorising VMP been identified and qualifications and certificate number recorded?	
12.3	Have egress and ingress at the site been safely provided?	
12.4	Have acceleration and deceleration lanes been provided?	
12.5	Are U turns being undertaken safely, related to sight distances?	
12.6	Are reversing movements undertaken safely with regards to sight distances?	
12.7	Are signs provided for stockpile sites etc as required?	
12.8	Are median crossovers being used correctly with regards to sight distances?	
12.9	Are delivery vehicles required to report to a designated location/person? Is it happening on site?	
12.10	Other	
13	**Miscellaneous**	
13.1	If the work is intermittent are all requirements met?	
13.2	Where a lookout person is used, are all requirements being met?	
13.3	If the work is mobile are all requirements being met?	
13.4	If the work is conducted at night are all requirements being met?	
13.5	Where travelling plant or vehicles travel slower than 20 km/h below the normal road speed limit, do they comply with the requirements of AGTTM Part 4?	
13.6	Have provisions been made for emergency vehicle access through the work area?	
13.7	Has adequate allowance been made for large vehicles, particularly over-width or over-mass vehicles?	
13.8	Other	
ADDITIONAL COMMENTS		
Signed (Inspector): ..... Date: ……		
Name and position: **……**		

Source: Modified from Roads and Traffic Authority, NSW (2006).

Austroads' Guide to Temporary Traffic Management (AGTTM) details contemporary temporary traffic management practice for application in Australia and New Zealand. It provides guidance for the planning, design and implementation of safe, economical and efficient temporary traffic management designs.

Guide to Temporary Traffic Management Part 10: Supporting Guidance provides information on a range of topics to support the information contained within the other parts of this AGTTM. The information includes, risk management processes, review, inspection and road safety audit of worksites, events and emergency works.

Guide to Temporary Traffic Management Part 10

10

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