Guide to Road Safety Part 6

Road Safety Audit

Austroads

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Austroads

Sydney 2022

Guide to Road Safety Part 6: Road Safety Audit

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Abstract

Guide to Road Safety Part 6: Road Safety Audit provides practical guidance on the procurement, management and implementation of road safety audits.

This Guide has been developed within the current operating environment for auditing, setting a series of key principles which establish good practice to shape a local road safety audit strategy/policy.

Where practical issues necessitate, reasonable exemptions are supported, but must be formally justified and signed-off to ensure responsibility and accountability.

The importance of engaging non-road agency stakeholders in the audit process is also recognised and has been a major consideration in the practical nature of the guidance provided within this document.

Keywords

Road safety audit, road safety management, Safe System, Safe System Assessment, competency, prompt lists, road safety engineering

Edition 6.0 published January 2022

Edition 5.0 published February 2019

Edition 1.0 published 1994

This is the 6th edition of the Austroads Guide to Road Safety Auditing, and consolidates the 5th edition which was published in two parts; Parts 6 and 6A. This has removed any ambiguity, inconsistency, or duplication in the texts.

ISBN 978-1-922700-22-3

Austroads Project No. SAG6221

Austroads Publication No. AGRS06-22

Pages 156

Publisher

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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
- Department of Infrastructure, Transport, Regional Development and Communications
- Australian Local Government Association
- Waka Kotahi NZ Transport Agency.

Acknowledgements

The lead author of this Guide would like to acknowledge the contribution of the Project Working Group and the Austroads Project Team (Mr Joseph Le, Mr Mark Keulen and Mr Kenn Beer), as well as the practitioners that contributed to previous versions of Part 6.

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1. Introduction

1.1 Road Safety Auditing and its Contribution

Road safety auditing (herein referred to as RSA) continues to make a significant contribution to saving lives and reducing serious injury on the road networks of Australia and New Zealand.

It is a long standing, internationally recognised process which identifies road safety related risks and hazards to road users during defined stages of a road's life cycle in order that they can be mitigated. The primary objective is to prevent road trauma from occurring at a location, but the findings of an RSA can also make a useful contribution when reviewing locations where crashes have occurred.

RSA predates the emergence of the Safe System approach (Austroads 2018) but remains relevant as it continues to be recognised that designing a road to standards and guidelines alone does not give a safe road system. The advent of Austroads road design stereotypes will be of benefit in this regard (Austroads 2020a) but conducting RSAs will continue to be a beneficial and necessary step in design and the ultimate delivery of projects and should not be viewed as an additional cost or a potential delay in a project's progress.

Importantly, RSA is not a stand-alone process, it can complement or be complemented by a range of reactive, proactive, and predictive road safety processes and tools, supporting a road safety strategy which is totally consistent with the universal vision of zero fatalities on road networks. In turn, this will also help road agencies demonstrate that they are fulfilling their duty of care to road users.

1.2 Previous Austroads Guides

This is the 6th edition of the Austroads *Guide to Road Safety Part 6: Road Safety Audit* since its inception in 1994. This Guide supersedes all previous editions in their entirety, most recently Parts 6 and 6A (Austroads 2019).

The entire RSA process has been returned to a single document.

1.3 Development of This Guide

A Project Working Group comprising of representatives from state and local road agencies was established with the primary objective of consolidating and updating the previously issued Parts 6 and 6A (Austroads 2019).

Wherever possible the Project Working Group has looked to streamline the Guide, which has been achieved by cross-referencing to other Austroads documentation, as opposed to providing extensive extracts, and providing bullet point lists of good practice.

While photographs of typical risks and hazards identified during audits have been provided in Appendix D, provision of these items and case studies has been scaled back given their known extensive coverage within recognised formal RSA training courses. Such a course must be completed as a pre-requisite to becoming a recognised auditor (Section 9.5).

The development of a guide for clients (e.g. developers and project sponsors, and where appointed, their designated project managers) on managing RSA commissions has been identified as a possible supplement to this Guide. Such an approach has been adopted by Austroads with respect to managing traffic modelling commissions (Austroads 2021b).

Extensive consideration was given to identifying and understanding the current and likely future operating environment for RSA and this knowledge has been used to reinforce previous guidance and identify fit for purpose, achievable, short, medium, and long-term improvements to the process. Every effort has been made to clarify responsibilities and optimise the outcomes of audits by advancing their procurement, management, and undertaking.

1.4 Guide Structure

This Guide comprises of 13 sections, which are supported by 10 appendices.

Links between sections of this Guide and references to other Austroads documents have been included to facilitate easy movement between them. References to external documents are also included.

1.5 Who Should Use This Guide and How Should They Use It?

Even with substantial streamlining of previous guidance, as discussed in Section 1.3, this finished Guide remains a substantial document, reflecting the nuances of the subject matter and its wide interest across public and private sectors. While it is obviously recommended that as many practitioners as possible familiarise themselves with the document in its entirety, including to pick up on new developments, it is recognised that certain sections will have across the board relevance or more practical relevance than others to, for example, private sector clients and their project management and design teams, road agency strategy/policy makers, and those undertaking audits. This will in turn determine a personal need for a sound awareness or detailed understanding in content throughout this Guide.

The overarching (core) messages of this document are as follows:

- this Guide has been written with the primary objective of further promoting and enhancing RSA as a process, within a road safety management framework operating under the Safe System paradigm.
- **The Guide identifies several RSA principles which are recognised as industry good practice.** These principles are complementary and must be used as building blocks, e.g. to assist road agencies in developing and implementing an effective local RSA strategy/policy for their new projects and existing road network. **Accordingly, these principles are denoted using 'shall' (or occasionally 'must') within this Guide[1] and practitioners are advised to identify throughout, and respond to, those which apply to their specific involvement in the RSA process**.

In many instances the principles identified build on current practice to 'raise the bar' and lay the foundation for the way ahead - future national harmonisation, although it is recognised that the latter will only be achievable over time and be reliant upon on-going consultation and contributory project tasks.

It is also recognised that achieving the undoubted, ultimate value from the RSA process involves a wider array of stakeholders. Most notably this includes private sector clients operating outside of the road agency, given that the resultant infrastructure may eventually revert to public ownership. **Accordingly, the guidance developed applies to all parties and stakeholders in the road safety process i.e. it is not just the domain of state or local road agencies.**

It follows from the above that the development of a local RSA strategy/policy is actively encouraged, which is closely aligned to the good practice within this Austroads Guide. Similarly, existing strategies/policies must be regularly reviewed and updated. One of the most important functions of the strategy/policy is to provide a schedule of which projects are required to be audited and at what stage/s during their life cycle.

1 Other principles are categorised as 'should' and 'may' requirements, with these terms assuming common understanding.

It is recognised that road safety should never be an 'add on' and to gain maximum returns, road safety risks and hazards need to be identified as early as possible in the life cycle (i.e. the planning and early design stages). This applies to several processes, including RSA and is stressed throughout this Guide.

While a consistently managed and implemented, fully compliant strategy/policy is the desired outcome of this Guide, it is recognised that practical issues and challenges do exist in meeting the identified good practice. In response, a **formal exemption process** has been included in the Guide, with determination on a project-by-project basis. To be legitimate an exemption requires justification to be given, an approval/sign off from an authorised person, and a record retained on the project file.

Finally, it is important to stress that **obtaining and reading this Guide does not qualify a practitioner or other person as an auditor.** Formal competency requirements exist and are explained within this Guide, and these in turn should be built into local protocols for the qualification and assessment of auditors.

2. The Key Features of RSA

2.1 Introduction

Table 2.1 introduces the key features and aspects of RSA under this Austroads Guide.

Table 2.1: The key features and aspects of RSA

Feature/aspect	Commentary
What is an RSA and why are they undertaken?	An RSA is defined as 'a formal examination of a future road or traffic project or an existing road or road related area, in which an independent, qualified team reports on the project's crash potential and actual safety performance respectively'. • RSAs: - are achieved in their most traditional form through the identification of risks and hazards to all foreseeable road user groups with the potential to result in crashes, such that they can be eliminated or mitigated - when aligned with the Safe System, are focused on fatal and serious injury crash types, but does not preclude the consideration of other crash types and severities - are formally documented - are extensively a proactive process – trying to prevent crashes from occurring, although audits can be used effectively to review sites where crashes have occurred - can be undertaken throughout the infrastructure life cycle stages (from project inception to design to operation) - are undertaken so that the infrastructure can operate/operates as safely as possible for all road users - and their scope are determined by a brief but with due regard to Austroads principles and with an understanding that a project can influence the safety and operation of the network outside of its immediate footprint. These influences must be reflected in the scope. - are necessary as it has been consistently found that compliance with road design standards and guidelines does not guarantee a safe road environment. • RSA should be distinguished from, but can complement and be complemented by, other processes and tools relevant to road design and road safety management within an overarching Safe System approach. • The conduct of any RSA does not preclude the client from raising known safety concerns that they may have at other points within the project/scheme review process. Clients should not put any pressure on the audit team to include or exclude safety risks and hazards or more general issues within their audit report.
What an RSA is not	• An RSA is **not**: - a check of compliance with technical standards and/or guidelines during the design process or the 'as built' configuration for an existing project - an assessment of the overall merits of a road project or a means of rating or justifying one project or options against others in a project or works program - a substitute for design QA/QC and related checks - a crash investigation (e.g. to Austroads treatment of crash locations/black spot guidelines) - a cyclic, visual asset management inspection - a road safety check (as defined later in this Guide) - something to be applied only to high-cost projects or only to projects where safety problems are anticipated - an opportunity to redesign or make changes to a design with no apparent link to a safety issue - a consideration of the composition or structural safety of the project or scheme - a check or assurance of the Workplace Health and Safety (WH&S) of road workers during the construction and/or operation of the road - a check of a traffic management plan, traffic control plan, vehicle movement plan or similar, which is a different task to an RSA, with unique competency requirements. Notwithstanding, road safety risks to road users that are readily foreseeable from planned or current road works are to be recorded in an audit report.

Feature/aspect	Commentary
Who undertakes an audit?	• An audit team – defined as a minimum of two or more auditors, all who have met applicable local competency requirements (a combination of skills, experience, knowledge, and attitude) for their role on that team. • For a new or modified design, the audit team must be 'independent' of the designer/design team. Local controls or conditions may exist for the audit of existing roads. Guidance is provided later, and a jurisdiction's requirements are to be specified within the local strategy/policy.
What can be audited?	• RSAs can be conducted on a wide range of road types and related situations, including (but not restricted to): new road construction (for any road type – sealed or unsealed) - small-scale road treatments such as realignments or intersection treatments - proposed projects in response to blackspot studies, or to support a blackspot application - pedestrian and bicycle lanes and routes, including their interface with roads, and increasingly at the time of drafting, Pop-up Facilities and Tactical Urbanism projects - local area traffic management (LATM) schemes - work zones on the public road network - areas outside of, but pertinent to operation of an adjoining public road, such as carparks, service roads, public transport interchanges, master planning residential estates/new subdivisions, sports complexes, schools, and hospitals – including importantly their access points to the public road. • The type of risks and hazards to be identified during an RSA relate to, or are a consequence of, the project being audited. • A clear description and assessment of the risks and hazards identified, and their respective crash types and mechanisms are to be provided by the audit team. • In addition to guidance provided within this Austroads Guide, requirements are to be specified within the local strategy/policy.
When can audits take place?	• Audits can be undertaken at various stages in the life cycle of a project or scheme – from feasibility (inception) to operation (existing roads). • In addition to guidance within this Austroads document, requirements are to be scheduled within a local strategy/policy.
What are the benefits and costs of an RSA?	• The benefits of conducting RSAs can be summarised as follows: - the exposure of road users to safety risks can be reduced - likelihood of crash occurrence can be reduced - the severity of crashes can be reduced - road safety is given greater prominence in the minds of road designers, traffic engineers and road funders - the need for costly remedial work is reduced - the total cost of a project to the community, including crashes, disruption, and trauma, is reduced - possible reduced land take in some instances. • The greatest benefits from RSA are obtained from audits conducted during the feasibility and preliminary design phases. It is also typically easier and more cost effective to effect changes to a design before construction has commenced. • Significant benefits can also be accrued from pre-opening audits and auditing of existing roads, although mitigation measures typically become more involved and/or incur larger costs and may result in delays and/or poor public relations. • The costs of an RSA are typically held as 4% of the total design costs (Austroads 2019. • The World Bank identifies a return of $36 for every $1 spent on RSA at the design stage, and a $6 return from every $1 spent on audits of existing roads (Deng, Jordan & Goodge 2012). • The findings and lessons learnt from RSAs are an important input to the continual improvement of design standards and guidelines, policies, and practices, both locally and to the road industry. As a result, internal and wider external feedback loops should be established.

2.2 Why Designing to Standards and Guidelines does not Guarantee Safety

The following is provided as additional context to the rationale behind auditing. Further information on the points introduced below can be found within Austroads Guides (e.g. Austroads 2020b and 2021a).

Design standards, guidelines and associated codes of practice are a very important starting point with any road design. However, designing to them does not necessarily mean that the road is safe or risk-free. This is because the safety outcome achieved can be affected by:

- the complexity of the environment and design task
- the presence of competing and sometimes overlapping and inconsistent design standards and guidelines
- use of standards and guidelines that are either insufficient or too complex for a local situation
- use of standards and guidelines that are obsolete or no longer good practice
- standards and guidelines being developed for a range of reasons e.g. cost or traffic capacity, as well as safety – and sometimes being applied for a purpose that was not intended
- standards and guidelines being often a minimum requirement; combining a series of minimums is undesirable and can leave no room for error, either on the part of the designer, the contractor, or the final road users
- standards and guidelines which cover general or common situations, not all situations
- standards and guidelines taken out of context or applied in isolation without consideration of other pertinent standards and Guidelines
- standards and guidelines which may not be applicable to the circumstances in the design
- individual road elements, designed to standards and guidelines, may be quite safe in isolation but may, when combined with other standard elements, impact on safety either at that location and/or an adjoining location or network
- application/interpretation (including any assumptions) by design practitioners who do not have the required competency (defined as knowledge, skills, experience, and attitude).

Where it is decided not to meet a documented standard or Guideline, the rationale must be recorded and retained. While in practice this will predominantly focus on design issues, the safety risk/s associated with not following the documented standards or Guideline must also be identified, and by what extent, the risk/s will be mitigated and how this will be achieved. This information provides useful background and context in the subsequent undertaking of RSAs.

RSA has traditionally identified risks and hazards associated with all crash types and severities. However, the widespread adoption of the Safe System approach to road safety focuses on the elimination of key crash types which lead to fatal and serious injuries (FSI) and necessitates a modified approach. Section 5 explains how Safe System principles can be incorporated into the RSA process.

2.3 What are the Attributes of the Safest Roads?

The safest roads facilitate road users to perceive and process road information, make decisions, act, and monitor, within time constraints – all critical components towards positive road safety outcomes.

It has been found that the safest road environments on our networks:

- are commensurate with their function and usage and are consistent in appearance and provision with similar road sections and contribute to the overall safety principles and outcomes of the network i.e. the concepts of Movement and Place (Austroads 2020c)
- recognise the benefits of providing a consistent and coherent network

- warn road users of any substandard or unusual features
- inform road users of conditions ahead
- are self-explaining, guiding road users and controlling their passage through conflict points or sections
- make allowance for road user error or inappropriate behaviour
- provide no surprises in road design or traffic control
- provide a controlled release of relevant information
- provide repeated information where pertinent to emphasise danger
- are forgiving and are designed to prevent death or serious injury throughout the pre, during, and post stages of a crash
- receive regular assessment and review across a range of reactive, proactive, and predictive processes and tools, including risk assessment and RSA with the objectives of minimising exposure, likelihood and severity to all crash types, and a focus on key crash types identified under the Safe System
- are well maintained (e.g. road surfaces, drainage, line markings, delineation) through the robust application of the disciplines of sound asset management.

Additionally, the generic and safety and mobility needs of all foreseeable road user groups are considered, especially the most vulnerable (e.g. children, the elderly, visually impaired).

Specific guidance regarding the issues raised in this sub-section is contained across the range of Austroads Guide series e.g. road design, traffic management and road safety.

2.4 Legal Considerations

Developing and consistently implementing a road network management strategy that considers road safety outcomes through the undertaking of RSA and other complementary processes will assist road agencies in demonstrating that the organisation is fulfilling its duty of care to the road users on its network.

The personal professional liability of auditors is also of interest.

These issues are discussed in Appendix B.

2.5 Closing Summary of the Key Benefits of RSA

The most significant benefits of conducting RSAs can be summarised as follows:

- The exposure of road users to risk can be reduced.
- The likelihood of crash occurrence can be reduced.
- The severity of crashes can be reduced.
- Road safety is given greater prominence in the minds of clients and their project managers, road funders, planners, and designers, and those involved in construction and network operation and maintenance.
- The need for costly remedial work (re-design and/or post opening reactive measures) can be avoided, with associated reductions in trauma, disruption, and the total cost of a project to the community. This in turn reduces the likelihood of road users being exposed to undue risk and ultimately a blackspot resulting at the location being considered.

3. RSA Within a Road Safety Management Framework

3.1 Introduction

Figure 3.1 illustrates how RSA is an essential component of a wide road safety network management framework which comprises of a suite of reactive, proactive, and predictive processes and tools across the seven stages of the road infrastructure life cycle. Each of the processes and tools have their own objectives but are also complementary.

While the origins of the strategic framework are within another Austroads project and its best fit is with state road agencies, the framework can also be adapted locally, to be fit for purpose, including local government application.

3.2 Explanation

The top row within Figure 3.1 shows the seven stages of the road infrastructure life cycle – which from left to right tracks the network-level decision process. This process begins with the planning of a network and corridors within it, which in turn influences project-level activities (from design to construction and to opening) and finally, operational and maintenance demands.

The green highlighted row ‘safety vision’ shows how Safe System principles apply throughout the life cycle and how components such as safety in design are integrated.

The red highlighted **reactive** road safety processes focus on the analysis of reported/known crashes to prevent the same or similar crash mechanisms and severities from recurring at that same location. Activities within this category traditionally include crash investigation and the identification and treatment of crash locations (also known by some jurisdictions as blackspot engineering or treatment of blackspots) (Austroads 2021d).

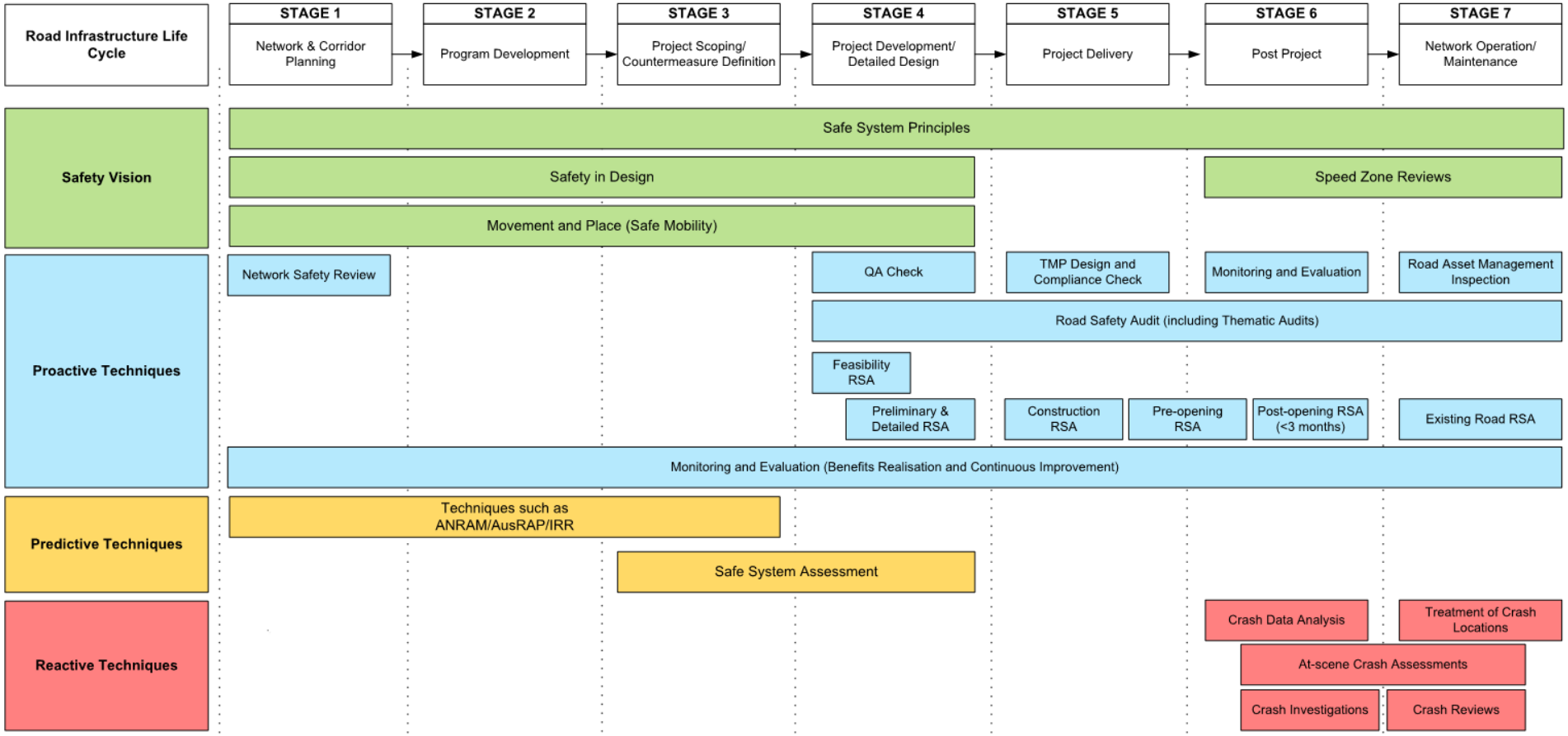
The blue highlighted **proactive** road safety processes focus on identifying risks and hazards at a location which have the potential to result in crashes. The aim is to mitigate the risks such that foreseeable crashes do not occur at a location. **The majority of RSAs fall within this category**. Mass action treatment programs on existing homogeneous lengths of road also fall within this category.

The development of **predictive** road safety processes (which are highlighted in gold) permit fatal and serious injury crash risk profiles to be determined. This enables the identification of locations where certain crashes can be reasonably expected to occur such that pre-emptive mitigation can be determined and implemented. Examples include the Australian National Risk Assessment Model (ANRAM) (Austroads 2014) and Safe System Assessments (SSA) (Austroads 2016a).

3.3 Verification of Designs

A holistic approach to verifying designs implemented across the parties involved has ultimately been shown to be beneficial. Processes such as safety in design, design review, SSAs and design stage RSAs have proved to be complementary in achieving the optimum safety outcome for a location.

Figure 3.1: Road safety network management framework



4. The Operating Environment

4.1 Introduction

Figure 4.1 illustrates the operating environment for RSA. It is a combination of current and emerging issues.

Two concepts have guided the development of this Guide – optimising the outcomes from RSAs and reflecting the appetite for establishing a pathway towards national harmonisation (as identified in the dark blue circles to the left of the figure).

The issues within the operating environment have also been identified and broadly collated into three themes (shown in orange, green and light blue). This helped to identify where new or additional good practice guidance was required during the drafting of this Guide. Initial commentary on each of the themes and their respective issues is provided below Figure 4.1, with guidance then being incorporated across the further sections and sub-sections of this Guide.

4.2 The Two Guiding Concepts

There is a strong desire to **optimise the outcomes from RSAs**. This recognises the past and on-going importance of the process, and its potential contribution within the road safety network management framework, but also some practical quality issues.

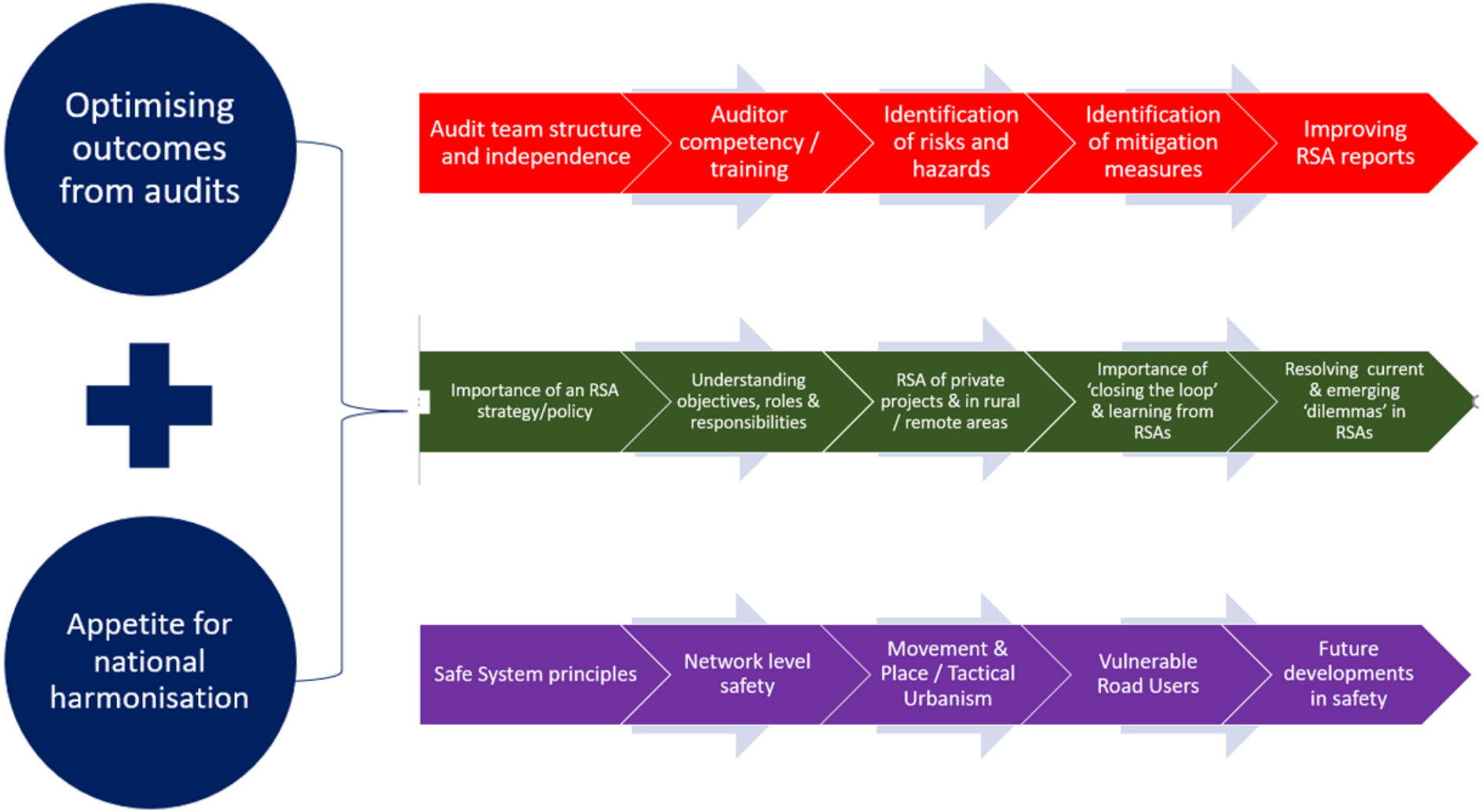
Ensuring that RSAs are consistently commissioned and delivered across public and private sector projects (i.e. new and modified infrastructure and existing roads) requires more than simply establishing a requirement within a Guide – the benefits, as expressed in terms of safety and efficiency, must be achievable and tangible such that the process is universally accepted, applied and trusted, and so becomes self-perpetuating.

Establishing stronger governance in RSA is also an important aspect within this guiding concept e.g. to ensure that all private sector led projects are audited and the audits undertaken are closed out, particularly where the infrastructure has obvious implications for the adjoining public road network and/or ownership and subsequent operations and maintenance revert to the public road agency.

Similarly, an **appetite towards harmonisation** of practices and protocols was readily apparent, with the ultimate objective of establishing a controlled pathway towards national harmonisation and full compliance with the foundation principles within this Guide.

The Project Working Group for this Guide recognises that a logical pathway is required, and a step change needed across the industry (private and public sector), for national harmonisation to be achieved. Accordingly, the pathway must include ample opportunities for consultation and tangible support through knowledge transfer and capacity building activities. The ultimate benefits of national harmonisation in the longer-term must also be widely promulgated.

Figure 4.1: Illustration of the operating environment for RSA



4.3 The Three Themes within the Operating Environment

4.3.1 Theme 1 – Raising Competency and Improving Outputs

This theme, as shown in Figure 4.2, concerns raising the competency of auditors and improving confidence in the outputs from RSAs.

Figure 4.2: Theme 1 – improving the competency of auditors and quality of outputs

Audit team structure and independence – this item recognises there is currently local variance in the structure and independence of audit teams. This can adversely affect the consistency and quality of audits in general terms, and specifically, key tasks within the process, such quantifying and expressing risks and in providing realistic recommendations and mitigation measures to the client within the audit report. In response, updated Austroads good practice is clearly documented within this Guide.

Auditor competency and training – while auditor competency is defined and training and qualification processes are established in most state jurisdictions as a pre-requisite to involvement on audits, such requirements tend to be less clearly defined or enforced for audits of local roads, road related areas and private sector projects. Specifying and ensuring auditor competency is crucial to the quality of RSA outputs and outcomes. A competency model has been identified in this Guide which adopts recognised principles from the learning profession, establishing a combination of skills, experience, knowledge, and attitude requirements (Section 9.5). Further improvement and harmonisation of auditor training is also considered desirable, such as has been applied by Austroads to the discipline of temporary traffic management.

Identification and prioritisation of risks and hazards – these are crucial tasks for auditors in the process. A need for improvement and consistency has been identified as part of this project. Updated good practice guidance has been provided, which is aligned to the Safe System principles (Sections 10.4 and 10.5). The clients of audits are increasingly from 'non-technical' backgrounds which makes it crucial that risks and hazards are objectively identified and clearly communicated in terms of their nature, location, and significance. This requires a clear identification of potential crash type, severity and the road user type/s affected, along with a realistic assessment of its priority. The outcomes from an RSA can be significantly diluted if a client detects uncertainty or inconsistency in the audit findings or is overloaded with a large number of risks and hazards, some of which may only present the lowest level of risk.

Provision of recommendations and identification of mitigation measures – as with the *identification of risks and hazards* immediately above, the role of the auditor is to educate and assist the client. Accordingly, good practice is that recommendations must always be provided such that the client gains a clear understanding of what action is required to mitigate each risk and that the physical measures identified are commensurate, realistic, and known to be effective. In more recent times, alignment with the Safe System is also a highly important consideration when framing and communicating recommendations and mitigation measures.

Improving the quality of RSA reports – raising the overall consistency and quality of RSA reports has also been identified as an on-going objective, such that clients are consistently provided with an audit report which has a familiar form which is clear, logical and easy to navigate. In short – the report assists them. It has been argued that the current situation is insular, with few auditors receiving critique or feedback on their audit reports and this is an area that would benefit from further consideration and rectification.

4.3.2 Theme 2 – Audit Coverage

This theme, as shown in Figure 4.3 concerns audit coverage – the determination of what to audit and when, as well as ensuring that all audit types and environments are considered and supported.

Figure 4.3: Theme 2 – audit types and learning from audits

Importance of an RSA strategy/policy – A local road safety strategy/policy is essential in setting out that jurisdiction's RSA requirements to be followed. Importantly this includes criteria for what type of projects and/or roads are to be subject to audit and at what stage/s within the life cycle they are audited. Requirements as to how audits are to be conducted and the composition and independence of the audit team are also typically included. The good practice principles in this Guide are the primary mechanism in 'raising the bar' in RSA across national, state, and local road networks Australia and New Zealand. While exemptions (i.e. local divergence from Austroads good practice) should be minimal, the local strategy/policy shall set out the scope and protocols to be followed where exemptions may be granted, but only where valid and/or insurmountable practical reasons demand.

Understanding objectives, roles and responsibilities – this was identified as an on-going issue, but one which can be readily addressed through the local RSA strategy/policy and/or the audit brief. A general lack of awareness and understanding of the audit process by clients has contributed to this issue, especially in the private sector, and this can lead to differences in expectation and ultimately a lack of confidence in the audit process. Improving clarity in all aspects of the process will be beneficial such that RSA is effective as a valuable contributor in the 'quality' component of the 'quality-cost-time' project management triangle.

RSA of private projects and in rural/remote areas – the auditing of private projects (e.g. developer led schemes with a direct influence on the networks of local road agencies and/or likely to revert to public ownership) and public roads in rural/remote areas were both identified for additional guidance. Such guidance has been provided throughout the Guide. Importantly there is understanding of, and empathy with, the very real challenges of resourcing audits of rural/remote areas.

Importance of 'closing the loop' and learning from RSAs – one of the most identified weaknesses in the audit process across all jurisdictional levels is the failure of the client to 'close the loop' on audits. This involves the client not responding to the findings or recommendations of an audit or across several audits within a locational area or program, or only effecting a token response. Failing to document and communicate the response, including no action, is also a further example of not 'closing the loop'. In such instances, the audit remains 'open' and does not achieve the desired road safety benefits if due diligence and governance are not upheld. It is similarly important that the learnings from RSAs are routinely collated and disseminated within the organisations directly involved and other stakeholders, including the road industry as a whole. This ensures that improvements to standards and guidelines, designs, policies, and the audit process itself and its application can result.

Resolving practical dilemmas in RSA – the Project Working Group is aware that auditors sometimes identify a risk or hazard which is strictly outside of the audit scope in terms of its location or the road user group affected. The auditor is then faced with a decision as to whether to record the risk or not, and if so, whether this is to be done within the audit report, or in some other way. The underlying good practice is that safety risks and hazards should always be recorded and reported when identified, regardless of the initial objective of the activity. Guidance on such dilemmas can be provided within a local code of conduct for auditors and this approach has been adopted for this Guide (Appendix G). In many cases the code of conduct will be incorporated in the local strategy/policy document.

4.3.3 Theme 3 – Staying Relevant and Future Proofing

This theme, as shown in Figure 4.4, concerns staying relevant and future proofing – the contribution of RSA to safety outcomes across contemporary and rapidly changing road networks, which are reacting to known future developments in road transport.

Figure 4.4: Theme 3 – RSA in a modern context

Safe System principles – the management of road safety and delivery of positive road safety outcomes in Australia and New Zealand are required to be aligned to Safe System principles. The latest example of this is the recently issued Draft National Road Safety Strategy for Australia 2021–2030[2]. As has been shown throughout the remainder of this Guide, it is possible to embed Safe System principles and thinking within the RSA process.

Network level safety – through recent Austroads projects such as the development of road stereotypes, practitioners are being required to consider projects more holistically i.e. whether the infrastructure proposed is consistent with similar roads on the network and supports wider safety outcomes being sought. This is in considerable contrast to adopting a solely micro or project level view of the length of road being audited. This Guide includes guidance as to how these principles can be further embedded and consistently implemented within the RSA process through the development of audit prompt lists. These lists incorporate the so-called 'front loading' of questions to ensure that likely key crash types and their speeds at a location are comprehensively assessed.

2 https://www.roadsafety.gov.au/nrss/nrss-2021-30

Movement & Place, Pop-up Facilities and Tactical Urbanism – The emergence of concepts such as Movement & Place, Pop-up Facilities and Tactical Urbanism have changed the landscape of urban networks and the way in which many former road corridors are now allocated and operate in urban areas. The rapid growth of more sustainable transport modes such as walking, and cycling has the potential to result in a significant increase in the amount and diversity of infrastructure being introduced. With this comes a wider range and focus of auditing. The likelihood of a client commissioning user (thematic) audits has never been greater and in response, guidance has been provided within this Guide (Appendix I).

Vulnerable Road Users (VRUs) – linked closely to the issues identified immediately above, auditors are also now more likely to have to consider the safety of VRUs. Again, guidance is provided within this Guide (Appendix I).

Future developments in travel – the foreseeable emergence of connected and automated vehicles (CAVs) and their associated intelligent transport systems (ITS) and their unique infrastructure requirements further alter the road landscape. The demands on auditors will change over time, with dynamic and responsive strategy/policy and guidance documents being essential. Auditor prompt lists will need to be reviewed and updated over time as technology and any previously unforeseen safety issues emerge.

5. RSA within the Safe System

5.1 Introduction

The Safe System approach is regarded as international good practice in road safety and provides an outcome whereby death and serious injury are virtually eliminated amongst users of the road system.

The Safe System is shown graphically in Figure 5.1, and its principles and their implementation are extensively documented by Austroads across various Guides.

Figure 5.1: Representation of the Safe System

Source: Austroads (2018).

There are four key principles that form the basis of the Safe System philosophy (International Transport Forum (ITF) 2016):

- People make mistakes that can lead to road crashes.
- The human body has a limited physical ability to tolerate crash forces before harm occurs.
- A shared responsibility exists amongst those who plan, design, build, manage and use roads and vehicles and provide post-crash care to prevent crashes resulting in serious injury or death.
- All parts of the system must be strengthened to multiply their effects; and if one part fails, road users are still protected.

These Safe System principles must be given due consideration in all activities within the road safety management of a road network, including RSA.

In basic terms this is to be achieved during the RSA process by:

- identifying and considering key crash types that result in fatal and serious injury
- relating possible crash forces to tolerable levels, regardless of the likelihood, when identifying and assessing risks/hazards
- consideration of audit findings and mitigation measures by their alignment with the Safe System e.g. in terms of operating speed, impact angles etc.

As previously stated in this Guide, RSAs have historically focused on identifying risks and hazards associated with all crash types, severities and user groups and while this approach is not totally precluded, a change in focus is required – to eliminate fatal and serious injury crashes.

It follows that a sound understanding of, and technical capability in, Safe System principles and their practical application are **essential** for all parties involved in the RSA process. A brief overview is provided here, but much greater detail appears within a wide range of Austroads and other industry documentation and practical guidance can be gained by attending recognised Safe System training modules.

5.2 Applying Safe System Principles in the RSA Process

An RSA under the Safe System approach requires an understanding of kinetic energy generation and its implications with respect to safety and personal outcomes when crashes of a certain type occur. This in turn has led to the identification of critical speed thresholds, also known as Safe System target speeds (as discussed below).

The predominant crash types that result in deaths and serious injuries in Australia and New Zealand are (Austroads 2016a, Marsh & De Roos 2016, Tate & Brodie 2014):

- head-on (crashes that occur when one vehicle crosses onto the opposing side and impacts another vehicle, including head-on crashes at intersections)
- intersection (crashes at intersections including side-impacts involving vehicles from adjacent directions and turning vehicles)
- run-off-road (crashes that occur when a vehicle leaves the carriageway without impacting another vehicle, including run-off-road crashes at intersections)
- vulnerable road user (crashes involving pedestrians, cyclists, motorcyclists, the elderly, children, and people with special needs).

Rear-end crashes are also an important cause of serious injury based on an analysis of all injuries from road crashes in Australia and New Zealand between 2001 and 2010 (Austroads 2018).

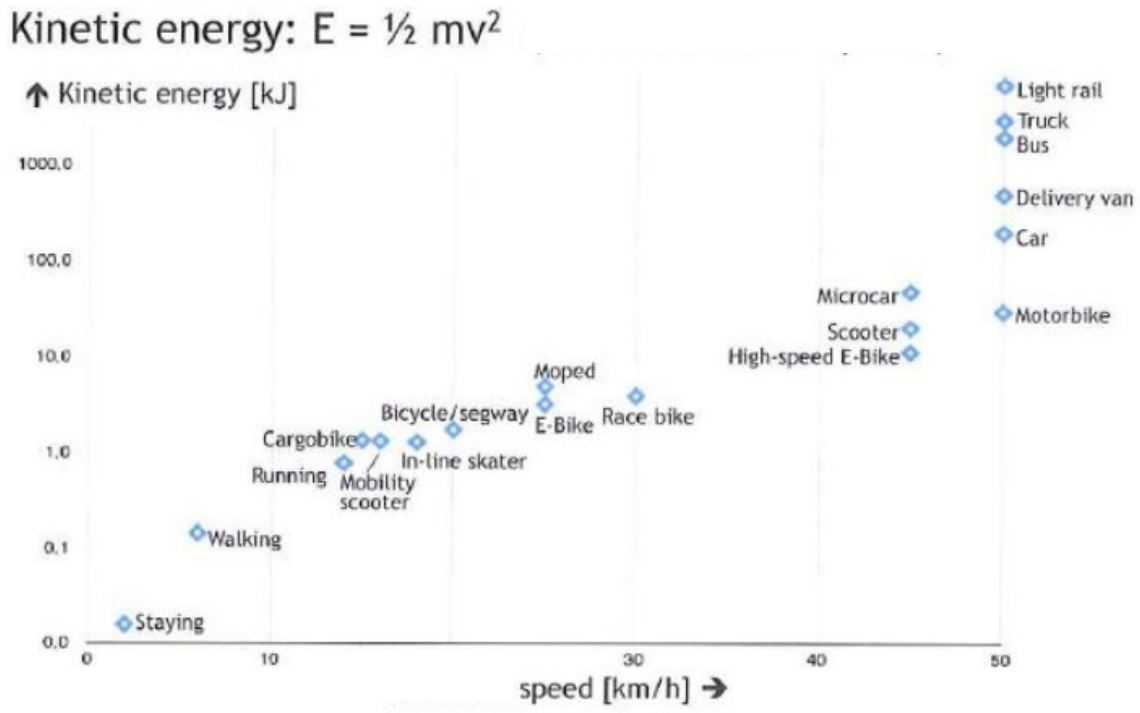
The following key questions are also essential at the beginning of any audit under the Safe System. An affirmative response to any of the questions means that the risk of a high severity crash is significant, and a subsequent risk assessment required:

- Is it possible to have a head-on crash at a speed ≥ 70 km/h?
- Is it possible to have an intersection (right-angle) crash at a speed ≥ 50 km/h?
- Is it possible to have a run-off-road (side impact with a rigid object) crash at a speed ≥ 40 km/h?
- Is it possible to have a vulnerable road user (e.g. pedestrian, cyclist and motorcyclist) crash at a speed ≥ 30 km/h?

Given their significance, these key concepts have been 'front loaded' on the Austroads prompt lists developed to assist auditors (Appendix H).

Figure 5.2 provides a useful comparison of the kinetic energy associated with various vehicle types operating at what might be considered as typical operating speeds. This highlights the need to be aware of where larger, heavier vehicles are operating at a location.

Figure 5.2: Comparison of kinetic energy associated with various vehicle types (y axis) at typical average operating speeds (x-axis)



Source: Austroads training material.

It is essential during an RSA to correctly identify, express and assess the exposure, likelihood and severity for each of the risks/hazards present (Section 10.5 refers).

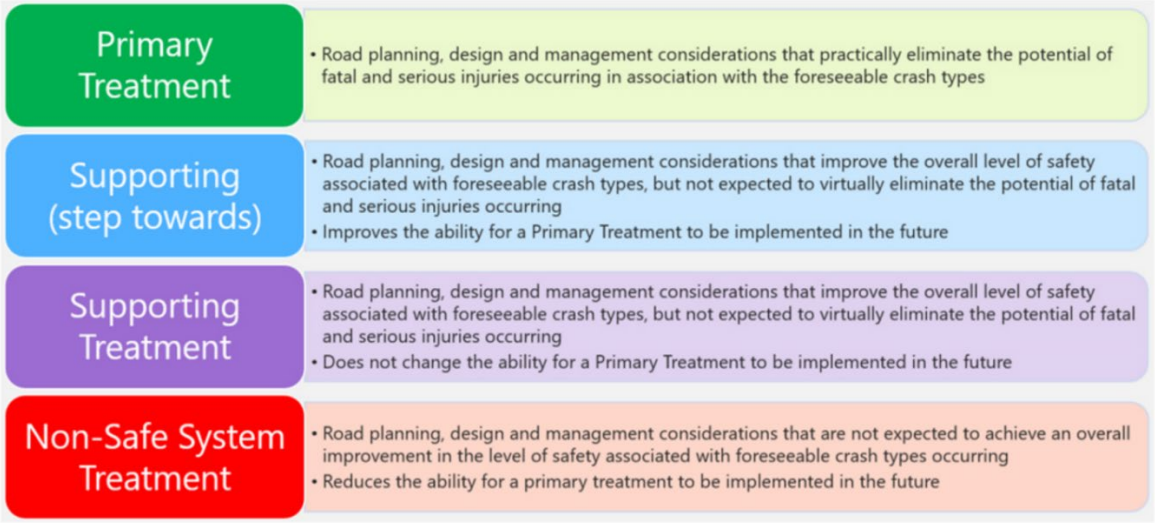
5.3 Identifying Risk Mitigation Measures Under the Safe System

All risk mitigation measures identified and ultimately to be implemented should be verified to ensure that they do not make the situation worse (i.e. they will not create further crash risk/s). In the worst case, an additional RSA or Safe System Assessment might be required to resolve issues arising.

The later sections of this Guide provide useful generic guidance on identifying and recommending appropriate risk mitigation measures (Section 10.6). The adoption of a generic hierarchy of controls approach is also included within this guidance.

Further, Figure 5.3 provides how to distinguish between mitigation measures that provide a high alignment with Safe System outcomes (i.e. they to all intents and purposes eliminate death and serious injury) and those measures that assist in delivering worthy, but more general, safety improvements, such that the former can be prioritised.

Figure 5.3: Safe System mitigation measures



Source: Austroads (2018).

Listings and associated hierarchies of primary and supportive mitigation measures, for various crash types and the influence of these measures on the risk parameters of exposure, likelihood, and severity are included within Austroads (2018).

While cross-referencing of each mitigation measure included within an audit report with the relevant Safe System pillar/s has been introduced by some jurisdictions, it is yet to be a mandatory requirement under this Guide.

5.4 Safe System Assessments (SSA)

SSAs were developed by Austroads as a practical tool to consider and quantify the degree of 'alignment' of a project design with Safe System principles. The position of SSAs within the Road Safety Network Management Framework is shown in Figure 3.1.

Extensive documentation regarding the tool, its development and usage can be found in a dedicated Austroads Guide (Austroads 2016a). In summary, the tool is founded on a Safe System Assessment Framework (SSAF) that has a Safe System focused risk matrix as its 'engine room'. This ensures consistent consideration of current key crash types and prompts an assessment of risk exposure, likelihood, and severity.

It is important to note that despite their apparent similarities, a contemporary RSA under the Safe System and an SSA are not identical but can be complementary. Both processes have their place and are important components of a road safety network management system. It follows that just as with RSA, the development of a local strategy/policy for the undertaking of SSAs, or a hybrid strategy/policy, is also required.

As with RSAs, it is strongly advised that SSAs should also be undertaken to a detailed brief and by an independent and suitably competent team i.e. competencies for conducting audits and SSAs are not identical, but they are certainly complementary.

Good practice in responding to the findings and recommendations and 'closing the loop' is common to both audits and SSAs.

6. A Strategy for RSA

6.1 Introduction

6.1.1 New and Modified Road Infrastructure

Throughout the design process for new and modified road infrastructure, the client (either a road agency or private sector body) is responsible for the undertaking or commissioning of regular checks of the compliance and ultimate safety of that design. As identified previously, RSA is a recognised process in the latter towards optimising the safety of the road users that will eventually use that infrastructure when it is built and opened.

6.1.2 Existing Roads

The road agency or road operator (as applicable) are responsible for the ultimate compliance and safety of existing roads. Existing RSAs (known as road safety inspections in some jurisdictions) are an important recognised process towards ensuring the on-going safety of the foreseeable road user groups traveling on an established road.

Notwithstanding, existing RSAs are different to routine visual checks of an established road as part of an asset management regime, or an alternative, less intensive technique known by some jurisdictions as a road safety check (Transport for New South Wales (TfNSW) 2011).

6.2 Developing a Local Strategy/Policy

All road agencies should develop a local **RSA strategy/policy**.

However, it is important to recognise that the strategy/policy for a state road agency is likely to be more complex and involved than that for a local road agency. Where a strategy/policy does not exist, the undertaking of RSAs of private projects can be included within development consents and technical specifications.

The key objective of the strategy/policy is to give clarity as to what is to be audited and when. This is essential as there is typically no requirement within legislation in Australia or New Zealand to conduct RSA for all road infrastructure projects and/or existing roads.

The local strategy/policy will document local requirements to be followed and consistent, full compliance with those requirements is the desired outcome.

Where **exemptions** are to be allowed within the local strategy/policy e.g. the audit schedule and/or an audit practice will not be followed, essential requirements for the justification, sign off and recording of each exemption requirements are also set and must be followed[3].

Specimen examples of a state road agency and local road agency strategy/policy document are included as Appendix C of this Guide.

3 Some jurisdictions have developed a local exemption proforma. An example of this to record why an audit is not being performed is NZTA's Exemption Form PMM 6.5b, which can be found within the organisation's Project Management Manual SM011, which is available from the NZTA website.

6.3 What Can be Audited and When Should Audits be Undertaken?

In simple terms, an RSA can be undertaken of any road or item of road-related infrastructure at any stage during the network life cycle.

However, the most typical audit types have been established to mirror the design process and beyond i.e. throughout the life cycle, as shown in Table 6.1. Other checks (i.e. which do not fall into the more traditional/classical audit types) have been included at the bottom of the figure. References to later sections of this Guide are also provided.

Table 6.1: Audit types

Audit types	Guide section reference
Feasibility (strategic/concept)	Figure 3.1 and Section 7.1
Preliminary design	Figure 3.1 and Section 7.2
Detailed design	Figure 3.1 and Section 7.3
Pre-opening	Figure 3.1 and Section 7.4
Immediate post-opening/post-completion (< 3 months)	Figure 3.1 and Section 7.5
Existing road (> 3 months)	Figure 3.1 and Section 7.6
'Other' • Interim audits • Thematic (specialist road user) audits • Traffic management/control • Adjacent usage/shared areas • Modern technology • Maintainability	Section 7.7

6.4 Developing an Audit Schedule – New/Modified Road Infrastructure

Two guiding principles apply:

- The benefits to be accrued from auditing far exceed the disbenefits.
- The potential for improving safety outcomes and the greatest benefit from mitigation measures are achieved when audits are undertaken as early in the design process as practicable, prior to construction taking place.

The Austroads position is that as a **minimum**, audits shall be conducted at the following stages with respect to new/modified road infrastructure:

- feasibility (concept) and detailed design; or
- preliminary and detailed design.

Notwithstanding, this does not negate the need for audits to be undertaken later in the life cycle (e.g. pre-opening, immediate post-opening, and existing road).

In specifying which new projects to audit a risk-based approach is required. Adopting project size and/or value as the proxies for risk or setting a sample-based requirement (% of projects) may not adequately reflect the characteristics and complexity of the project. Preference is to base the new road audit schedule on criteria linked to the ultimate usage of the road and with due consideration of Safe System principles – key crash types and Safe System speeds.

The local audit schedule should be documented (typically in tabular form) within the RSA strategy/policy and compliance to this requirement formally reviewed.

6.5 Developing an Audit Schedule – Existing Roads

Application to the existing road network can be either in a site or route form (which yields specific safety issues), or in a network wide form (which yields overarching safety issues).

It is important to note that although crash/blackspot studies and less formal cyclic asset management inspections and road safety checks are all useful processes within a road safety network management system and are complementary, they are not the same as an existing RSA. Further information on these other processes/tools is contained in Section 7.7.

It is possible to conduct an audit of both sealed and unsealed roads. The ARRB Best Practice Guides (Australian Road Research Board (ARRB) 2020a, b) for such roads provide extensive technical information.

As with new and modified infrastructure a local RSA strategy/policy must set out which existing roads are to receive an audit and when (e.g. in response to a trigger/s, such as a request from the local police or political or community concern or following a routine audit frequency).

In practice, routinely conducting an RSA across a complete road network is not achievable for most road agencies. Therefore, it is strongly advised that existing roads or sections of the network be identified through objective criteria and/or using complementary processes and tools as being of greatest potential risk/hazard to road users. An example with respect to local government, is the Austroads Infrastructure Risk Rating (IRR) which will assist councils to undertake a strategic, macro level assessment of their network as a screening tool to identify and prioritise routes or road sections where an existing RSA would be most beneficial. This will also help optimise often limited local resources.

7. Types of RSA

This section provides for each audit type its objectives (and for some types, general background), a summary of good practice[4], and where to find photographic examples.

7.1 Feasibility (Strategic/Concept)

The objectives and general background of a feasibility (strategic/ concept) stage RSA are collated in Table 7.1.

Table 7.1: The objectives and general background of a feasibility stage RSA

Feasibility audit	Commentary
Objectives and general background	• To examine for any issues with the strategic planning of a project that might compromise the safety of road users if the project is constructed in its current form. • By providing road safety engineering input at this stage, such an audit can support development under the principles of Movement and Place, Pop-up Infrastructure, and Tactical Urbanism, influencing fundamental issues such as route choice, impact on continuity with the existing adjacent network, location, and layout, and ensuring provision for all road users. • The selection and placement of an inappropriate concept can ultimately be impossible, or extremely costly to rectify e.g. after land purchase or acquisition. • A poor choice of design criteria is likely to introduce conflicts between road user groups and can have an adverse impact on basic safety issues such as sight distance and readability of the road. • This audit type appears within the Road Safety Network Framework as shown in Figure 3.1.

Indicative examples of the risks/hazards identified during a feasibility audit are included in Appendix D.1.

Good practice in undertaking a feasibility stage RSA is provided in Table 7.2.

Table 7.2: Good practice advice in undertaking a feasibility stage RSA

Feasibility audit – good practice
• The audit team should conduct a field inspection of the general area for the project, but this may need to be conducted within significant geographical, access, and weather constraints. Virtual inspections cannot guarantee a satisfactory or complete knowledge of conditions. A night inspection is unlikely to be required at this audit stage. • Concept sketches or photographs (and in some cases computer-generated images) can form part of the information provided to the audit team. • Issues to be examined are broader and often more subtle than audits at later stages and as a result such audits should be undertaken only by very experienced auditors who have a good understanding of Safe System principles and concepts. • The audit team should include knowledge and experience in road design and traffic engineering. Familiarity with pertinent standards and guidelines as well as being able to visualise the layout in 3D is also important. Specialist advice in any unusual aspect of the project e.g. the introduction of light rail/transport integration schemes, should also be sought. Additional safety experience in such environments will generate discussion and contribute greatly to project brainstorming.

4 Good practice in the Guide has been collated, and in many cases summarised) from extensive material within previous versions of the *Guide to Road Safety Part 6 – Road Safety Audit*, provided by PWG members (and their respective jurisdictions), and latest developments identified from other operating environments, including most notably, UK. .

Feasibility audit – good practice
• The inclusion of a road safety engineer/s at the earliest stage i.e. pre-design, is particularly useful, and the greatest on-going influence is possible, especially when considering master and strategic plans (e.g. land use developments and subdivisions). Potential immediate and on-going benefits (e.g. reduced land purchase, minimising exposure, risk and conflicts and future reworking of designs, possible 'selling feature') will typically outweigh any reluctance of the client to conduct such an audit. • It is important to ensure that all foreseeable road user groups have been considered and their likely flow and volume etc. managed appropriately. In this regard specialist knowledge may be required e.g. of a vulnerable road user group, or human factors. • A feasibility audit should not be at the expense of audits being undertaken at a later stage/s as the detail and complexity of the design increase and more risks and hazards can become apparent, which are best rectified prior to construction. • An effective audit at this stage will also serve to further breaking down the perception that designing to standards results in a safe road and that QA checks of designs and/or traffic impact assessments (TIAs) negate the need for, or override, RSAs. • Feasibility stage audits are also the best time to consider how a project will supplement, support, influence, be consistent with, or jeopardise, safety and mobility objectives and strategy over a corridor or area, as per current thinking regarding Movement and Place. In this way, appropriate concepts are verified, and inappropriate concepts identified as early as possible, such that the objectives of the project and its outcome are not compromised, and time-consuming and costly rework is avoided. • Design briefs can also be considered at this stage e.g. to ensure that the most appropriate design standards and guidelines are specified within the brief, and that it is consistent with sound road safety engineering principles, allows innovation, and gives due consideration to foreseeable road user groups. • Characteristics such as forecast traffic flows and speeds should be documented at the earliest stage to 'front load' the auditor's awareness of the project, allowing them to apply Safe System principles in an informed manner. • Where more than one option has been developed e.g. for community consultation, each option should be subject to audit at this stage. • In practice, the feasibility stage audit can be combined with a preliminary design stage audit for small scale improvements to the network. • Austroads guidance on managing traffic modelling commissions (Austroads 2021b) has recently been published and a similar Guide and associated training has been suggested for RSA with the target audience of developers. This would include, but would not be limited to, practical guidance on: - priorities for auditing at this stage based upon, for example, a project's size, likely road users, influence of the local area, and number and type of accesses to the public highway - procedures within the local planning lodgement and approval processes and allocation of responsibility for activities such as determining and qualifying the audit team and how audit findings are addressed and associated documentation. • The design can be in many forms, depending upon the scale and type of a project e.g. a freeway, highway, new or retrofitted intersection, local area traffic management scheme, local road, shared path etc, and accordingly the information provided can range from an initial line on a map through to the findings of a complex 1- or 2-year preparatory study. • Prompt lists can assist auditors in considering designs at this stage. • Safe System Assessments (SSAs) can complement feasibility stage audits.

7.2 Preliminary Design

The objectives of a preliminary design stage RSA are set out in Table 7.3.

Table 7.3: The objective of a preliminary design stage RSA

Preliminary design audit	Commentary
Objective	• To identify any safety risks and hazards, including those not identified or addressed in any earlier, feasibility (strategic/concept) stage audit undertaken, and ensure that the design considers all foreseeable road users. • This audit type appears within the Road Safety Network Framework as shown in Figure 3.1.

Examples of the risks/hazards to be identified during a preliminary design audit are provided within Appendix D.1.

Table 7.4 collates good practice in the undertaking of a preliminary design stage RSA.

Table 7.4: Good practice in the undertaking of a preliminary design stage RSA

Preliminary design audit – good practice
• Where a feasibility (strategic/concept) audit has not been undertaken (i.e. an exemption to the local strategy/policy was authorised), the preliminary design audit is the first consideration of the design. It is suggested that in such situations, the audit team considers a step back – to check that the design will be easily read and understood by all road users prior to commencing the preliminary design audit. • The entire audit team should conduct a field inspection of the general area for the project, but this may need to be conducted within significant geographical, access, and weather constraints. Virtual inspections cannot guarantee a satisfactory or complete knowledge of conditions. The undertaking of a night audit must be considered at this audit stage, where this would derive benefit. • Computer-generated images and fly throughs can be provided to the audit team, most typically complex projects where public consultation is taking place. • Similar auditor competency is required to that described for feasibility (strategic/concept) stage audits. • At this stage, the audit team must consider the appropriateness of design applications/packages, standards and guidelines (including with respect to design vehicles) adopted by the design team, both in general terms and at locations. Any departures from a design standards and guidelines should also be identified and considered. • It is important to ensure that all foreseeable road user groups have been considered and their current and future flows and volumes etc, managed appropriately. In this regard specialist knowledge may be required e.g. of a vulnerable road user group, or human factors. • If more than one preliminary design is prepared e.g. say 3 preliminary options for an intersection are prepared for a public consultation, each option should be audited. • Plans at an appropriate scale, showing general alignment and intersection details etc. should be obtained for the audit. • For larger projects, significant changes in road alignment become much harder to achieve after this stage, as land acquisition and other associated legal matters commence. • The audit may identify unusual features where some degree of engineering judgement is likely to be required e.g. inconsistent or unexpected features which could be a hazard if incorrectly interpreted by a road user. • Care is needed to ensure that an audit at the preliminary design stage does not stifle an innovative feature that has a good level of safety, simply because it is not a standard way of dealing with an issue. • The findings and recommendations within the audit report will greatly assist the design team with the subsequent detailed design. • Prompt lists are available to assist auditors in considering designs at this stage. • Safe System Assessments (SSAs) can complement preliminary design RSAs.

7.3 Detailed Design

The objectives of a detailed design stage RSA are identified in Table 7.5.

Table 7.5: The objective of a detailed design stage RSA

Detailed design audit	Commentary
Objective	• To identify any safety risks and hazards, including those not identified or addressed in any earlier, feasibility (strategic/concept) or preliminary design stage audit/s undertaken, and to ensure that the design considers all foreseeable road users. • This audit type appears within the Road Safety Network Framework as shown in Figure 3.1.

Examples of risks and hazards to be identified during a detailed design audit are provided within Appendix D.1.

A collection of good practice advice for the undertaking of a detailed design stage RSA is provided in Table 7.6.

Table 7.6: Good practice in the undertaking of a detailed design stage RSA

Detailed design audits – good practice
• Where an exemption has been secured such that a feasibility (strategic/concept) audit or preliminary design stage audit have not been undertaken, a detailed design stage audit is the first consideration of the design. It is often the case that where a project is basic in nature and/or it is held that resources are limited that a conscious decision is reached that the design stage audit will be the only pre-opening consideration of the project. It is suggested that in such situations, the audit team at least considers a step back – to check that the design will be easily read and understood by all road users prior to commencing the detailed design stage audit. • This is the most common audit type (stage) within local RSA strategies/policies, given that it is the last opportunity to make changes to the design (e.g. significant realignment) prior to construction. • The entire audit team should conduct a field inspection of the general area for the project in both day and night conditions, but this may need to be conducted within significant geographical, access, and weather constraints. Virtual inspections cannot guarantee a satisfactory or complete knowledge of conditions. • Computer-generated images and fly throughs may be available and are increasingly being developed for complex projects, especially where public consultation is taking place. • Although not typical, if more than one detailed design is prepared for an element e.g. three options for the intersection layout are worked up for a public consultation, these should all be assessed (e.g. using the SSA technique) and an audit conducted of the selected design. If the selected design is not ultimately implemented, any subsequent amendments or alternative designs must also be audited. • The audit team must consider the interaction of different road elements within the location being audited, which required the auditors to be able to visualise the project from what can be a raft of detailed design drawings. • The audit team may have to include, and secure funding for, a specialist advisor to assess features such as traffic signals, signage, street lighting, crash barriers, ITS, or any highly /localised road user issue. This will also require consideration of the standards and Guidelines adopted by the designer, how they have been applied, any stated departures and whether there are any 'disconnects' between different standards. Specialist advisors are not considered to be part of the formal audit team but do fulfil a very important role in the auditing of many projects. • Plans at an appropriate scale are to be provided by the client, covering not only the general road layout and alignment, but also any items present (e.g. utilities, services etc.) and development documents associated with large public buildings such as schools or transport nodes. This will enable the audit team to consider how all aspects of the design will affect its operation by all applicable road user groups. • Care is needed to ensure that an audit at detailed design stage does not stifle an innovative feature that has a good level of safety, simply because it is not a standard way of dealing with an issue. • The findings and recommendations within the audit report will greatly assist the design team to finalise their design and incorporate safety improvements in contract and construction documentation. • Departures from design standards and guidelines are to be assessed for their impact on road safety outcomes. • Prompt lists are available to assist auditors in undertaking detailed design audits including at the interface and interaction with adjoining roads. • Safe System Assessments can complement detailed design stage audits.

7.4 Pre-opening

The objectives of a pre-opening stage RSA are provided in Table 7.7.

Table 7.7: Objective and general background for a pre-opening stage RSA

Pre-opening audit	Commentary
Objective & general background	• To identify any safety risks and hazards within a substantially completed (constructed) project, prior to its opening to live traffic. • **This is not a design check, construction stage audit, as constructed review, or a safety assessment/check as to implementation of a Traffic Management Plan (TMP) or similar.** • This audit type is included within the Road Safety Network Framework as shown in Figure 3.1.

Examples of risks and hazards to be identified during a pre-opening audit are included within Appendix D.1.

Good practice in the undertaking of a pre-opening stage RSA has been summarised in Table 7.8.

Table 7.8: Good practice in the undertaking of a pre-opening stage RSA

Pre-opening audits – good practice
• Pre-opening audits are most typically associated with lengths of new or re-engineered public roads (i.e. projects on a national, state, or local road network). • This is a site-based audit – i.e. it should involve drive and/or walk-throughs of the site by the entire audit team. Ride-throughs (cycle, motorcycle) may also be appropriate. • Both day and night-time visits are required. • Interfaces with obvious feeder roads and links to the road being audited should be considered. • Some risks and hazards e.g. sign conspicuity issues, are extremely difficult to detect from plans alone, but will become readily apparent during pre-opening and immediate post-opening audits. • Assistance to auditors can also be found, if available, in preliminary crash and near miss data and community concerns expressed, but with recognition that some of this information may be anecdotal. Physical cues such as tyre marks, damaged components of vehicles or infrastructure can also be extremely useful to the auditor. • This stage is the last opportunity for risks and hazards to be rectified prior to the opening of the project to live traffic. In some circumstances, it may be decided to affect an interim measure to mitigate a risk such that opening can still go ahead, but this should be accompanied by an action plan clearly identifying future rectification or further mitigation. • As with the detailed design stage, the audit team may have to bring in specialist advisors to assess features such as traffic signals, signage, street lighting, crash barriers, ITS, or any highly/localised road user issue. The relevant drawings will need to be taken to the site. There may also be potential to involve a police officer who has experience in traffic and safety and/or a maintenance engineer. Specialist advisors are not considered to be part of the formal audit team but do fulfil a very important role in the auditing of many projects. • The main findings of the audit and associated recommendations are often required to be communicated and discussed immediately following the audit's completion, with the report to be completed when back in the office. This enables the site team to consider the issues in hand immediately and to resolve or mitigate them prior to the opening of the project. At this stage, time is typically of the essence and delays to opening to live traffic to be avoided. • Prompt lists are available to assist auditors at this stage, including consideration of the interface and interaction with adjoining roads.

7.5 Immediate Post-opening (Post-completion)

Table 7.9 collates the objectives of an immediate post-opening (post-completion) RSA.

Table 7.9: Objective of an immediate post-opening (post completion) RSA

Immediate post-opening audit	Commentary
Objective	• Undertaken within a short period (typically the first 3 months) of the opening of a fully completed project (i.e. including any mitigation measures implemented in response to a pre-opening audit) to assess how the road is being used and to identify any detail or safety issues that may affect or are affecting its usage for the foreseeable traffic types. • This audit type appears within the Road Safety Network Framework as shown in Figure 3.1.

Examples of risks and hazards to be identified during an immediate post-opening (post-completion) audit are included within Appendix D.2.

Good practice in the undertaking of an immediate post-opening (post-completion) RSA is summarised in Table 7.10.

Table 7.10: Good practice in undertaking an immediate post-opening (post-completion) RSA

Immediate post-opening (post-completion) audits – good practice
• An audit at this stage is not an assessment of the original design or its construction, it is undertaken by the entire audit team to consider the safety of subsequent road users and has the advantage of being undertaken most typically when resources are still on the ground or readily available to react. • A post-opening audit should be scheduled after a short period of traffic flow and/or speed restrictions imposed early in the life of the project have been removed. • Audits at this stage can assist with evaluating innovative solutions and/or how a project operates in practice during peak periods. • Immediate post-opening audits are most typically associated with lengths of new or re-engineered public roads (i.e. projects on a national, state, or local road network). • This is a site-based audit i.e. involving drive and/or walk-throughs. Ride-throughs (cycle, motorcycle) may also be appropriate. • Both day and night-time visits are required. • Consideration must be given to the interactions with obvious feeders and interfaces to the road being audited. • Such an audit provides early opportunity to identify any risks and hazards that have emerged immediately following the opening of the project to live traffic. This includes both risks and hazards identified but not resolved, or missed, by a detailed design or pre-opening audit. • Some risks and hazards such as sign conspicuity issues can be extremely difficult to detect from plans alone but become readily apparent during pre-opening and immediate post-opening audits. • In some circumstances, it may be agreed to affect an interim measure to mitigate a risk such that live traffic can still use the length of road, albeit for example, in a reduced capacity or speed, and with an action plan for future rectification or further mitigation. • As with the detailed design and pre-opening stages, the audit team may have to bring in specialist advisors to assess features such as traffic signals, signage, street lighting, crash barriers, ITS, or any highly/localised road user issue. The relevant design drawings will need to be taken to the site. Specialist advisors are not considered to be part of the formal audit team but do fulfil a very important role in the auditing of many projects. • It is likely that the main findings of the audit and associated recommendations will be communicated and discussed immediately following the audit's completion, with the report to be completed when back in the office. This enables the site team to immediately consider the issues in hand and to resolve or mitigate them. • Prompt lists are available to assist auditors at this stage.

7.6 Existing Road

Table 7.11 lists the objectives and general background of an existing road RSA.

Table 7.11: Objectives and general background of an existing road RSA

Existing road audit	Commentary
Objective & general background	• Undertaken on a road in service (including where a project was opened over 3 months prior) to identify any detail or safety issues that may affect or are affecting its usage for the foreseeable traffic types. • NOTE 1 – existing RSAs are known as a road safety inspection in some jurisdictions. • NOTE 2 – an existing RSA is different to a road safety check. • NOTE 3 – an existing RSA is different to a routine visual, often driven, inspection or check of infrastructure, and which are under part of the asset management regime. • This audit type appears within the road safety network framework as shown in Figure 3.1.

Examples of the risks and hazards to be identified during an existing road audit are provided within Appendix D.2.

Good practice advice in undertaking an RSA on an existing road is collated in Table 7.12.

Table 7.12: Good practice in the undertaking of an existing road RSA

Existing road RSAs – good practice
• This is undertaken to consider the safety of on-going road users. • Road agencies may use tools such as the Austroads IRR as a screening tool to identify and prioritise which routes or road sections should be subject to an existing RSA. • This is a site-based audit, involving the entire audit team and including drive and/or walk throughs. Ride-throughs (e.g. cycle, motorcycle) may also be appropriate. • Both day and night-time visits are required. • Such an audit identifies any road safety related risks and hazards present, which are notified to the road owner, most typically a road agency, in the form of a report containing findings and recommendations for the client's consideration. • Road crash data may be provided in advance of the audit and it is largely auditor preference as to whether this is considered before the audit or used to verify/review the audit findings. Notwithstanding, detailed analysis of available crash data is not expected as part of an audit, with this being more typically associated with a more reactive investigation, most typically the treatment of crash locations (blackspot) protocols (Austroads 2021d). • The results of individual existing road audits can also be collated/aggregated to identify common risks and deficiencies that may require a design standard or other change. • Prompt lists are available to assist auditors at this stage. • Existing RSAs audits should be undertaken as they: - complement a blackspot program - specifically address safety, rather than rely completely on routine maintenance - identify problems in routine maintenance procedures and practices - identify locations for mass action treatments (e.g. removal of horizontal pipe railing to prevent it becoming a spearing hazard, or improvements on an out-of-character curve) - allow identification of issues associated with changes in the network before they lead to crashes; uses of the road and land beside the road can change over time - assess the consistency of the road features - assess the adequacy of provision of traffic management features - assess items such as landscaping, which can grow and obscure infrastructure (e.g. signs, lighting) and sight lines - assess the implications of infrastructure aging over time, affecting conspicuity, reflectivity, accuracy of messages e.g. signage.

7.7 Other Considerations

7.7.1 Interim and Repeat Audits

The designation of formal types for RSAs does not exclude a client from commissioning an **interim** (i.e. between stage) and/or **repeat** RSA, at any stage in the network life cycle.

Interim RSAs can be of particular benefit for large-scale and/or longer-term projects, where waiting until a scheduled trigger point would cause the audit report to identify a large list of issues that would then result in extensive time delays whilst modifying the designs. Projects that utilise staged construction and projects on a tight deadline might also benefit, where interim audits allow for real-time modifications, minimising delays to implementation. Such audits can also be useful where the design team is less experienced in road safety issues and more frequent feedback would assist them to integrate road safety in the design. It may also prove desirable for an alternate team to conduct any interim reviews to allow a fresh view of the designs at these additional points.

However, it is important to stress that in no circumstances should an interim RSA be a replacement for an audit at later, previously identified formal stage/s.

It may be beneficial with interim audits to commission an audit team who are independent of the original audit/s.

A **repeat** audit should be considered if any significant changes are made to the design e.g. in response to changing environmental or economic conditions, or from safety concerns arising following a previous audit. Conducting a repeat audit of an existing road is good practice where changes have been made in direct response to an elevated crash risk, and consideration must be given to the implications for the site itself and adjacent areas. The changes made do not have to be major to have a significant safety impact and may introduce a different crash type not previously experienced at that location.

Further, should there be delays in implementation of a design and considerable time elapses, the client should commission a review of the design and a repeat RSA prior to restart. The repeat audit can then consider contemporary issues, such to the surrounding road environment, local demographics, and updates to a design standard or guidelines since the original audit at the same stage.

Regardless of whether significant changes are known, jurisdictions will typically assign a shelf life for an audit report as part of their local strategy, beyond which time a repeat audit should be commissioned. A shelf life of two or three years is typically assigned. This considers factors such as revisions to guidelines and standards, the emergence of different materials and techniques, and further research being available into the mitigation of crash risks.

7.7.2 Thematic (Road User Specific) Audits

In classical form, an RSA (regardless of stage) should identify risks and hazards relating to all road user types. However, it is becoming more common for clients to specify within their brief that an audit should only consider a specific user group or groups, either operating within a shared or dedicated facility. Such an approach has become known in many jurisdictions as a **thematic (road user specific) RSA.**

Examples include consideration of pedestrians, cyclists or motorcyclists, or the most vulnerable sub-groups e.g. the elderly or children, all of whom have different physical characteristics and assess risk and interpret and respond to road network challenges and the infrastructure provided in subtly different ways. Specific vehicle types and sizes can also be considered within such audits e.g. heavy vehicles over a certain size, mass or axle configuration, or public service or emergency vehicles. This is likely to extend in the future to thematic audits with connected and automated vehicles in mind.

The findings of a thematic audit can feed into either dedicated works and/or more general maintenance activities or programs e.g. a thematic audit of an existing footway can provide data towards a Safer Routes to School program or a program responding to risks and hazards affecting trucks operating within a freight corridor.

The client is responsible for ensuring that the audit team for a thematic audit has the requisite specialist experience. Similarly, the lead auditor must only select suitably experienced auditors. More generally, auditors must not make false claims in this regard – they must only operate within their competency knowledge, skills, and experience. In some cases, jurisdictional registers include experience in thematic audits.

It is also essential to consider the method/logistics of a thematic audit e.g. undertaking a cycling audit from a bicycle or a motorcycle audit from a motorbike to gain the perspective and eye height of a rider. Where impairments are to be considered e.g. on a footpath immediately outside a hospital or aged care facility, involvement of an elderly, wheelchair bound, or visually impaired person, or an advocacy group representative, will give a greatly informed outcome. With such audits, awareness of legislation such as the national Disability Discrimination Act (DDA) is also important.

Prompt lists and fact sheets relating to thematic audits are included in Appendix H and Appendix I, respectively.

7.7.3 Road Safety Checks and Asset Management Inspections

While ultimately contributing to a jurisdiction's overall road safety network management effort as shown in Figure 3.1, **road safety checks** and **asset management inspections** differ from an existing road RSA, having different objectives and a reduced scope and level of detail.

Road safety checks tend to be commissioned to provide a more generic safety overview of a location and there is typically no requirement for them to be conducted by competent auditors. Notwithstanding some jurisdictions have decided to include road safety checks within their local strategy/policy documents and utilise competent auditors towards the best overall outcome.

Asset management inspections are typically scheduled, routine visual inspections conducted by officers working in asset management teams. They involve the detection of obvious infrastructure defects that are assigned to be rectified under asset management/maintenance programs according to a pre-determined suite of intervention headings and levels. No specialist road safety knowledge is required, although many of the defects to be detected under such regimes can have obvious network safety implications e.g. carriageway edge break or potholes on the curves of a winding section of road frequented by recreational motorcyclists. This is mentioned as such items should be detected if present during any existing RSA undertaken at the same location.

7.7.4 Traffic Management

The design, assessment/checking, approval and sign-off of traffic management plans (TMP)/traffic control plans (TCPs) and their implementation on site during construction and roadworks also differ from an RSA as defined in this Guide. These activities, which have the objective of mitigating the risks to road workers and any road users alike, are documented within other Austroads guidance e.g. the *Guide to Temporary Traffic Management: Set* (Austroads 2021e), and/or local jurisdictional protocols.

This is important to note as feedback received is that auditors are frequently approached to conduct an independent 'audit' of intended traffic management provision, especially where applying the applicable standards and guidelines is impossible or impractical for the site being considered. This is not an RSA in a true sense of the term, despite the overall objectives being safety related.

The above scenario contrasts with the identification of risks and hazards related to major staging switches required as part of larger projects and **permanent traffic management infrastructure** and systems and their on-going operation at a location. Such tasks do fall under the definition of an audit. In simplistic terms, the auditor becomes the road users' representative. This aspect of auditing often involves considering whether any previous features related to the temporary traffic management have been entirely and effectively removed and permanent measures implemented. In such cases, auditors must consider, for example, whether temporary measures have been dismantled, localised crossing points or accesses have been permanently stopped up, and obsolete line markings have been removed or covered.

7.7.5 Road Related Areas

Despite the terminology typically used, RSAs are not j ust about the road i.e. the area typically occupied and used by vehicles, and must consider where provided and included in the audit brief, integrated and immediately adjacent footways and cycleways.

The following features, where present, should be considered as part of a project and be subject to audit: off route/road shared paths, transport interchanges, accesses to ferries, over and underpasses, tunnels, ungated/private car parks and service roads (such as at hospitals, educational establishments, and shopping centres). This is because they can impact upon the operation of an adjoining road and part of the public road network.

Interest should also include points of vehicular/pedestrian conflict, spill over of parking from a car park onto a road, restricted visibility from accesses, and the incidence and proximity of heavy vehicles and busses, unloading trucks etc. Additionally, unusual, and clearly non-standard layouts, and more generally the system of delineation and signage are also typically of importance.

The findings from an audit of an adjacent usage or shared area may also be of interest and use to the management and safety of a facility where WH&S obligations and a wider duty of care apply, and in many cases, the client in such situations will have limited road engineering awareness and expertise.

Experience indicates that the greatest gains can be achieved if road safety is an integral part of the planning stages, with RSAs being an invaluable tool to be conducted of:

- strategic plans
- town planning (land use development) application of a significant size (where 'significant size' is defined locally, which could be for example, where a subdivision of more than 20 lots, major shopping centres and car parks with space for more than 50 cars are planned. The primary interest is typically in resultant public road upgrades and new or modified access/intersection requirements)
- applications where the project interacts directly with an arterial road or other significant traffic route, for example, matters as simple as safe driveway access are sometimes overlooked in development applications, particularly when the plan extends only to the site boundary
- applications where significant numbers of pedestrians or cyclists are expected nearby.

7.7.6 Emerging Technology

Checks of modern and emerging transport technologies and associated features, such as LED lighting, ITS applications and preparations for connected and automated vehicles (CAVs), will become increasingly relevant. In response, it is anticipated that the scope of the RSA process, associated prompt lists and auditor competence requirements will all be reasonably expected to develop and mature quickly.

7.7.7 Maintainability Assessment

Although more typically a part of the safety in design checks undertaken by the design team, an auditor may be asked to foresee and assess the potential risks to road users of maintaining a road infrastructure component (e.g. overhead gantries, street lighting), or a site in general terms after its construction and opening.

As with some of the other considerations above this would not formally constitute an RSA. Where such a check is ultimately conducted, the auditor must still have the required competency, including experience in road construction and asset management. Such assessments are reliant upon the client providing a detailed works procedure, setting out method and equipment. A Safe Works Method Statement may also be useful, but it is important to note that the assessment is not of generic WH&S requirements – the objective is to assess whether road user/s (including maintenance personnel as drivers and/or pedestrians) would be exposed to an unacceptable level of risk. Mitigation measures utilising the principles of hierarchy of controls can then be effected.

8. The RSA Process

8.1 Introduction

Following a decision to commission and conduct an audit under the requirements of the local strategy/policy, the process is as shown in simplified form in Figure 8.1.

Figure 8.1: A simplified flow chart of the RSA process

A more detailed illustration of the process appears in Section 8.4.

8.2 Client and Audit Teams

There are several stakeholders in the RSA process, but for ease of understanding within this Guide two main teams have been identified – the **client team** and the **audit team.**

8.2.1 Client Team

The client team is taken to include anyone involved in the financing, commissioning, planning, design, project management and construction of a new project or project to modify existing infrastructure, or those owning or responsible for, an existing road.

However, in practical terms, the core members of the client team are:

- the client (sometimes referred to as the project sponsor or developer depending upon the project)
- the client's immediate representative (typically a project director or project manager)
- the designer/s.

Most typically, the client's project manager is responsible for procuring, administering, and managing the RSA. This includes keeping the client advised as to progress and key decision points during the process, not least the audit completion.

The pertinent road agency or road operator is the client for audits of existing roads.

With larger, complex projects commissioned by the public sector or development banks, the project manager can be an externally appointed professional.

The involvement of delegates from the relevant road agency (e.g. road safety engineer or planning consent specialist) is strongly recommended where the new infrastructure is a private development but is likely to revert to public ownership/operation. This allows audit findings and recommendations to be considered and responded to from the perspective of the ultimate asset owner and operator.

8.2.2 Audit Team

The audit team is ultimately commissioned by the client and includes the core personnel involved in the conduct of the RSA. Guidance on the composition and qualification (competency and independence) of the audit team is provided in Section 9. In practice, the lead auditor is often asked by the client team to assist in identifying suitably competent auditors.

8.3 Communications

While it is a fundamental principle of RSA that the audit team is independent of the design (Section 9.6 refers), this does not imply that the client and audit teams should operate in isolation and without communication taking place.

Open communication is required throughout, in the form of a respectful dialogue in which points of disagreement and criticisms are more likely to be constructively discussed and accepted. This also allows the identification and clarification of misconceptions before they become a major concern. Communication also allows the audit team to gauge the client team's understanding of safety issues, which will inform future discussions, how findings and recommendations are framed and presented and the level of technical guidance and referencing that is required.

Positive practical examples of open communication include members of the respective teams meeting on site for an overview or to clarify issues; the audit team contacting the client team to clarify the brief or to request further information; and the audit team identifying specialist resources that may be needed.

Notwithstanding the above, it is essential that open communication does not compromise the formal channels or the independence of the audit team e.g. the designer/s should not independently contact the audit team regarding the conduct of an audit or ask to receive an audit report without it first going to the client.

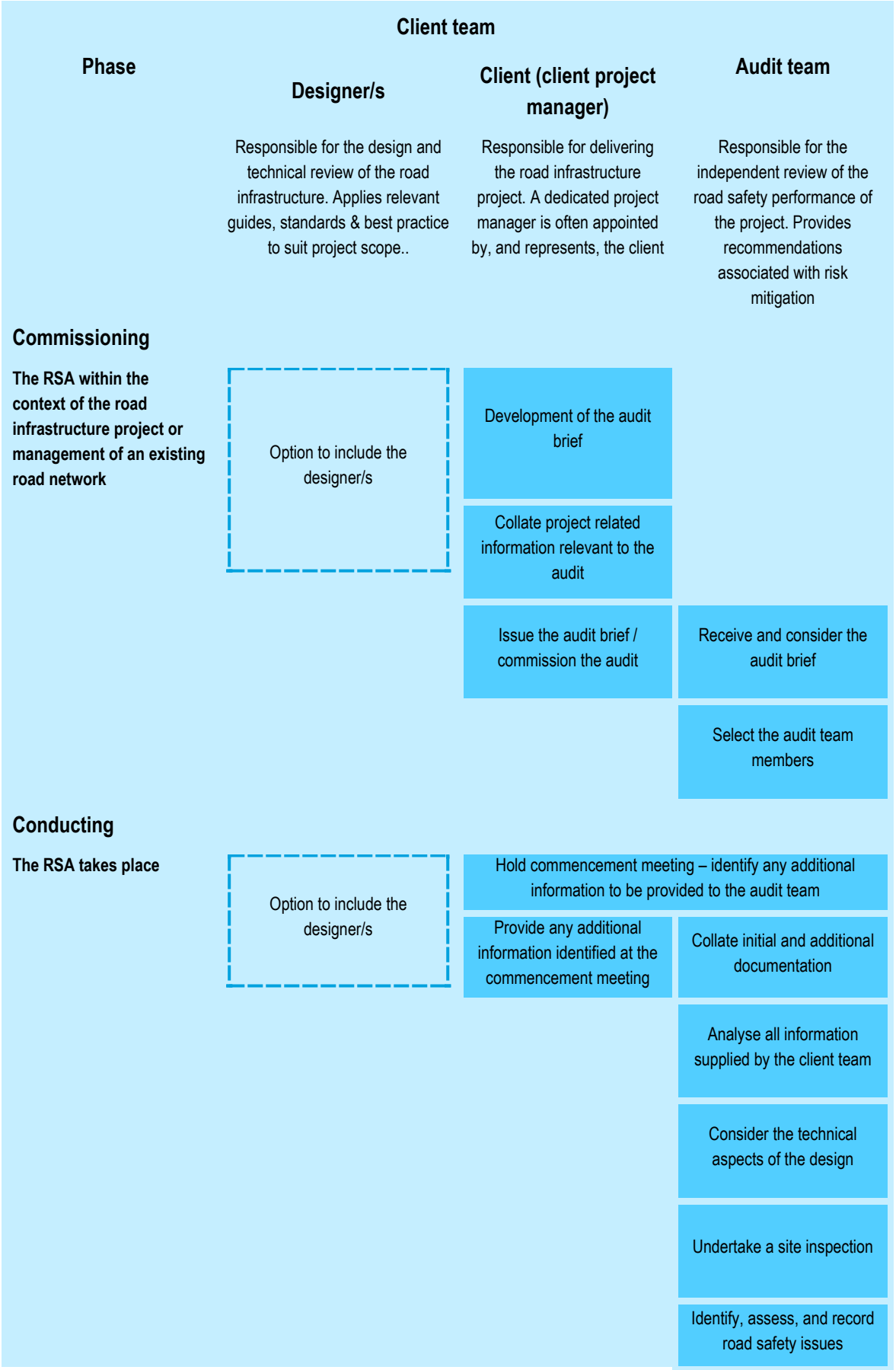
8.4 The Responsibilities of the Client and Audit Teams

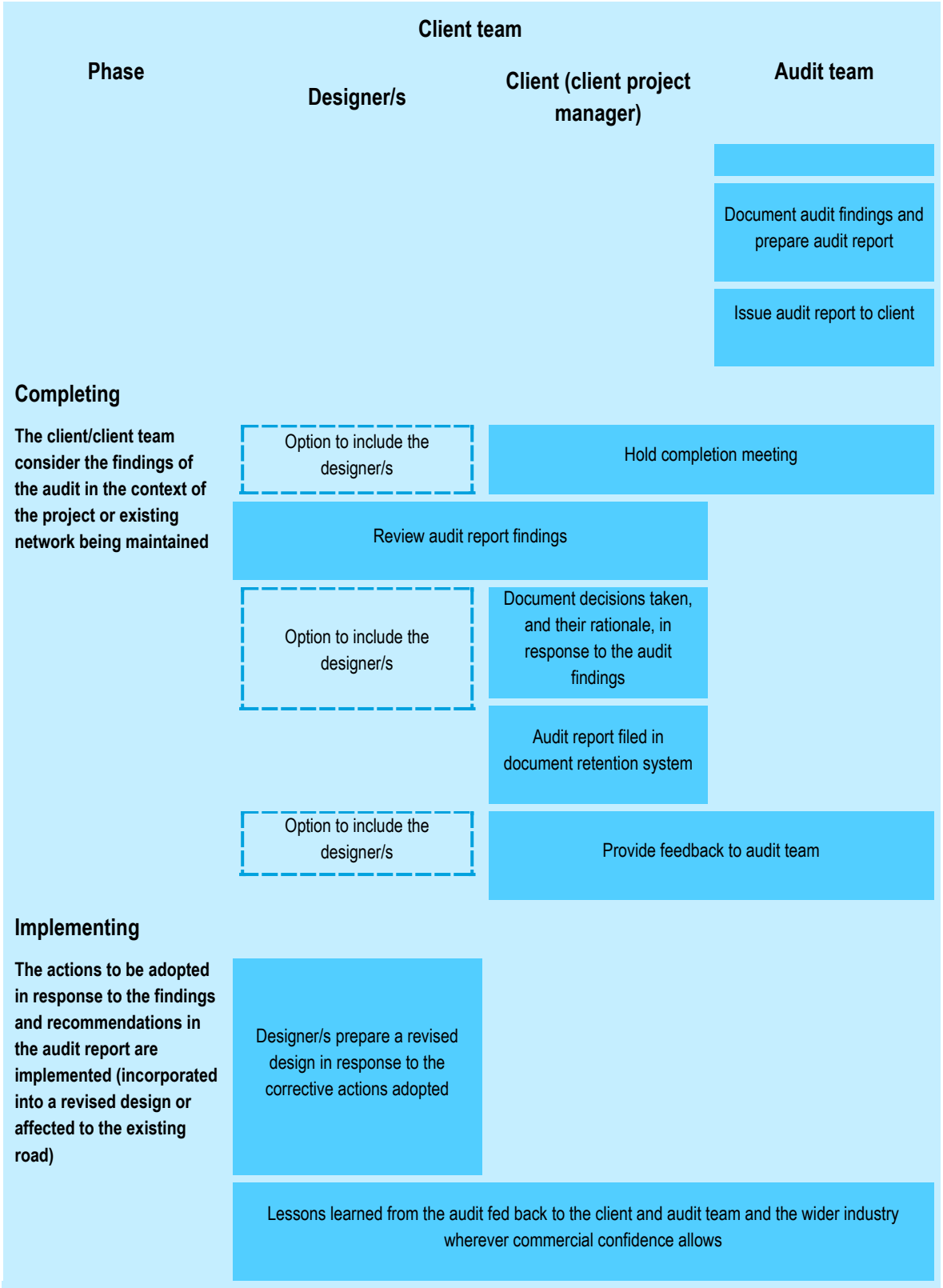
Figure 8.2 provides a more comprehensive illustration of the tasks and responsibilities within the RSA process. For clarity, this includes distinction between the two elements of the client team, but also where the elements may combine for certain tasks.

Four distinct phases within the process are identified:

- Commissioning – activities up to commencement of the audit
- Conducting – activities up to the preparation of the audit report
- Completing – activities up to implementation of the client response
- Implementing – of the client response and subsequent monitoring and evaluation.

Figure 8.2: Detailed flow chart of the RSA process





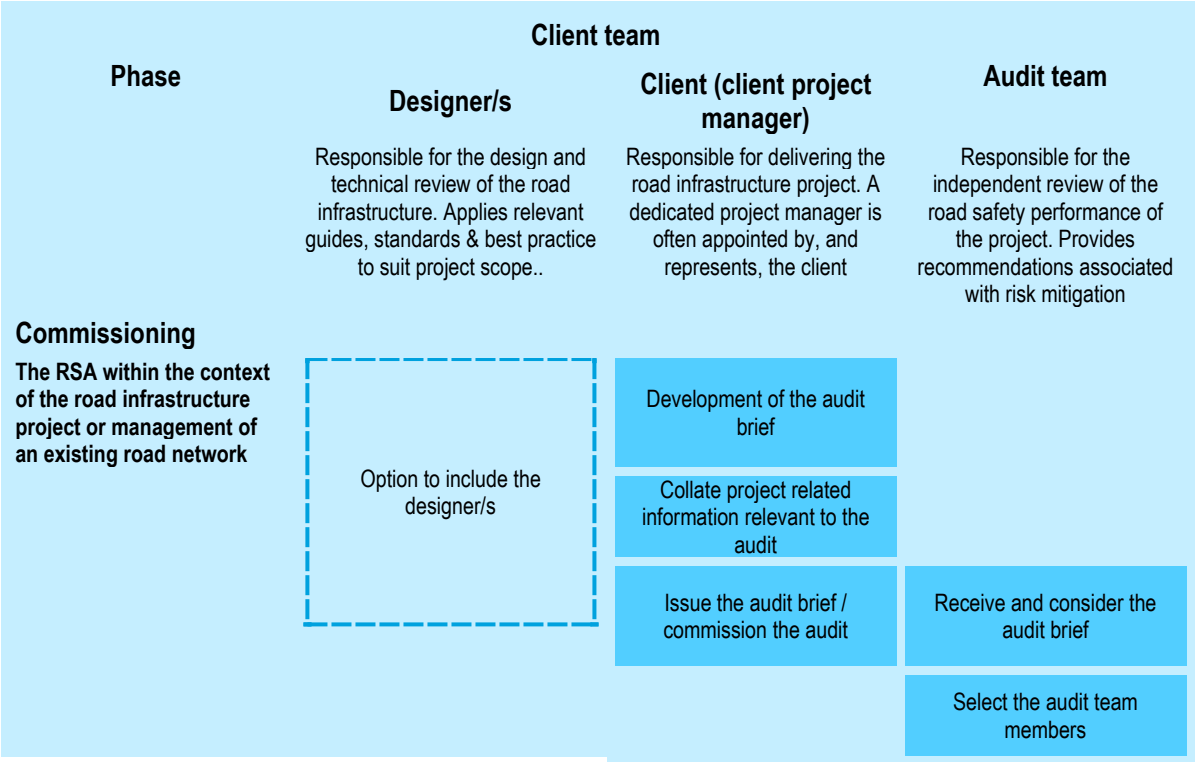
Further detail relating to the tasks appearing within the flow chart is provided in Sections 9 to 11 of this Guide.

9. Commissioning Phase

9.1 Introduction

The commissioning phase and its components are shown in Figure 9.1.

Figure 9.1: The commissioning phase of an RSA



The earlier sections of this Guide have identified that RSAs can be conducted at several stages of the infrastructure life cycle and on a wide range of scenarios and projects. The client team must ensure that sufficient time is made available for the scheduled RSAs to be conducted. This should include allowances for time to modify designs as required, based on the audit findings and recommendations.

9.2 Preparing the Audit Brief

The objective of preparing a brief is to provide the audit team with all the necessary information to allow a comprehensive safety assessment of the project.

Preparing an effective brief requires a good understanding of the objectives and process of RSA, as defined by the Guide and any pertinent local strategy/policy document. It is strongly recommended that those persons likely to be engaged in commissioning audits and preparing audit briefs should attend RSA awareness training as an absolute minimum. An incomplete or vague audit brief issued by a client team can be confusing and counterproductive, and ultimately demonstrates a lack of awareness and knowledge of the audit process.

A specimen audit brief is provided as Appendix E.

Wherever possible within the client team's combined knowledge and expertise the brief should include:

- general information relating to the project – which will typically include:
  - title and/or reference
  - a summary description (e.g. the project's nature, scale, and duration)
  - the type/stage of the audit sought
  - the location (including scope, inclusions and exclusions, as applicable)
  - names and contact details across the client and audit teams
  - context/background
  - a list of relevant technical documents (e.g. design briefs, design reports, plans, drawings and visualisations, pertinent sections of contract documents). These items can be in a variety of formats, utilising a range of applications/software.
  - a list of any previous audits and their respective reports and outcomes, including highlighting any safety issues that have not been resolved
  - design criteria and/or design report/s (including any exceptions)
  - details of any other safety related inspections, checks (e.g. sight distance), studies, or assessments undertaken
  - key road users (e.g. VRUs) and road and traffic characteristics (e.g. volumes, speed environment e.g. 85 percentile speed, turning movements)
  - information relating to any events undertaken/to be undertaken at the location (e.g. monthly markets, harvesting) that have the potential to impact on usage and safety
  - photos, video etc. showing the location or other pertinent aspects
- audit requirements – including:
  - principles to be observed – e.g. Safe System, network level consistency
  - strategies/policies/standards/guidelines to be followed – e.g. local RSA strategy/policy, Austroads Guide; and any exemptions (including their justification)
  - crash types and road users to be considered during the audit
  - timeframe and milestones (including provision for commencement and completion meetings)
- considerations – including:
  - how the audit team is to notify the client team if it identifies any risks and hazards that are deemed to present an immediate safety risk
  - how the audit team is to record and notify the client team of any risks and hazards that are strictly out-of-scope (e.g. in terms of location and/or risk/hazard type), but have the potential to adversely affect safety outcomes at the location being audited
  - what additional/specialist expertise will be involved or is available
  - how audit findings and recommendations are to be communicated – when, format, level of background and justification required (e.g. consideration of Safe System principles; whether supporting data, references etc. are required).

Good practice is that the audit team shall undertake a risk assessment and assign a risk priority and associated recommendation (mitigation measure/s) in relation to each of its audit findings. Risk assessment requirements are to be documented in the local strategy/policy.

This ensures that the audit team must provide the client team with an honest and focused road safety perspective of the project. This is extremely important as it is ultimately the responsibility of the client to respond after considering the findings and recommendations and decide upon their course of action and level of risk mitigation.

9.3 Providing Background Information

As stated above, a listing of background information is required within the audit brief. All items on that list should be provided to the audit team well in advance of the audit in an appropriate method and format. Providing all relevant background information increases the likelihood of a quality output and outcome from the audit. The designer/s within the client team are the most likely source of background information.

Gaps in information may be detected and this should be resolved. It may also be necessary to secure available, or collect additional, information, such as traffic volumes and composition and swept paths, especially if vulnerable road users and/or heavy vehicles are a foreseeable component and concern.

The whole process should be initiated and ideally completed by the client team well before the audit team is selected and commissioned to avoid delays and uncertainty. The audit team ultimately needs to be given a clear understanding of the project/scheme and its context and the brief setting out what is required.

Background information should include:

- any known safety issues which have been identified but are yet to be resolved
- any deficiencies yet to be addressed
- the design parameters, standards and guidelines adopted and any known departures from those standards (e.g. use of the Extended Design Domain)
- any ‘trade-offs’ that have been necessary and why
- any community input from prior discussion, correspondence and consultations.

Details of any mitigation measures that have been identified and/or previously considered at this early stage should also be made available.

In certain situations, environmental factors will be relevant to the design and operation of the project and could include:

- weather conditions (ice, fog, snow, etc.)
- locations prone to surface water and flooding
- street lighting
- flora and fauna
- historic buildings
- topography.

Relevant information on these factors should be assembled. Similarly, adjacent land-use and community demographics may be relevant e.g. likelihood of high-risk behaviour.

One of the most frequently asked questions is whether crash data should be requested and/or routinely provided in advance of an existing road audit, to then be considered during the audit and/or used to verify the audit findings? This is largely a matter for auditor preference and regardless of what is ultimately chosen, detailed analysis of the crash data is not expected. The latter is more in keeping with other processes and tools used for reactive studies (e.g. treatment of crash locations, black spot studies). The main caveat is that where crash data is used during an audit, care should be taken to ensure that the approach does not divert attention from the identification of other risks and hazards, given that research has shown that a crash history alone is not a reliable indicator of future crashes.

9.4 Selecting the Audit Team

RSAs must be conducted by a core team i.e. consisting of at least two members, one of whom must be a senior auditor and fill the assigned role of lead auditor. All auditors must be competent for the audit being commissioned as set out in the locally documented strategy/policy, have experience pertinent to the type of project to be audited, and have the specified level of independence from the design process. The most appropriate size of an audit team depends on the nature, extent, and complexity of the audit task, and whether and/or any training opportunities are to be provided.

While in theory, there is no upper limit on the number of core members involved, practical experience shows that audit teams comprising of more than four people can be intensive in terms of management (not least agreeing on the foreseeable impact or severity of a road safety risk) and in some cases unmanageable. The WH&S implications of site visits must also be considered.

Each auditor in the team must make a meaningful contribution to the audit process. It follows that this can become difficult to manage and demonstrate with larger audit teams.

9.4.1 Lead Auditor

The tasks and responsibilities of the lead auditor, a senior auditor appointed by the client, are as shown in Table 9.1.

Table 9.1: Tasks and responsibilities of the lead auditor

Position	Tasks
Lead auditor	• Represent the audit team throughout the audit process. • Attend the commencement meeting. Determine whether any other person/s should attend the commencement meeting as a representative of the audit team. • Seek clarification from the client regarding any technical questions or issues identified, including securing additional documentation. • Plan, schedule, lead/manage/delegate the overall RSA, including site WH&S. • Undertake/participate in the RSA, leading discussions regarding risks and hazards identified, their prioritisation and recommendations to be made. • Hold the completion meeting, including recording and confirming the outcomes and actions. • Oversee the production, finalisation (including signing off) and delivery of the RSA report to the client (project sponsor). • Mentors trainee auditors.

The competencies of the lead auditor differentiates them from an auditor and are detailed later in this Section 9.5.

9.4.2 Auditor

The tasks and responsibilities of auditors making up the remainder of the audit team are shown in Table 9.2.

Table 9.2: Tasks and responsibilities of auditors

Auditor level	Tasks
Auditor	• Attend the commencement meeting if directed by the lead auditor. • Undertake/participate in the RSA. • Assist in preparing the RSA report. • Attend the completion meeting if directed by the lead auditor.

Auditors provide valuable additional experience and expertise to the core team and can offer a different perspective of the design or project under review based on their experience.

The competency of auditors is detailed later in this section.

Requirements for the audit team composition are to be included within the local RSA strategy/policy.

Challenges associated with commissioning audits and assembling audit teams for local road agencies/councils, particularly in remote and rural areas, and potential practical options in response, are introduced in Section 12. This includes consideration of what are termed 'peer reviews' of designs and single practitioner assessments. It is important to note that these are practical responses recognising the importance of road safety outcomes and not a deliberate attempt to make financial or time savings and/or move away from Austroads good practice guidance. Notwithstanding, the term RSA must not be used or implied in such situations.

9.4.3 Additional Audit Attendees

Additional attendees of an audit are considered outside of the core audit team, and can include:

- **Trainee auditor/s** – who are seeking experience required under a jurisdictional auditor qualification and assessment protocol to progress to be competent as an auditor.
- **Specialist advisors** – required to provide input outside of the core audit team's knowledge and experience regarding aspects of the audit and/or its findings e.g. traffic signals or human factors. A specialist advisor must be a practising professional and be able to provide independent advice to both the client and audit teams, as required. They may be asked to attend and observe the audit process on site or take part in pertinent meetings during a project.
- **Key stakeholders** – with a direct and tangible interest in the design or existing road, as applicable, including but not restricted to police (e.g. highway patrol), representatives of adjacent premises or advocacy bodies e.g. local Chamber of Commerce, local cycling interest group. Key stakeholders do not actively participate in the audit, nor should they influence the audit findings and recommendations, but can provide useful context/background.

9.5 Auditor Competency

The training, competency, assessment and progression requirements for practitioners to conduct RSAs vary by jurisdiction across Australia and New Zealand and are typically documented or referenced within the local RSA strategy/policy. Accordingly, practitioners are advised to contact their local jurisdiction for more details.

As part of this Guide's objectives in 'raising the bar' and establishing a pathway for auditors, Table 9.3 establishes the **suggested Austroads auditor progression pathway from trainee auditor to senior auditor status to be used by local jurisdictions to benchmark and improve their current requirements, or to determine local requirements where these have not previously existed.** The suggested Austroads pathway includes associated status maintenance requirements (e.g. continued professional development (CPD)). Being commissioned as a lead auditor is the pinnacle, with responsibility for heading up audits as well as mentoring emerging auditors and in many cases a role in the assessment of auditors as they progress through the pathway.

The composition and delivery of training also varies across jurisdictions, with levels of training typically from 'awareness' to 'basic' (undertaking RSAs) and more 'advanced', which are then a prerequisite to the local auditor status and assessment protocols.

Transition progress towards national harmonisation is advocated, including towards the development and agreement of a national training syllabus. Recognition of **principles used by learning professionals** will support this approach and is consistent with that being adopted by Austroads regarding the design and approval of temporary traffic management (Austroads 2021e).

Throughout many industries and work scenarios, learning and recognition pathways are extensively built upon **competency requirements**.

Competency is typically defined as the ability to perform a task or program of tasks successfully or efficiently and more ally, a combination of attributes which are reflected in behaviour that can be observed, assessed (measured) and evaluated. In such a form, competency becomes a determining factor in successful performance and hence, the basis of qualification protocols.

Various **competency models** are in existence, but the **'SEKA' model** is highlighted in this Guide, as shown in Figure 9.2, **for its potential and clarity as a concept and 'fit' to the RSA task**.

Figure 9.2: The SEKA model of competency

The above model illustrates that overall competence is a 'sum' of the following attributes (shown in alphabetical order):

- **Ability** – the sum of skills, experience and knowledge, defined as the 'possession of the means or skill to do something' or alternatively, 'talent, skill or proficiency in a particular area'.
- **Attitude** – defined as 'a settled [consistent] way of thinking or feeling about something', which is held as highly significant in influencing performance and one of the most important factors in learning and building on the potential provided by knowledge and skills.
- **Experience** – defined as 'practical contact with and observation of facts or events'.
- **Knowledge** – defined as 'facts, information and skills acquired through experience or education, the theoretical or practical understanding of a subject' or 'a body of information (factual or procedural knowledge) required for performance of a task or function'. This includes the understanding of concepts – i.e. it is theoretical and not practical. Reading technical guidelines and texts alone, with the primary thought of only gaining knowledge, does not provide competency.
- **Skill** – defined as 'the capabilities or proficiencies developed through training or hands-on experience' or 'proficiency (direct application of knowledge) to perform a particular task or learned act' i.e. a person acquires skills by practically applying knowledge.

In summary, the SEKA model is designed to be the reference for qualification and assessment protocols in that competency cannot be achieved and demonstrated through skills, experience, knowledge, or attitude alone – it relates to a combination of attributes.

As indicated within the definition above, the significant and importance of **attitude** cannot be underestimated – it is often described as complementing the other attributes. Unfortunately, it is also recognised as the hardest of the four attributes to assess. The following traits are considered a good indicator of a committed auditor:

- The auditor is passionate about preventing/reducing road trauma.
- Auditing is clearly much more than 'just a job' to the auditor and is not viewed as simply a 'tick the box' exercise.
- Each audit is seen as a learning experience or chance to improve.
- Each audit is conducted and findings and options expressed with professionalism and as much care and commitment as if it were a road section outside the auditor's family home.

During this project, an analysis of jurisdictional audit competency definitions and auditor qualification and assessment protocols also identified significant variations in terminology and auditor status levels, as well as differences in auditor progression requirements. As a result of the analysis the following model (Table 9.3) has been suggested as a discussion prompt towards harmonisation in auditor status levels and progression pathways in the future. Again, jurisdictions are encouraged to benchmark their current requirements and/or shape new requirements or future directions against the model introduced.

Table 9.3: The suggested Austroads auditor qualification and pathway model to afford benchmarking or assist future improvement

Criteria	Trainee auditor	Auditor	Senior auditor
Role	• gain exposure and experience by observing and filling a minor role in audits	• part of audit team	• part of audit team • lead audits (as appointed), including mentoring
Prequalification	• gaining experience in road safety engineering • awareness of road design • successfully completed recognised RSA course		
To maintain level	• continued interest in road safety and RSA	• be part of audit team for a minimum of 2 audits every 2 years • meet on-going CPD requirement	• lead a minimum of 2 audits every 2 years • meet on-going CPD requirement • promote RSA
To progress to next level	• receive mentoring • meet continued professional development (CPD) requirement • observe/fill minor role in minimum of 2 audits within 2 years • have gained a minimum of 2 years' experience in road safety engineering	• receive mentoring • be part of audit team for a minimum of 5 design stage audits • have gained a minimum of 5 years' experience in road safety engineering • meet on-going CPD requirement • successfully complete lead auditor training (as applicable)	

Source: acknowledgement Gillies, QDTMR

The following aspects of the above model are highlighted:

- There are three status levels – **trainee auditor, auditor, senior auditor.**
- **Only senior auditors can be assigned to lead an audit (fulfill the lead auditor role).**
- Both senior auditors and lead auditors have a mentoring role.
- At this stage, training and competency requirements have been shown simplistically in Table 9.3 – with further discussion and work required to ensure a greater degree of consistency with learning principles based on the SEKA model. This work is likely to include further consideration of assessment protocols (including practical assessment methods) and auditor registers.

The technical training qualification requirement is to be expressed through professional disciplines, namely:

- road design
- traffic engineering
- network operations and maintenance – including road construction, traffic management and traffic control
- road safety engineering – a road safety engineer which is defined within the Austroads *Guide to Road Safety Part 8: Treatment of Crash Locations* (Austroads 2021d) as 'a practitioner with:
  - sound knowledge in traffic engineering and road design practice
  - an appreciation of road user behaviour and the contribution it makes to road crashes
  - competency in crash investigation (i.e. crash data analysis, and identification of crash causation and severity factors), and countermeasure development (i.e. identification of targeted cost-effective remedial treatments/mitigation measures)
  - competency in monitoring and evaluation methods'.

Recognised Austroads definitions of these key disciplines appear in Appendix A of this Guide.

All auditors (regardless of status) must have awareness and understanding of the Safe System – including its principles and application.

Table 9.4 has also been put forward in this Guide by the PWG as a working draft/proof of concept, showing how the elements of the SEKA model of competency can be used to locally benchmark current, or improve future, **qualification and assessment protocols for the status of auditor**. Further examples have also been developed for the other statuses of trainee auditor, senior auditor and lead auditor roles. It is expected that further development of this concept will follow in time as part of the pathway towards national harmonisation.

At least one jurisdiction, Main Roads Western Australia (MRWA), has highlighted that the foundation skills and experience required to conduct **RSAs, blackspots analyses, and Safe System Assessments are complementary**. In practical terms this means that effective auditors also tend to be effective in these other areas, and vice versa. This premise has then been used to encourage certain practitioners to become multi-faceted and raise the quality of audit and assessment outcomes.

Table 9.4: Working draft illustration of how the elements of the SEKA model of competency can be obtained and assessed in considering successful progression to auditor status

Competency attribute required to be achieve auditor status	Skills	Experience	Knowledge	Attitude
How can the attribute be **achieved**?	• foundation and on-going technical training • observing audits • mentoring by peer auditors	• relatable technical projects • observing audits • undertaking audits	• technical training • meeting CPD requirements • undertaking audits	• peer mentoring • undertaking audits
How is the attribute **assessed**?	• peer interview/assessment • submission of a career report	• submission of audit portfolio • peer assessment	• peer interview/assessment • submission of a career report	• reports from lead auditors
How is the attribute **maintained**?	• submission of technical/audit portfolio • peer assessment • submission of a career report • meet on-going CPD requirement	• submission of audit portfolio	• lead a minimum of 2 audits every 2 years • meet on-going CPD requirement • promote RSA	• reports from lead auditors

As previously stated within this Guide, further consideration of aspects of training (e.g. syllabus, pre-qualification requirements etc.) is desired, with the development of a national syllabus considered a realistic and necessary longer-term goal, as part of the longer-term pathway to harmonisation. This would contribute to 'raising the bar' of RSA yet further and supporting auditors being able to work across the country to common requirements, as opposed to restrictions within current jurisdictional based policies and protocols.

9.6 Independence of the Audit Team

9.6.1 New and Modified Infrastructure

The classical theory of RSA is established on the basis that the audit team must be **totally independent** of the design process.

However, it is recognised that some variance exists within the industry as what constitutes/qualifies as 'total independence', often linked to practical implications and challenges.

Good practice is that the locally required level of independence be defined within the local strategy/policy document and that the requirements are formally satisfied prior to commencement of any audit.

Establishing a local requirement can qualify reasonable responses to practical solutions, for example, where separate teams or divisions within a large consultancy or road agency are proposed to design and project manage a project, or design and audit a project; and where a road agency wishes to commission an audit of one of its existing roads and has competent auditors in house or within a neighbouring road agency.

However, such situations can be tolerated if the objectives of RSA and the rationale behind independence in the process are understood and respected. It has also been found that consistently implemented internal controls will negate/dilute any suggestions of 'vested interest'.

In summary, the need for a practical, pragmatic approach is understood, but the audit output and outcomes must not be compromised.

9.6.2 Existing Roads

Given that the road is established, requirements for the auditor to be independent of the original designer are not typically applicable. This means that existing roads can be audited by competent auditors who are officers within the road agency or sourced and commissioned from an external organisation. Any controls and conditions that are to apply must be stated within the local strategy/policy document.

9.6.3 Summary

It follows that the client must not commission a particular auditor/s because they are the cheapest option or may be perceived to be favourable – identifying fewer issues than other auditors or proposing low-cost mitigation measures that could be questioned for their effectiveness.

Similarly, auditors must understand their responsibilities and respect the audit process. For this reason, the responsibilities of auditors should be reflected within a formal code of conduct. An example of a current auditor code of conduct is provided within Appendix G. A code of conduct is often included within the local strategy/policy document.

In summary, the integrity of the audit team must be safeguarded by its members, so that it is ultimately capable and unhindered in providing objective, impartial and credible judgement in the conduct of an audit.

Indicators of where dependence is suspected or exists can include:

- Risks and hazards are ignored or not properly identified (in terms of exposure, likelihood, and severity) and/or subsequently mitigated.
- Unethical behaviour, breaches of confidentiality and malpractice are not reported.
- Explanations and justifications are accepted without checking.
- Undeserved positive feedback is given.
- Records are falsified, incomplete or not kept.
- The audit team unreasonably supports certain positions held by the client.
- The audit team is less than thorough/is overly sympathetic to the designer or client.
- The audit team is requested or pressured to effectively design/re-design mitigation measures, including in response to client modified/preferred recommendations.

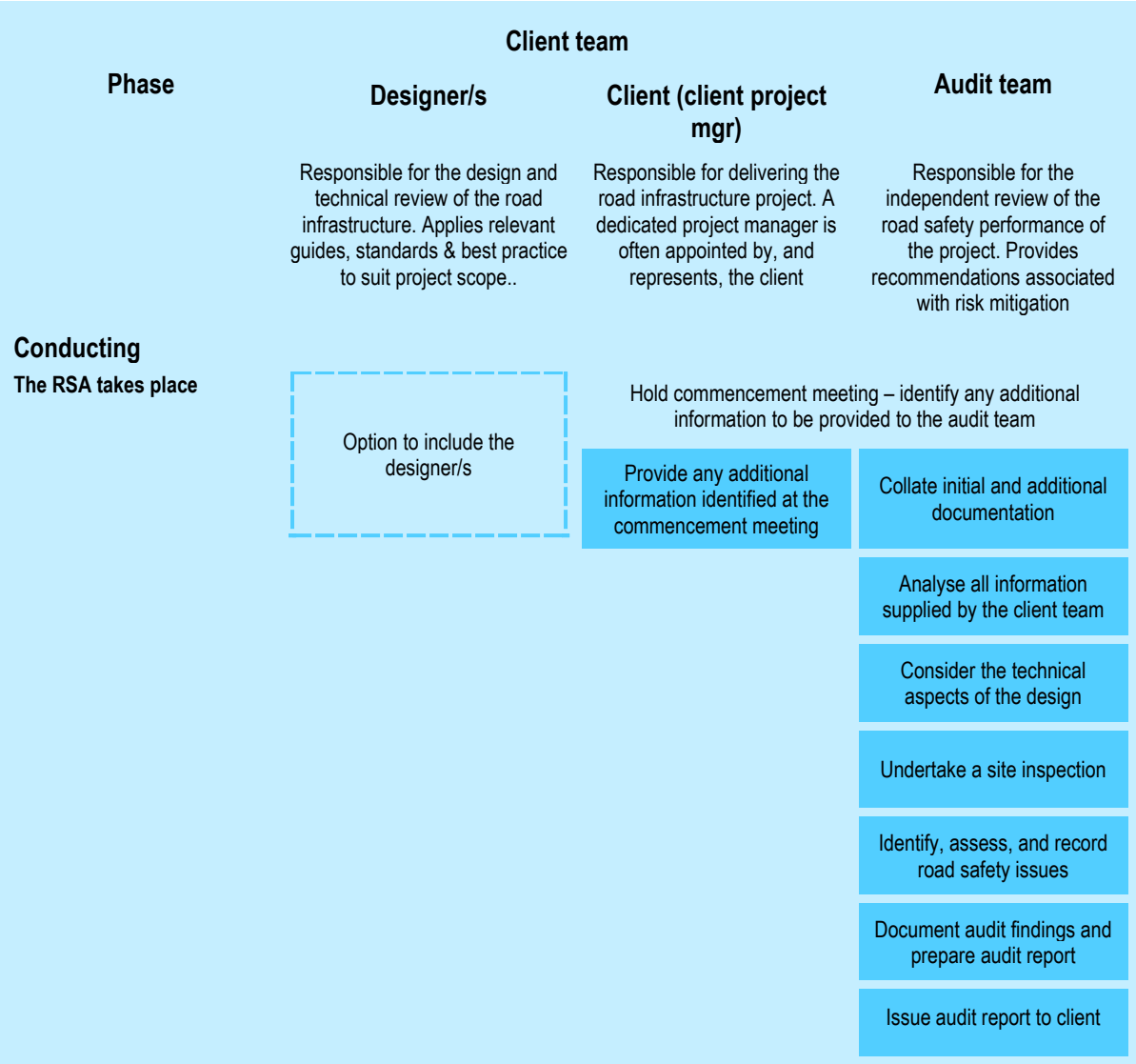
In practice, the above reinforces the importance of the relationship between the client procuring the audit and the lead auditor. It has been found that engagement between the two parties is most effective if conducted in a transparent and unbiased manner.

10. Conducting Phase

10.1 Introduction

The conducting phase and its components are shown in Figure 10.1.

Figure 10.1: The conducting phase of the audit process



10.2 The Commencement Meeting

A commencement meeting is essential in ensuring that the client team understands the audit process and its roles and responsibilities and acts as an opportunity for both parties to confirm the audit objectives, scope, any focus, and timeframe. The meeting also serves as a forum for the client team to provide any additional background information to the audit team which might identify key issues, constraints and potential issues requiring consideration. This typically includes a briefing on issues that may have emerged during the previous project planning or design processes.

The client's project manager is typically responsible for organising the commencement meeting and ideally, formulating an agenda.

While it is possible for the commencement meetings to take place face-to-face and ultimately be combined with a site visit, and can be advantageous, this practice is becoming less common. Increasingly commencement meetings are conducted over the phone or using modern technology (MS Teams, Zoom, or similar) as a practical and more cost-effective solution e.g. in the case of the simplest projects/audit briefs, the commencement meeting might only need to be a phone call and a follow up e-mail with the audit brief and other technical documentation attached.

If issues and further questions arise following the commencement meeting, the lead auditor should contact the client project manager immediately such that they can be resolved without delaying the process.

10.3 Analysing the Information Supplied

This step assists the audit team in forming or reviewing its findings and conclusions about the current or likely (as applicable) safety performance and crash potential of the road within the scope of the client brief. All documentation provided should be reviewed prior to the audit commencing and the audit team needs to ensure that they are allocated sufficient time for that review. The same documentation is likely to be useful during the site visit and may also need to be revisited following the site audit when the report is being compiled.

In practice, the first impressions and instinct of competent auditors when reviewing background documents is typically reliable and will also help generate a list of possible items to be considered during the site visit.

If issues and further questions arise during the analysis of the information provided, the lead auditor is encouraged to contact the client project manager immediately such that they can be resolved without delaying the process. This can also be a good time to seek clarification from the designer/s on any aspect of the project that are not seemingly covered by the documentation, avoiding any confrontation or suspicion later.

10.4 Undertaking the Audit – Identifying and Assessing Safety Risks and Hazards

The audit team must focus on road safety risks and hazards and aspects that directly influence and/or impact upon safety outcomes e.g. traffic volumes, speeds. Aspects such as amenity or aesthetics, which do not impinge on safety or present risk (e.g. potential for graffiti or a missing item of wayfinding), should not be the focus, nor should they be covered in the audit report.

Where it is believed and/or known that previous audits have been conducted at an earlier or equivalent stage, the reports must be reviewed to identify any key safety information and/or outstanding issues, which should then be repeated within the final audit report along with a summary of subsequent consideration during the current audit.

10.4.1 The Road as a System

The importance of the interface between different road infrastructure elements e.g. barriers and other road furniture with landscaping and the impact upon parameters such as sight lines, is also stressed for all design stage and existing road audits. When conducting a design stage audit being able to visualise a project/road layout from multiple plans and drawings is an essential skill of an auditor.

Photographic examples of the typical risks and hazards found by audit type (stage) are provided in Appendix D. These are not exhaustive. Additionally, this is an area extensively covered within the classroom (face to face) and fieldwork components of recognised training courses.

10.4.2 Prompt Lists and Front Loading

Prompt lists (previously referred to as check lists) can also assist auditors at all stages. Further background and standard Austroads prompt lists are provided in Appendix H. In addition to the material provided in Appendix H, several auditor training courses, auditor professional bodies, and road agencies have developed local prompt lists, which are also useful.

This Guide has adopted an approach referred to as **front loading**, which has the objective of using the front page of prompt lists to remind auditors of the requirement **to consider Safe System and Network Level Safety principles at the earliest stage**, when preparing for an audit.

10.4.3 Planning Site Inspections

The schedule for the **site inspection** component of the audit must be discussed and agreed with the client team and documented within the final audit brief. This may or may not include attendance by the client and/or project manager. There are pros and cons to each option and auditors will develop their own experience and preference in this regard.

The conduct of both **day and night audits** is required at the detailed design stage and later stages. Further consideration may be required regarding representative weather and lighting conditions, days of the week, times of day etc. for certain projects and locations. The experience of the lead auditor will be important in this regard, especially where the client team is inexperienced. The relative cost and time of site inspections should not be a factor.

The attendance of specialist advisors and key stakeholders at site visits is also to be agreed e.g. whether a representative from the local Police or interest group might attend.

10.4.4 Considerations during the Site Inspection

The site inspection should focus on how the design and provision proposed or existing provision (as appropriate) interacts with its surroundings and nearby roads (e.g. entry/merge and egress/exit points) and to visualise any potential impediments and conflicts for road users.

For existing roads, an initial observation of operation is strongly recommended, to get a feel for the site, prior to commencing the more formal component of the audit. Providing that auditor and user safety can be assured, elevated positions such as overpasses or embankments can be particularly useful for this purpose.

A competent auditor will quickly ascertain whether a site operates effectively and can secure a very good initial indication of manoeuvres, potential conflicts and where they occur, and impediments to flow etc. Although to be treated as strictly anecdotal the thoughts of residents in the immediate vicinity can be an important source of background information and may be able to answer any questions that might become apparent while on site.

10.4.5 Practical Aspects of Site Inspections

Every member of the audit team must visit the audit site and the inspection is to be undertaken co-operatively, with members expressing their observations and concerns in an open manner as they arise. This is because even the most experienced auditors can overlook issues or have alternative viewpoints, so all auditors in the team should be encouraged to voice any concerns they have, regardless of their nominal status in the team and experience.

A photographic and/or video record of the inspection component of an audit is to be captured to supplement field notes, with a focus on this being able to adequately locate and communicate the safety risks and hazards identified.

As previously discussed, crash data can be useful, especially in verifying safety risks and hazards identified during the audit i.e. as a post audit check.

Audits must consider all road users, unless constrained by the audit brief (i.e. a thematic audit is commissioned) when the audit must be undertaken from their unique perspective. Thematic audits should reflect that, for example, young and elderly pedestrians, impaired road users, truck and bus drivers, cyclists, and motorcyclists, have quite different requirements and safety needs. Drive and walk-throughs of audit sites are required and can be complemented by auditors riding cycles or motorcycles as required for thematic audits.

The **safety of the audit team and others attending the site is paramount**. To this end, planning of site inspections is essential to ensure that national and local WH&S legislation and practical requirements are followed (e.g. risk assessment, Safe Work Method Statement prepared etc.). This is especially the case where the project or road to be audited is extensive and/or complex and lengthy and/or multiple sessions are required. Consideration must be given to where an audit vehicle can stop/park and the operating speed at the location, which could in turn give rise to the need for temporary traffic control. **Where an elevated level of risk becomes apparent during an audit, the activity must be suspended.**

10.4.6 Practical Dilemmas when Conducting RSA

As initially identified in Section 4.3.2 of this Guide, **identifying and how to record and communicate risks and hazards that are strictly outside of the audit scope** sometimes cause a dilemma for auditors. An example could be where a safety risk/hazard is observed 20 m from the boundary stated within the audit brief or relates to say a pedestrian but is of concern during a thematic audit for motorcyclists. Good practice identified earlier in this Guide is that local direction on such instances should be provided within the **audit brief**. However, where direction it is not provided or not adequate, the audit team's understanding of road safety and their **professional duty of care** should prevail to ensure a reasonable outcome. Auditors must always follow their professional duty of care and record and notify the client and any other relevant stakeholders of **obvious safety issues regardless of the audit brief.** It is typical for such findings to be communicated outside of the audit report e.g. via e-mail or phone call, with accompanying photographs or video. Guidance on 'out of scope' issues can also be given within the local auditor **code of conduct** (Appendix G).

In summary, risks/hazards identified outside of the scope of the audit scope (e.g. the physical boundary and risk type) are important in the wider network safety outcome and may also result in a safety issue inside the audit boundary.

10.4.7 Site Inspection De-brief Meeting

In some jurisdictions e.g. NZTA, a **site inspection de-brief meeting** is held ahead of the production of the report.

10.5 Expressing and Prioritising Risks and Hazards

Identifying and capturing the attributes (e.g. location, nature, size etc) of risks or hazards must be followed up by effective communication.

This requires an **objective, professional, blameless approach in terms of written communication** (language and style) that assists the client team. To assist, the content of the audit report must be commensurate with the client team's technical experience and awareness and importantly, does not excessively use jargon or extensive acronyms etc.

Terms such as ‘unsafe’; ‘sub-standard’; ‘unacceptable’ and/or ‘deficient’ are subjective and should be avoided. Similarly, the description of the risk or hazard should not provide a solution or encourage the client team to take a course of action. For example, a description such as ‘there is a sharp tree lined bend with no road restraint system’ should be avoided, in favour of ‘the bend at location X is estimated as having a radius of Y m. This is a tight curve out of character for the route, with inappropriate infrastructure provision, with a potential for run off road crashes which may result in collision with roadside objects’.

Further guidance is as follows. This example has also been written up as a learning example, using the specimen audit findings table (Appendix F.1 refers).

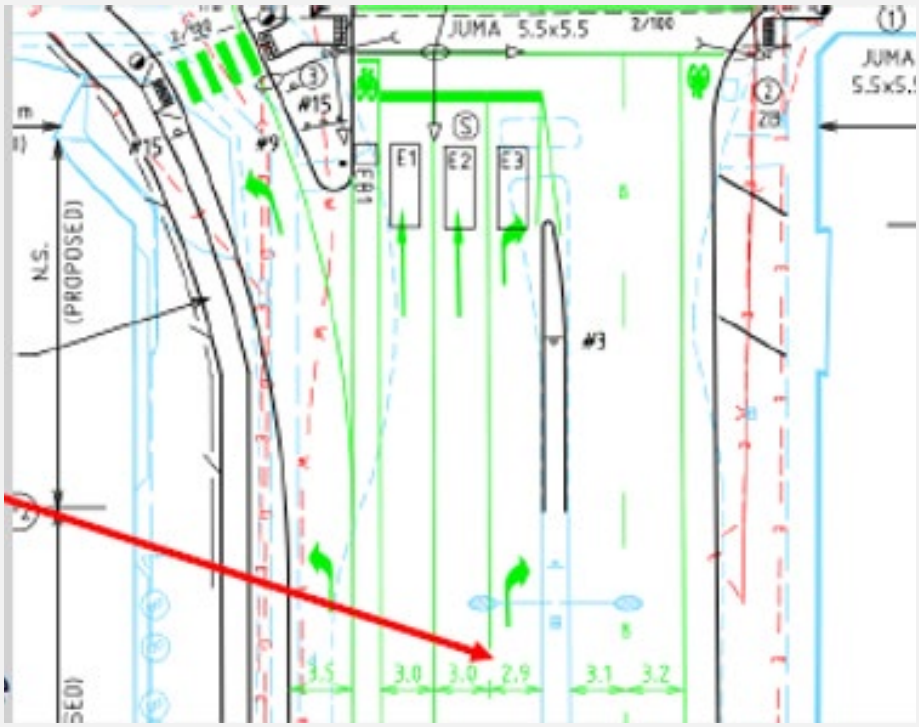
Getting it right! (a good practice example – expressing risks and hazards identified during an RSA)

Poor example – ‘the right-turn bay is too narrow’

Reasonable example – ‘the right-turn bay from Main Road to Side Road is too narrow, which increases the potential for side-swipe or rear-end type crashes. The Austroads design Guide states that the minimum traffic lane width should be 3.3 m’.

Good/preferred example – ‘the right-turn lane from Main Road into Side Road is not wide enough to adequately store right turning vehicles, which could result in vehicles encroaching into the same-direction traffic lane while either performing the turning manoeuvre or waiting in the lane, especially if more than one vehicle is queuing. This will increase potential for sideswipe or rear-end crashes, particularly in wet weather and at night. Austroads road design Guide also states that the minimum traffic lane width should be 3.3 m. The traffic volumes are high, it is in a 60 km/h speed zone and the concern is likely to occur occasionally with likely minor injuries resulting.

The area of concern is shown here:



The example given is preferred as it clearly states the:

ISSUE, CRASH TYPE, RISK FACTORS and REFERS TO STANDARDS/GUIDELINES

Source: acknowledgement Safe System Solutions Pty Ltd

While there is currently no requirement to support and strengthen audit findings and recommendations by providing evidence such as research reports and appropriate data, this approach is favoured by some jurisdictions e.g. MRWA's local control data requirement. The approach is considered worthy of further discussion during consultation towards national harmonisation.

Good practice guidance is often sought as to how best to collate and display audit findings e.g. sequential according to chainage, in the order of any audit prompt list used, or grouping by common issue or priority of audit finding. While guidance on this element can be established within the audit brief, it is more common for lead auditor preference and experience to Guide the reporting for a particular audit.

Notwithstanding, reporting should be logical and helpful to the client, especially when it comes to considering their response to the recommendations of the audit team.

For example, for a location where there are three distinct intersections and ramps at a grade separated interchange and issues have been identified regarding each one of the elements of alignment, cross-section, delineation and visibility, it may be better to discuss each site in turn, rather than discussing each design element about the different sites in turn. In this way, any possible interaction between the problems at each site is more likely to be recognised and addressed effectively.

On road projects of a considerable length, it may be more appropriate to split the reporting into sections, with any mutually dependent recommendations being recognised upfront and then cross-referenced within the more localised reporting.

The positive aspects of a design or existing road which are contributing greatly to achieving road safety outcomes can also be identified during an audit and recorded and communicated to the client. However, where this is done, it is typically kept separate i.e. outside of the formal RSA report.

10.5.1 Risk Assessment

Good practice is that each of the risks and hazards identified must undergo a risk assessment.

As shown below, likelihood and severity are considered for the crash type/s associated with each risk or hazard.

The risk assessment is completed with the assignment of a priority for action.

The level of risk and priority for action must be communicated for all issues/hazards within the audit report.

The assessment of risks is to be as **objective and repeatable as practicable** as this greatly assists the client team in determining their response.

Risk parameters and a risk matrix are defined below as good practice with reference to related Austroads guidance (Austroads 2016a, 2021c). However, in the short-term local risk assessment requirements and approaches may apply.

Risk assessment principles must be a part of the syllabus of any recognised auditor training course.

The two risk parameters and their categories to be considered are likelihood and severity as follows[5]:

- Likelihood
  - Almost certain – occurrence once per quarter
  - Likely – occurrence once per quarter to once per year
  - Possible – occurrence once per year to once every three years
  - Unlikely – occurrence once every three years to once every seven years
  - Rare – occurrence less than once every seven years.
- Severity[6]
  - Insignificant – property damage
  - Minor – minor first aid
  - Moderate – major first aid and/or presents to hospital (not admitted)
  - Serious – admitted to hospital
  - Fatal – at scene or within 30 days of the crash.

Figure 10.2 was developed by the PWG to show how likelihood and severity are considered within a standard risk matrix to give a 'priority' for risk mitigation.

Figure 10.2: Austroads RSA risk matrix

Likelihood (includes exposure)			Severity*				
			Insignificant	Minor	Moderate	Serious	Fatal
			Property damage	Minor first aid	Major first aid and/or presents to hospital (not admitted)	Admitted to hospital	Death within 30 days of the crash
	Almost Certain	One per quarter	Medium	High	High	Extreme (FSI)	Extreme (FSI)
	Likely	Quarter to 1-year	Medium	Medium	High	Extreme (FSI)	Extreme (FSI)
	Possible	1 to 3 Years	Low	Medium	High	High (FSI)	Extreme (FSI)
	Unlikely	3 to 7 Years	Negligible	Low	Medium	High (FSI)	Extreme (FSI)
	Rare	7 years+	Negligible	Negligible	Low	Medium (FSI)	High (FSI)

*see Severity Guidance Sheet

Safe System crash outcome threshold

The corresponding priorities for mitigation are categorised as:

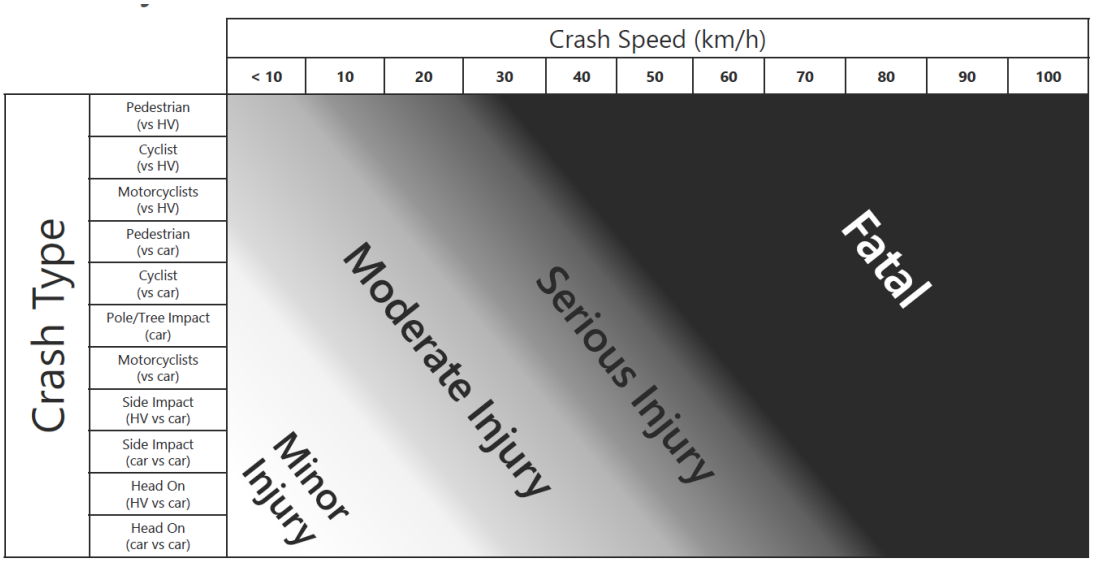
- Negligible – no action required
- Low – should be corrected or the risk reduced if the treatment cost is low
- Medium – should be corrected or the risk significantly reduced, if the treatment cost is moderate, but not high
- High – should be corrected or the risk significantly reduced, even if the treatment cost is high
- Extreme – must be corrected regardless of cost.

5 Exposure is factored into likelihood.
6 Severity is the likelihood of the outcome occurring.

No definitive guidance can be given as to the respective monetary values of the terms 'low', 'moderate' or 'high' regarding treatment costs, but it is expected that consideration against the total project cost would be an important factor when categorising mitigation of each risk.

The risk matrix above is aligned to Safe System principles and has been designed to be used with consideration of a severity guidance sheet which was developed by the PWG (Figure 10.3).

Figure 10.3: The severity guidance sheet – to be used with the risk matrix (Figure 10.2)



It is stressed that the information contained within the severity guidance sheet is a general indication only and that professional engineering judgement is required with its usage.

Research is also continuing in the review of current published Safe System fatal and serious injury tolerance speeds, with a particular interest in side impacts. Practitioners should keep themselves abreast of developments in this regard.

The risk assessment model shown in this Guide has also been applied to the case study at the start of Section 5.1 and the results have been recorded as a learning example in the audit findings table included in Appendix F.1.

10.6 Making Recommendations

Good practice is that the audit team must provide a **recommendation** for all risks and hazards that are identified, and risk assessed, and include identification of an appropriate **mitigation measure/s**.

When identifying and communicating mitigation measures, the audit team must:

- be clear and constructive about what is required i.e. how the safety risk or hazard might be resolved, but without it appearing to be a formal instruction
- be realistic, considering the severity of the issue and the cost of mitigation measures – as well as being effective first and foremost, the mitigation measures proposed must be appropriate and realistic. Providing too many options can be overwhelming

- be aware that there are typically high and low-cost and short and longer-term mitigation measures. The optimum is to identify low-cost mitigation measures that give a good rate of return in terms of safety (generically) and an impact with regard to the principles of Safe System treatments. There are various road safety engineering compendiums/toolkits available that can assist with identifying options applicable to various crash types and road user groups, as well as give an indication of the relative effectiveness in securing road safety benefits, their cost and expected in-service life. A **hierarchy of controls** protocol has also been developed for road infrastructure related mitigation measures and can be applied (Section 11.4)
- understanding that a balance is required – whereby the client team understands the mitigation proposed, but the audit team must on no account redesign the project or scheme or detail the mitigation measures, as this would jeopardise the independence of the audit, and in effect, invalidate the audit.

Adhering to the above guidance will reinforce client confidence in the audit process and build client – lead auditor respect and trust. In this way, auditing and auditors will typically gain a good professional reputation.

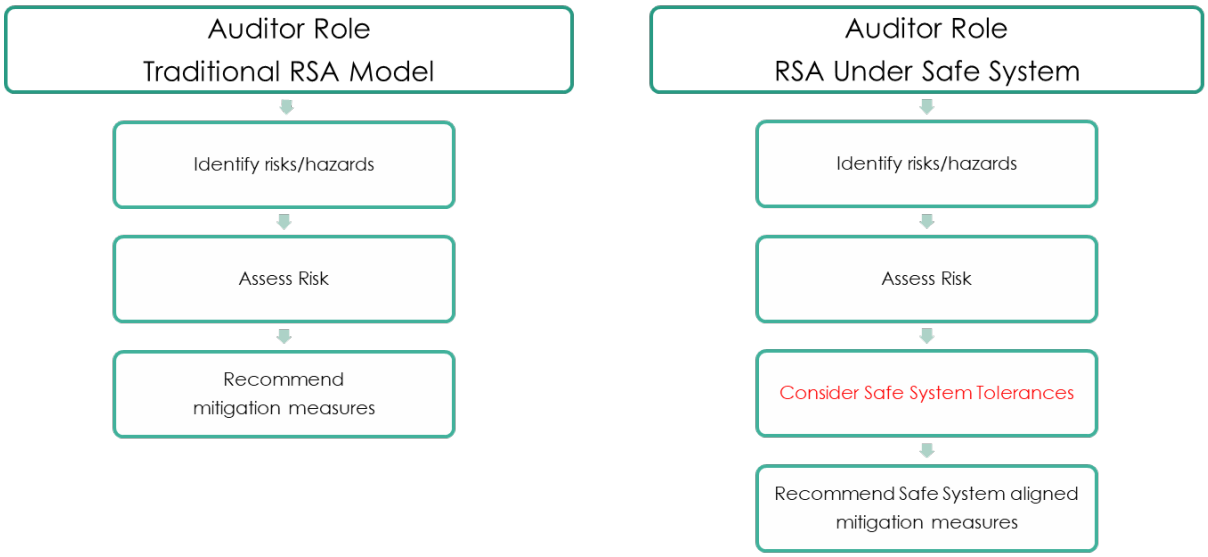
Poorly worded, vague recommendations e.g. 'to consider...', 'to study...', 'to monitor...', 'to investigate possible treatments and implement the most appropriate...', etc. are not helpful to the client, and should be avoided, unless detail is provided e.g. why, how, when, who is responsible, further decision-making process etc.

As previous stated, providing references, research findings etc. to support recommendations is advocated by some jurisdictions within their local RSA strategy/policy e.g. MRWA. It is held that such a requirement assists the auditor in identifying and justifying reasonable, fit for purpose mitigation measures.

Austroads has developed a series of tables identifying Safe System aligned mitigation measures for key crash types (Austroads 2018).

Figure 10.4 summarises, with respect to the identification of mitigation measures, alignment of RSA with Safe System principles (right) when compared against the historical approach (left).

Figure 10.4: Summary of alignment of RSA with Safe System principles against the historical approach



10.7 The Audit Report

The RSA report should be a concise and succinct account of the audit, focusing on the risks and hazards identified, their risk assessment and associated recommendations, which is then to be considered by the client team during the completion phase[7].

An audit report must contain as a minimum:

- Title and project introduction
  - a title which includes the name of the road, the extent of the audited project (length of road or intersecting road name), the locality (e.g. suburb), the type (stage) of the audit
  - a brief description of the project/scheme, its objectives, and any special aspects.
- Background information
  - the audit team and its composition – names, registration, and structure (lead auditor, auditor/s, other parties)
  - client details
  - reason/s for the audit e.g. in accordance with local strategy, conditions of contract, conditions of development approval
  - an overall plan of the project or road length, showing the audit findings (location and reference number) and if required, recommendation referencing
  - factual details of, and conditions during, the audit site visit/s
  - details of commencement and completion meetings (times, dates, format, attendees, agenda etc.)
  - list of documentation provided, and used during, the audit, including dates/versions e.g. drawings, maps, Guides, standards etc.
  - list of photographs, video, images etc. utilised.
- Audit findings (including identification of crash types) and associated recommendations (i.e. mitigation measures, including with reference to the Safe System treatment types) and the resultant client response (action/s) – note: this will be the most substantial part of the report and is typically tabulated (see Appendix F.1 for a proforma and a learning example).
- Formal statement/declaration – a concluding statement, signed by all auditors, advising they have undertaken the audit.
- Appendices.

There are many advantages to an organisation developing a standard audit reporting template, not least consistency for auditors and audit clients. To assist with this approach, a specimen audit findings proforma and audit report are included as Appendix F.

7 Although there is an obvious primary purpose for the audit report, it should be recognised that some information within it may be of interest or be used in other aspects of road network management.

10.8 Closing Summary – Conducting Stage

When conducting a site visit, auditors are encouraged to:

- undertake the inspection in accordance with the conditions of the audit brief (i.e. regarding times of day, peak and off-peak conditions, certain weather conditions)
- begin the audit by observing the site from a safe position to get an understanding of the surroundings and the layout e.g. how things operate and the range of road users
- establish the primary road users and any variations in their usage (e.g. peak hours, weekends)
- be methodical in approach and keep their actions and demeanour composed and uncluttered
- be practical and pragmatic and ensure that both basic observations and issues are shared and discussed such that all points of view are heard
- trust their competency as an auditor – backing their knowledge, skills, and experience, and to display a constructive/positive attitude
- consider and consult technical references when needed, either through personal knowledge or consulting with documents, including when back in the office
- develop the next generation of auditors – encourage input and contribution from any trainee auditors on the audit, pass on experience, mentor etc.

When conducting an audit key questions to be considered by an auditor might include:

- What will cause someone to get injured here one day?
- What manoeuvre/s are likely to be involved – what will the chain of events be?
- What road users/road user groups will be affected?
- Whereabouts within the audit site is this likely to occur?
- What is the possible and likely result/s (outcomes)?
- What level of severity might be expected?
- Does the risk/hazard and mechanism identified apply all the time? (e.g. time of day, weather, direction of travel)
- What are the initial thoughts on what can be done about it (what mitigation measure/s options are there)?

When considering and expressing the findings and recommendations of an audit, auditors should:

- Write clearly and use vocabulary commensurate with the client's knowledge and experience.
- Remember that each mitigation measure must address the risk of a crash type/s – experience has shown that there are very few 'generic' (one measure addresses all) road safety solutions.
- Recognise that combinations of mitigation measure/s can be very effective and are typically required.
- Consider the likely effectiveness (benefits) of the proposed combinations of mitigation measures.
- Not identify/select mitigation measures based solely on which measure/s give the highest stated return. Similarly, there is no definitive relationship between the cost or complexity of a mitigation measure and its effectiveness i.e. just because a mitigation measure is the most expensive or complex technically it should not be assumed that it will be the most effective. Identifying and implementing effective, low-cost mitigation measure/s should always be the objective.

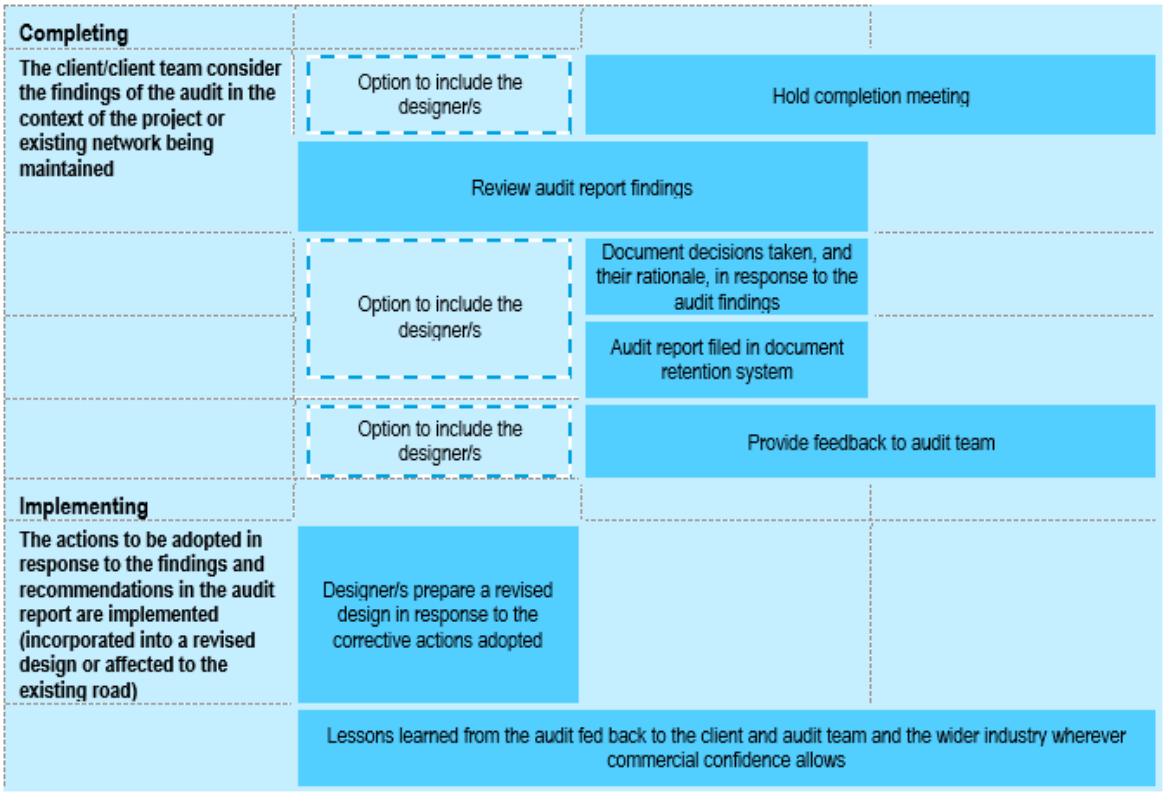
- Any ‘migration’ of, or change in profile of, a risk/hazard likely to result from a proposed mitigation measure should be identified e.g. the introduction of a roundabout at the site of a signalised intersection will be very effective at reducing potentially serious side impacts, but may increase the incidence of minor rear-end impacts on the approaches.

11. Completion and Implementation Phases

11.1 Introduction

The completion and implementation phases and their components are shown in Figure 11.1.

Figure 11.1: The completion and implementation phases of the RSA process



11.2 Handover of Audit Report and the Completion Meeting

On its completion the audit team must submit its report to the client or his/her project manager, as per the audit brief.

The audit report is typically circulated across the client team for consideration e.g. identification of factual inaccuracies, areas where clarification is sought, or where additional information or context might be required.

A **completion meeting** then takes place, so that client and audit teams can discuss the audit findings and recommendations made, including proposed mitigation measure/s. As a minimum, this will involve the lead auditor and the client project manager. Other auditors and/or the designer/s team may be useful additions.

Completion meetings can be face-to-face but are increasingly being conducted over the telephone or using modern technology such as video conferencing.

A completion meeting must not be viewed as an opportunity to question or debate the findings or recommendations of the Audit team. Any misunderstandings that have not been resolved prior to the completion of the audit report can be addressed. The meeting can also be very useful in providing an opportunity for members of the client team to further explore options for mitigation measures, including in some cases, engage in brainstorming.

11.3 Reviewing the Audit Findings

The client team is responsible for considering the audit findings (including the risk assessment outcomes, recommendations and mitigation measures) alongside other relevant scheme parameters to decide on the most appropriate response. The client or their project manager may seek input from the designer/s and/or specialist advisors to discuss the matters raised and the most appropriate response. Any remaining queries or clarifications regarding the report are to be raised with the lead auditor.

It is sometimes specified within conditions of consent, and encouraged otherwise, that with private sector projects where the infrastructure will become a public asset, that the future road agency is consulted at this stage.

The audit team is not responsible for the client team response or any subsequent re-design of the project/scheme and/or design of mitigation measures and their subsequent implementation. However, it is suggested that audit teams can assist the client team in their deliberations wherever possible and reasonable to do so e.g. answering reasonable technical questions, assisting with valid request for references and other pertinent resources.

11.4 Responding to the Audit Report

The client must formally document their response/actions within the local audit proforma[8]. Each response must include the rationale and where applicable, the headline details of the proposed implementation (what, who is responsible, timeline etc.).

In preparing their response to an audit report, the client or their project manager is advised to follow a step process:

- Consider whether to accept or reject each audit finding.
- For each accepted finding, consider whether to **accept or reject** the risk assessment, recommendation and mitigation options identified.
- Formally document and sign off the decision reached in designated cells of the audit proforma.
- As a courtesy, communicate the decisions reached to the audit team.
- Implement any action/s identified (e.g. commission a design change/s, construct etc.).
- Consider whether the actions are significant enough to warrant commissioning a follow-up audit (e.g. a detailed design audit of a re-design).

8 NZTA's Electronic Decision Tracking Form PMM6.5a, which is within the *Project Management Manual* SM011 available via the organisation's website, has been identified as a very useful way of formalising, tracking and recording the client's decisions following an audit.

While the inclusion of an extreme or high-risk rating/s within an audit report should obviously be viewed with due importance by the client team, it is important to remember that it is not mandatory for the client to accept any findings or recommendations within an RSA report. For example, after due consideration the client team may decide to disagree with a finding, a risk assessment, or recommendation where they believe that reasonable justification exists e.g. the audit team had reached a recommendation but were not privy to certain information. Alternatively, a recommendation may be made that, whilst addressing the identified issue, is considered by the client to come at an unreasonable cost relative to the risk.

In practice, it is of course preferred that the client team response is predominantly positive i.e. one of the following:

- Accept a recommendation completely and adopt the audit team recommendation which will typically include an infrastructure-based mitigation measure.
- Accept a finding completely but adopt an alternative measure that is equally effective.
- Accept a finding and/or recommendation in part or in principle but, due to other constraints, implementing changes which go only part of the way to resolving the safety problem, and hence lead to the client team consciously agreeing to recognise and accept the residual risk.

However, more negative responses include:

- Accept a finding in part or in principle but, due to other constraints, deferring the recommended action/s, or staging them over an extended period, with an understanding and acceptance of the associated risks.
- Accept a finding in part or in principle but deciding to take no action and formally document the rationale.
- Reject a finding and therefore deciding to take no action/s and not formally document the rationale.

It has also been previously stressed within this Guide that the client team should consider whether the project will revert to public road agency operation in the future, including when formulating its response to audit findings. Discussions with the adopting road agency at this stage can help towards positive road safety outcomes in the future.

It is important to restate that it is not the audit team's responsibility to approve the client's response to the audit findings and recommendations, nor to ensure that they are implemented. Notwithstanding, it is considered both courtesy and good practice for the client team to communicate its actions and progress to the lead auditor for continual improvement purposes.

It is often the case that several potential solutions (mitigation measures) can be identified to an issue within an audit report. It is then the responsibility of the client team to make a final decision on the best course of action. Typically, this will require consideration of factors such as the viability and cost/benefit of a treatment, and the feasibility of actioning the treatment to fit in with the timeframe and scope of the project.

A standard risk management principle called the **hierarchy of controls** (Standards Australia 2018) can be used to evaluate mitigation measures in a road safety context and to prioritise them based on their effectiveness (i.e. the extent of reduction of risk), as follows:

- elimination – remove the risk in its totality from the road and traffic environment
- substitution – replace a higher level of risk with one less severe and more controllable
- engineering controls/isolation – apply design modifications to minimise road user interaction
- administrative controls – provide warning/advice to seek appropriate behaviour
- personal protective equipment – use equipment to protect road users from injury and death.

This approach recognises that it may not always be practicable to adopt treatments that are higher in the hierarchy of controls, and a process of working down the controls is followed.

For instance, a road may be designed to pass adjacent to a steep incline. In assessing the risk, the hierarchy of controls might indicate that the safest option would be 'elimination' of the risk by removing the slope or redirecting the road along an alternative route. In many cases such mitigation would generally not be feasible or necessary. Attention would then be given to a next best option i.e. 'substitution', in which an alternative (but lesser) risk reduction results e.g. installation of roadside barriers. Where this can be achieved, lower order controls may be introduced e.g. additional signage, albeit with a further decrease in risk reduction.

Table 11.1 and Table 11.2 show the application of the Hierarchy of controls to a road safety context. The original figures can be found along with further detail in the Austroads report *Safe System Roads for Local Government* (Austroads 2016b).

Table 11.1: Hierarchy of controls from the ISO for risk management as applied to roads

Hierarchy of control level	Control	IS031000:2009	Road safety hierarchy of control
1	Eliminate	Removing the risk source	Remove the risk
2	Substitute	Avoiding the risk by deciding not to start or continue with the activity that gives rise to the risk	Reduce the risk
	Isolate		
	Engineer		
3	Administration	Changing the likelihood	Change road user behaviour
4	Personal protective equipment	Changing the consequences	Protect the road user
		Taking or increasing the risk in order to pursue an opportunity	Not applicable
		Sharing the risk with another party or parties (including contracts and risk financing)	Not applicable
		Retaining the risk by informed decision	Not applicable

Source: Austroads (2016b).

Table 11.2: Risk controls as related to road environments

Hierarchy	Risk control method	Effect of control	Example
1	Remove the risk	Remove the hazard from the road and traffic environment	Remove a tree or utility pole from the roadside area Grade separated pedestrian crossings Fully separated cycleway
2	Reduce the risk	Replace one hazard with another, less severe and more controllable, hazard Physically separate road users from the hazard to minimise road user interaction with it, or modify the design of the road infrastructure to reduce road user interaction with the hazard and/or assist road user control	Road safety barrier Roundabout (replacing priority controlled cross or T-intersection) Wide median or verge area with or without a safety barrier Traffic signal control pedestrian crossings Off-road cycleway Increase lane and sealed shoulder width Improve delineation of the carriageway Provide pedestrian crossing with refuge island On-road cycleway and shared zones Improve Australian New Car Assessment Program (ANCAP) rating of vehicle fleet
3	Change road user behaviour	Provide warning/advice to seek appropriate behaviour	Curve warning/speed advisory signs Reduced speed limit and school zone alert signing Vehicle safety features such as speed alerts, lane departure warning, blind-spot monitoring, etc. Enforcement, education and training.
4	Protect the road user	Use equipment to protect road users from death/injury	Seat belts, anti-lock braking system (ABS), electronic stability control (ESC), automatic emergency braking (AEB) Pedestrian airbags and bonnet designs Replace a rigid lighting pole with a frangible pole

Source: Austroads (2016b).

The principle of the hierarchy of controls also applies to the implementation of the Safe System approach and the concept of Safe System treatments which was identified in Section 5 of this Guide. To recap, the objective is to apply primary treatments in a systematic, targeted way. Where it is not possible to apply these, or in the short term, alternative solutions should be used, working down through the hierarchy.

Figure 11.2 gives two examples of how the hierarchy of controls has been used in developing a Safe System aligned approach at sites where a primary mitigation measure is not practicable in the short-term, but an alternative strategy towards a primary treatment is identified.

Figure 11.2: Two examples of where a Safe System aligned Hierarchy of Controls has been applied in practice towards the implementation of a primary treatment

Source: Austroads training materials.

Responding to the audit report and documenting that response are considerable, significant activities for the client team. Accordingly, the development and publication of a dedicated Guide has been identified to assist clients in the management of, and responding to, RSAs within Safe System principles. Such an approach has recently been applied by Austroads with respect to managing traffic modelling commissions (Austroads 2021b).

11.5 Importance of 'Closing the Loop'

Completion through the audit process is often referred to as 'closing the loop'.

Once the client team response has been finalised, it is considered courtesy for the agreed actions to be communicated to the lead auditor and where applicable, the pertinent local road agency if the project is going to become part of the public network in the future. This should occur before they are implemented within the agreed timeline and may include the implementation of temporary measures while the agreed action is completed.

When implementation is complete, the client team should formally sign-off the actions, and again, it is considered courtesy for this to be communicated to the lead auditor.

It is important that all relevant documentation collated and of prime importance, is retained securely for any future reference.

Failing to 'close the loop' of an audit has been widely identified as 'a weak link in the process', but it is important to recognise that these steps are essential for all the benefits of auditing to be accrued.

Poor levels of compliance may have emerged for several possible reasons:

- responsibility and financial issues – uncertainty in projects/schemes as to who is ultimately responsible for the mitigation measures, including their finance
- lack of finance and/or resources to implement mitigation measures, including competing demands
- a lack of understanding of the audit process.

Following good practice in 'closing the loop' also allows the huge learning potential from audits to be recognised e.g. in the improvement of designs and standards to optimise safety outcomes and respond to how infrastructure is being used and perceived in service and more generally, aspects of the audit process itself. This can be both internal (i.e. within a single organisation) or externally (e.g. the industry as a whole), either in response to specific situations or project types and/or emerging trends and patterns across several projects and/or time periods.

Figure 11.3 shows a practical example of the benefits of learning from RSA findings – the development of traversable culvert designs.

Figure 11.3: Two good examples of where learning from RSAs has improved road design

It is also important to stress that the implementation of a mitigation measure should always be followed by monitoring and evaluation of that measure. Further information is contained within (Austroads 2021c).

11.6 Retention of Records

It is the responsibility of the client team to ensure that all documentarian associated with an RSA, including concerning the completed actions, is retained within the project files. Where state legislation and local document control and retention protocols exist, these must be followed, including minimum document retention periods (most typically 7 years). As well as their relevance in any future litigation, such records may also prove useful for any future internal analysis of how audit findings have been incorporated into designs and how this may have influenced crash outcomes.

11.7 Registration of Audits

The local audit strategy/policy, auditor certification requirements and/or associated auditor code of conduct will set out the formal requirements for the registration of audits undertaken.

In addition, auditors are strongly advised to keep a personal record of all audits in which they participate. Such a record supports an auditor's progression and continued development and allows clients to identify competent auditors when identifying and commissioning an audit team.

12. Auditing at Local Government Level

Several challenges exist in the undertaking of RSAs at local government level. These challenges tend to be exacerbated where the network is in a remote and/or rural area.

The uncertainties and challenges tend to relate to:

- whether the council is the client for the audit of a design for a new road, road improvement or an existing road; or where the client is a private body (developer) and the project has a road component and the infrastructure is likely to ultimately transfer to public ownership
- the rate of development and growth of infrastructure and the road network in some areas (e.g. dormer/commuting belts of large cities and new sub-divisions within these)
- the cost of road safety auditing when considered against the benefits accrued and competing demands, and mitigation measures recommended within audit reports
- the extent of the local network and whether the project to be audited is hard to access and/or a considerable distance from the administrative centre or technical office
- the physical availability of competent auditors – either in-house or commercially on a fee-for-service, including for in-house resources the costs of training and maintaining existing accreditation
- general lack of understanding of road safety issues and the importance of consideration at the earliest possible stage e.g. feasibility and preliminary design.

While there is an obvious, strong desire within local councils (local road agencies) to promote road safety, the constraints faced make it largely inevitable that such organisations are having to adopt audit practices which are not totally consistent with the good practice positions identified within this Guide. Although almost without expectation such practices are introduced with the best of intent (i.e. they are considered, pragmatic solutions which respect the objectives of auditing to ensure as far as practicable that positive road safety outcomes are secured), in strict terms, they are exemptions and must be formally managed as such (justified, signed off etc).

Known examples of such a response include:

- application desktop road safety checks to a design which are undertaken by an internal or external, experienced road safety professional – known in some jurisdictions as a ‘peer review’ of the design
- commissioning of an on-site assessment by a single competent auditor (sometimes accompanied by an experienced practitioner/s) rather than no assessment activity being undertaken.

However, such responses should only be short to medium-term, with the involved parties being actively encouraged to continually improve towards good practice i.e. the objective must be that the need for, and number of, exemptions should be reduced, and ultimately removed. A known effective example of this in action is MRWA’s policy relating to audit teams in rural/remote areas which allows an exemption on practical grounds but on the proviso that a long-term action plan is put in place to ensure compliance within an agreed timescale.

Within larger local councils, with a formal structure of dedicated sections and teams it has been found that in-house separation between the designer/s and the auditor is possible, giving a sufficient level of independence to the audit process.

Further consideration is required to the challenges facing local councils relating to the availability of competent auditors. Recent developments such as the increasing availability of on-line RSA training are recognised as a positive development in this regard.

Reviewing the governance of RSA at local council level is also considered a priority – seeking to ultimately strengthen the position of the road agency and increase the level of responsibility and accountability on public sector clients, including the undertaking of awareness training on RSA and the Safe System as a minimum.

13. Closing Remarks

This Guide consolidates and updates the previous *Guide to Road Safety Parts 6* and *6A* published in 2019. It sets out good practice to be followed by all public road agencies and private sector organisations (e.g. developers) in commissioning and undertaking RSAs.

A realistic stance has been taken, in that while full compliance with this Guide is desired, it is likely to take time within the current operating environment, and accordingly, a formal exemptions process has been included. It is clearly stated that all exemptions to good practice and locally documented strategy/policy must be considered on a case-by-case basis and where accepted, must be formally justified, recorded, and signed off. They are also intended as short to medium-term, and ideally with an action plan towards good practice established in parallel.

The operating environment for RSA has been identified in Section 4 and relates to two guiding concepts – the need for continual improvement in road safety outputs and outcomes and the establishment of an equitable pathway to national harmonisation. It is ultimately recognised that several steps will be required towards national harmonisation, involving engagement through Austroads, and consultation with, and agreement from, key stakeholders, not least all road agency levels.

As well as identifying good practice, this Guide has identified some of the action points required for such a pathway and the Project Working Group has also tabled with the Austroads Road Safety Task Force several items for further consideration.

National harmonisation is seen as a logical way of bringing about the change and improvement identified as being necessary across all aspects of RSA. This is not change for change sake or gold plating – only improvement such that the protocols, processes, and professional requirements are commensurate with the importance of the process and its contribution to positive road safety outcomes. A good practice case study exists in the UK, where an audit function (expressed in terms of taking appropriate measures to reduce the possibilities of crashes) is mandatory for road agencies. A national Society of Road Safety Auditors (SoRSA) has been established under the Chartered Institution of Highways and Transportation (CIHT) and its national auditor accreditation scheme and code of conduct are key components. At the time of writing, MRWA are perhaps the closest state road agency to such a model.

A further priority issue is the **governance of audits** – which can be expressed in its simplest terms of determining expectations, and firm requirements and responsibilities for the client. This includes but is not restricted to what must be audited and when; ensuring audits are undertaken; selecting an audit team that complies with good practice requirements (e.g. structure, competency etc.); responding to audit reports (its findings and recommendations), ensuring audits are closed out and audits registered. This is likely to require a review of the roles and responsibilities of road agencies; especially over private sector road related projects, many of which will ultimately revert to public management and operation. The overarching objective is to increase the responsibility/accountability of private sector clients. It is considered that this can be achieved by requiring clients to undergo further awareness training and, it has been suggested, the development of practically based guidance in managing RSA commissions, as has been developed and published recently to cover traffic modelling (Austroads 2021b).

In addition to the headline items identified above, Appendix J tables several potential ideas to be taken forward by Austroads and the road industry for the on-going improvement of the RSA process.

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Appendix A Key Terms

Table A 1 defines the **key terms** used within this Guide i.e. it is not exhaustive of all terms used throughout the document. The definitions have been developed with due reference to the Austroads Glossary of Terms (Austroads 2015) and topic specific Austroads Guides, where applicable, and with minor modification to reflect current industry usage; the default positions within this Guide; and to support future harmonisation in this field.

Table A 1: Definitions of key terms used within this Guide

Term	Definition
Audit team	A team comprising of at least two auditors, one of whom must have attained senior auditor status and is commissioned to fulfil the role of the lead auditor. All auditors must have the required competency, as established by this Guide, or as detailed within a local RSA strategy/policy. While an audit may also include a trainee auditor/s, specialist advisors, and in some cases, key stakeholders, they are not considered part of the core audit team.
Client	The instigator of a project or scheme. May also be referred to as the project sponsor or developer depending upon the project type, its funding and potential ownership.
Client team	The team assembled by the client to design and manage a project or scheme, typically including a designer/s and a project manager.
Crash investigation	A technical discipline involving the examination of crashes to identify patterns and common trends that may have contributed to crash causation or crash severity. This can include the detailed investigation of a single crash.
Design (road design)	The process of originating and developing a plan for an aesthetic and/or functional object, requiring research, thought, modelling, iterative adjustment, and redesign. In road design, the result of the design process is presented on drawings and in actions to allow the road to be constructed. The philosophy and principles set out in these documents underpin the creation of a successful design.
Designer/s (design team/design organisation)	A practitioner/s and/or organisation(s) commissioned to undertake various phases of project design including project preparation.
Developer	See client, also project sponsor.
Engineering	The term engineering has many definitions, given it is an occupation with extremely wide reach – the term covers many fields and, by extension, many skills. The need to apply engineering judgement is considered a particularly important competency of an engineer (collated from many sources).
Exemption	Where a good practice principle or requirement identified within this Guide and/or within local RSA strategy/policy is not implemented, but a reasonable alternative approach has been identified. That approach must be formally justified, agreed, signed off and recorded, and must be short to medium term only.
Human factors (road user behaviour)	A technical discipline in the study of the behaviour of road users that forms an important factor in crash causation with the aim of developing effective countermeasures. Road user behaviour involves the understanding of risk taking and risk acceptance along with other behavioural functional and motivational models (current TfNSW protocols).
Key stakeholder	A person or representative of an organisation with an interest in the location where an RSA is being conducted. Has no formal role in the audit process but can provide background or context, as invited by the client or audit team.
Lead auditor	A senior auditor with the competency and status required, as established by this Guide, or as detailed within a local RSA strategy/policy, who is then commissioned to lead the conduct of an RSA. A lead auditor participates in the entire undertaking, including primary communication with the client. Lead auditors are required to mentor auditors and trainee auditors and may also be invited to take part in the assessment of auditors as part of the progression pathway.

Term	Definition
Network operations and maintenance	A technical discipline in the management, operation, and maintenance of a road network, which incorporates road construction, traffic management and traffic control.
Project manager	An appointment of the client and typically leads the client team in many aspects of the project/scheme, including the RSA process.
Project sponsor	See also client or developer.
Road construction	A technical discipline in the construction of road infrastructure, within the wider discipline of network operations and maintenance.
Road safety audit (RSA)	A formal, systematic, robust, technical assessment of the potential road safety risks associated with a proposed road project or existing road conducted by an independent team of auditors with required competency. The assessment considers all road users and provides recommendations in the mitigation of the risks identified.
Auditor	A practitioner with the competency required as established by this Guide or as detailed within a local RSA strategy/policy, to take part in the conduct of an RSA as required by the lead auditor. An auditor can progress from a team member to senior auditor status.
Road safety engineer/road safety engineering	A road safety engineer is defined within the Austroads *Guide to Road Safety Part 8: Treatment of Crash Locations* (2015a) as a practitioner within the disciplines of road safety engineering as follows: • sound knowledge in traffic engineering and road design practice • an appreciation of road user behaviour and the contribution it makes to road crashes • competency in crash investigation (i.e. crash data analysis, and identification of crash causation and severity factors), and countermeasure development (i.e. identification of targeted cost-effective remedial treatments/mitigation measures) • competency in monitoring and evaluation methods.
Senior auditor	A practitioner with the competency required as established by this Guide or as detailed within a local RSA strategy/policy, to play a senior role in the conduct of, and where so commissioned, lead an RSA, and participate throughout its entire undertaking.
Specialist advisor	A person agreed by the client and audit teams who provides independent specialist advice during the conduct of an audit, such as, road maintenance advisors, traffic signal specialists, police (e.g. highway patrol officers).
Traffic	A generic term covering all vehicles, people and animals using a road and road related areas (collated from various sources).
Traffic control	The planning and implementation of directing traffic through, around or past a works site or temporary hazard with the arrangement of traffic control devices (current TfNSW protocols). Might also include the control of road user groups e.g. at special events. Falls under the overarching discipline of network operations and maintenance.
Traffic engineering	A technical discipline in the measurement and study of traffic, the determination of its characteristics, and the application of the knowledge so gained to improving the safety, convenience, and economy of road transport (Austroads 2015).
Traffic management	A technical discipline in the use of traffic engineering processes and tools to control the flow of traffic. The aim of traffic management is to provide for the safe, orderly, and efficient movement of persons and goods, and to protect and where possible, enhance the quality of the local environment on and adjacent to roads (Austroads *Glossary of Terms*, Austroads 2015). Falls under the overarching discipline of network operations and maintenance.
Trainee auditor	A practitioner who has the required duration of industry service and has successfully undertaken basic RSA training in his/her state and is now seeking practical experience in RSA towards achieving auditor status and beyond. A trainee auditor is not considered an official member of the core RSA team but takes part in the audit as an observer to gain experience.
Transport planning	A technical discipline in the planning of operations and development of transport including the efficient and equitable allocation of resources (current TfNSW protocols).

Appendix B Legal Issues

The following text is provided as a practical overview of the legal issues as they affect the conduct of RSAs. More general coverage of legal issues as they affect road agencies is given within the Austroads document Managing Asset Management Related Civil Liability Risk (Austroads 2012). It is important to note that these materials are not a substitute for professional legal advice, either in terms of strategy and policy development or on a case-by-case basis following a crash.

B.1 Key Messages from this Section

- Road agencies are vulnerable to civil proceedings following crashes on their network but can choose to defend such claims by demonstrating that they have taken reasonable measures in managing and maintaining their network. This includes consideration of good practice, and how they have met their duty of care. This may also include the 'joining' of other parties such as the instigator of the project in the case of a private development.
- In relation to RSA, important issues for a **client**[9] (in being able to demonstrate 'reasonableness') are:
  - following requirements for the undertaking of audits, including ensuring the independence of the audit team
  - providing an adequate brief
  - considering, prioritising, responding to, and acting upon, auditor findings and recommendations.
- For an **auditor**, the important issues are:
  - operating in a diligent, professional manner, within their competency, and complying with specified and recognised auditing process and practices
  - actively liaising with the client or their project manager e.g. to ensure that a clear, adequate brief is agreed, and that any additional information required is secured prior to the audit
  - ensuring that the specified requirements within the brief are fulfilled (e.g. physically visiting the site, undertaking of both day and night audits)
  - using their professional competency in identifying foreseeable road safety risks and hazards and suggesting/recommending appropriate mitigation measures
  - fulfilling requirements as a lead auditor, having obtained senior auditors status and if commissioned in that role.

9 Used here as an overarching term that includes developers and project sponsors etc.

B.2 Context – Civil Claims against Road Agencies

In general terms, there is no specification legislation blocking a road user from instigating proceedings in civil law[10] against Australian road agencies following a crash, where that road user has incurred injury and/or economic loss and it is alleged that this has resulted from the provision and/or condition of the road infrastructure[11]. The decisions and actions of the pertinent road agency, and any precedents from previous cases, will be considered during the conduct of such cases.

Notwithstanding, there are local differences in the legislation which determine the precise scoping and conduct of such proceedings which need to be considered and understood.

Where statutory duties to manage the road network exist (e.g. under the *Victorian Road Management Act 2004*) the conduct of road agencies are tested against these requirements. However, in most jurisdictions, the test is under the tort of negligence i.e. whether a road agency has fulfilled its generic duty of care to road users on its network by acting 'reasonably'. The latter is determined on the balance of probabilities and with due consideration of good practice (including Australian Standards, Austroads guidance, and local practice and technical notes, where applicable) and what a peer organisation would have done in the same circumstances at the same time, given the same information (i.e. case by case consideration and with no application of hindsight or information that has subsequently come to light). In more recent times (post 2001–02), the 'competing demands' of road agencies are most typically considered when assessing whether an action was reasonable. Case law has also determined several issues relating to the 'prior knowledge' of a road agency, both actual and 'expected' against that of peers.

The fact that a road agency may be joined as a defendant in civil proceedings instigated by an injured road user is important but does not automatically infer liability. Both sides state their respective cases, with the onus of proof on the claimant that the road infrastructure was defective and that this had contributed to the crash and/or its severity. For this reason, it is often stated that road agencies have a vulnerability to civil proceedings and that the extent of their liability in a crash will be determined on the facts in hand. In simplest terms, road agencies can defend their position by demonstrating that they had reasonable policies in place and had effected reasonable measures in managing and maintaining the road section in question. It is rare for a road agency to be held 100% liable in a civil action.

There is currently no legislation (statutory obligation) for road agencies to conduct RSAs, with a jurisdiction exercising a power where it undertakes one, with its approach to RSA and other kindred processes being set out within a local road safety strategy and/or dedicated local policy. Despite RSA being a long established and widely adopted and applied process, practical experience is that it is only in recent times the conduct or otherwise of an audit has become a more frequent and component of a case raised by a claimant's legal team – in many cases the undertaking or otherwise of an audit is not mentioned due to a lack of awareness. Where the conduct of an audit is raised, the audit report will be secured (through Freedom of Information or similar legislation as required) and considered alongside other road safety and more general activities and actions. It is often said that the focus of the courts is more on what happened because of a risk or hazard, than why it was present (e.g. how an audit if undertaken, was carried out).

10 That is a claimant seeks compensation for their injuries and/or economic loss resulting from a road agency's actions and decision falling below a reasonable standard of care, as opposed to the criminal law which seeks to prosecute and punish perpetrators for their actions.

11 In New Zealand, road controlling authorities (RCAs) have no specific duty under law to consider and implement measures to address road safety risk. Instead, personal injury is considered a community responsibility and individuals who are injured are not entitled to sue whether the injury was caused by individuals or by organisations. Civil proceedings are possible for crashes causing property damage. Insurance cover for injuries resulting from motor vehicle crashes is provided by the nation's Accident Compensation Corporation (ACC) through its Motor Vehicle Account, which is funded by a levy on petrol sales and a component of the motor vehicle licence fee. Nevertheless, the community has an expectation that authorities will provide safe travel conditions.

B.3 The Positive Contribution of RSA

By proactively identifying safety risks and hazards so that they can be effectively mitigated before the opening of a road and/or before crashes occur, RSA makes a significant contribution to road safety. Put simply, where there are no crashes, there can be no claims, and acting professionally and diligently helps a road agency to demonstrate that it recognises, and is fulfilling, its duty of care – and importantly, helping to reduce its vulnerability in civil action.

This means, however, that where an RSA is conducted, there is an expectation that it too is managed and conducted in a diligent and professional manner, in accordance with local policy and practice and more widely, industry good practice. Failure to do so will add to any increase in a road agency's vulnerability over the course of the action.

It is often queried by practitioners whether road agencies will increase their liability by identifying risks during an inspection or audit, especially if the risk/s may not feature highly on a prioritised listing and as a result may not be mitigated for some time, or even at all. Practical experience is that this is not the case and the competing demands of road agencies are understood and recognised by the court (and in some jurisdictions a 'special defence' exists) – it is considered better to identify all risks and rely upon the road agency's risk assessment and prioritisation protocols than to not actively adopt a process and remain largely ignorant until a crash occurs.

B.4 Procuring an Audit and 'Closing the Loop'

Where local legislation and/or strategy/policy dictates, clients are responsible and accountable for procuring an audit (by a competent and independent team) and ensuring it takes place. If a crash occurred at that location in the future, resulting in a claim, and it could not be demonstrated that an audit had been undertaken (and no formal exemption had been granted or signed off), then this would likely increase the vulnerability of the client. However, it is again important to note that this does not automatically infer liability.

Similarly, a client is responsible and accountable for 'closing the loop' of an audit, clearly setting out its response to the audit findings and recommendations. While not encouraged as a response, ally recording 'no action', if it was accompanied by a reasonable explanation or justification would not typically prejudice a client in civil proceedings. Where faced with a number of complex, expensive mitigation measures, it is understandable (reasonable) for the client to prioritise and decide upon a level of residual risk that they are prepared to accept.

B.5 Personal Professional Liability of Auditors

A large proportion of practitioners/engineers will go through their entire career without direct involvement in legal proceedings, others may only experience a minor role e.g. preparing a witness statement, without having to attend the court to give verbal evidence. However, it is important that auditors are aware of the following aspects relating to the potential for personal professional liability, without being duly concerned or not wish to be engaged in what is an extremely stimulating and rewarding area of work.

In very basic terms, an auditor is not held as a 'guarantor of safety' and has little to fear if they act professionally and diligently and within their competency. In practical terms, this means that an auditor will only, but quite rightly, be under the spotlight if they deliberately decide to commit an abhorrent act or operate in such an unprofessional and incompetent manner that it puts an individual in considerable and entirely foreseeable danger. Typically, auditors employed by a road agency or consultant will not be ally named, in favour of their organisation[12]. Self-employed auditors will most likely secure appropriate Professional Indemnity (PI) Insurance. The general advice given under this sub-heading extends to jurisdictions where Registered Professional Engineer (RPE) requirements exists.

The types of conduct that would give rise to intense scrutiny are likely to include, but not be restricted to; signing off an RSA when the audit had not been conducted; falsifying audit findings for financial or other gain; not undertaking a night-audit when required to do so; relying on a plan or drawing when the requirement was to attend a site; or deliberately withholding or under-assessing a serious safety risk. A further concern may be a practitioner agreeing to lead an audit team when they do not have the required status (they are not qualified to do so), the team does have the required structure, and/or on a project which is in a field beyond their technical competence. A more general requirement also exists for all auditors to operate within their competency in auditing. But this is not different to the professional expectations of any practicing engineer. The emergence of RPE requirements should also serve as a reminder to the client that they should always engage an appropriately qualified and experienced Lead auditor, who then assembles a suitably credentialled team.

A response to a perceived threat of personal professional liability for auditors might also lead to some deciding to adopt a totally risk averse approach, for example, recording all risks as 'intolerable', such that they require immediate mitigation, or not wanting to recommend an effective alternative or innovative mitigation measure in favour of a standard design that might not address the risk or give as effective an outcome as the preferred design. Such outcomes are not helpful or promote the best safety outcomes, nor are they commensurate with the role of practitioners (especially those with formal engineering qualifications/professional engineers) in foreseeing, identifying, assessing and mitigating risk and applying professional/engineering judgement across a range of project sizes and complexities. In some cases, engineers have been held liable for blindly following a standard, without considering the best outcome.

In summary, while practitioners/engineers must understand and respect their role and the elevated accountability (over lay persons) that comes with it, ultimate personal professional liability for engineering decisions in a road's context is often held to be overstated. Being able to demonstrate reasonableness (including comparison with peers) in both conduct[13] and decision making, are often the primary considerations.

B.6 The Future – Could RSAs Become Mandatory?

As the process of RSA continues to become more widely practised, it is considered **possible** in the future hat legislation could mandate the undertaking of audits for certain project types (i.e. in such cases the process would become a statutory duty). The tightening of audit procedures e.g. with respect to audit stages, time frames and documentation of responses to audit findings, could also follow. Presently, such items are left to local strategy/policy. It could be argued that such a development would further reinforce the important concept that any failure to meet specified audit requirements[14] is likely to significantly increase a road agency's vulnerability in civil proceedings.

12 Under the principles of vicarious liability.
13 For example, ethics and codes of conduct where these exist and are applicable.
14 Within legislation, as applicable, and/or local policy.

Appendix C Example Local RSA Strategy/Policy

The following examples of an RSA strategy/policy for a state road (Section C.1) and local road network (Sections C.2) are provided to illustrate the coverage and main section headings of such a document i.e. it is important to note that the document requires adaptation to incorporate all local requirements.

C.1 State Road Agency Example

Below is an example of the state road agency RSA strategy/policy. An editable version can be secured from the Austroads website.

<<insert audit client organisation logo>>

RSA Strategy/Policy Statement

STATEMENT OF POLICY

<<insert audit client organisation>> shall ensure that Road Safety Audits (RSAs) are conducted throughout the various life cycle stages of road and bridge projects in accordance with the Austroads *Guide to Road Safety Part 6: Road Safety Audit* (2021) and this local strategy/policy document. This strategy/policy includes both internal projects/works undertaken on the road network by/on behalf of <<insert client organisation>> and external projects/works undertaken by land developers and other public bodies.

DETAILED REQUIREMENTS AND PERFORMANCE STANDARDS AND PROCEDURE

Purpose of RSAs

RSAs are undertaken to identify safety risks/hazards to all road users so that those who are responsible for delivering the particular outcome (conceptual design; preliminary or detailed design plans; constructed works) or managing existing roads can take the findings into account and consider effecting risk mitigation measures.

Stages of audit

The audit stages adopted and the scheduling of RSAs depends on the nature, complexity, and risk profile of the projects/works. This strategy/policy provides the requirements to determine at what stages audits shall be undertaken, i.e. at all, or some, of the following stages:

- Feasibility
- Preliminary design
- Detailed design
- Pre-opening
- Immediate post-opening
- Existing roads

Audits shall be undertaken as follows <<expand table & insert bullet points or ticks in table>>:

Description of project/works & list local parameters to be considered	Feasibility	Prelim. design	Detailed design	Pre-opening	Post-opening	Existing road
<<insert>>						
<<insert>>						
<<insert>>						

RSAs provide their optimum return when conducted at the design stage/s.

Where the above table is not followed, a formal **EXEMPTION** must be recorded on <<insert ref. to local exemption form>>, including full justification and sign off by the person/s responsible for authorising that exemption.

Audit team

An audit team shall consist of at least two auditors, with one assigned to lead the audit and fulfil the client liaison role. All members of the audit team must be registered as competent for the role they are undertaking and the project/works that they are auditing [<<insert reference to local auditor accreditation protocols>>].

Application

RSAs shall be conducted in accordance with the Austroads *Guide to Road Safety Part 6: Road Safety Audit (2021)* and [insert audit client organisation's] complementary audit prompt list and site procedures {insert local references].

The findings of all RSAs shall be recorded using the audit report proforma [insert reference]

All RSAs shall be repeated if the project design changes materially, if there are many minor changes which together could impact on road user safety, or if the previous audit for the relevant stage is more than <insert local policy> years old. Should a project not begin the next stage in its development within <insert local policy> years of the completion of the previous audit, the project must be re-audited. This is to ensure that due consideration is given to the project's interface with the existing road network.

Close out

Once received from the audit team, the client and their team shall complete (close out) the audit report [<<insert local reference>>] with their responses to the audit team's findings and recommendations as soon as possible following an audit, but no later than <<insert local policy>> after the audit.

The audit report shall be signed off as 'closed out' and retained as specified in <<insert local doc retention/record keeping policy>> and a copy forwarded to the lead auditor.

The client / client team shall be ultimately responsible for the planning, design and delivery of any mitigation actions to be affected.

C.2 Local Road Agency Example

Below is an example of the local road agency RSA strategy/policy. An editable version can be secured from the Austroads website.

<<insert audit client organisation logo>>

RSA Strategy/Policy Statement

STATEMENT OF POLICY

<<Insert audit client organisation>> shall ensure that RSAs are conducted throughout the various lifecycle stages of road and bridge projects in accordance with the Austroads *Guide to Road Safety Part 6: Road Safety Audit* (2021) and this local strategy/policy document. It includes both internal projects/works undertaken on the road network by/on behalf of <<insert audit client organisation>> and external projects/works undertaken by land developers and other public bodies.

DETAILED REQUIREMENTS AND PERFORMANCE STANDARDS AND PROCEDURE

Purpose of RSAs

Road Safety Audits are undertaken to identify safety risks/hazards to all road users so that those who are responsible for delivering the particular outcome (conceptual design; preliminary or detailed design plans; constructed works) or managing existing roads can take the findings into account and consider effecting risk mitigation measures.

Scope

This strategy/policy applies to:

- [insert audit client organisation's] road infrastructure projects/works
- qualifying projects that are subject to the development application processes
- [insert audit client organisation's] existing district distributor, local distributor and local access roads.

Audit stages

The audit stages adopted and schedule of audits depends on the nature, complexity, and risk profile of the projects/works. This strategy/policy provides the requirements to determine at what stages RSAs shall be undertaken, i.e. at all, or some, of the following stages:

- Feasibility
- Preliminary design
- Detailed design
- Pre-opening
- Immediate post-opening
- Existing roads

Audits shall be undertaken as follows <<expand table as required & insert bullet points or ticks in table>>:

Description of project/works & list local parameters to be considered	Feasibility	Prelim. design	Detailed design	Pre-opening	Post-opening	Existing road
<<insert>>						
<<insert>>						
<<land developments>>						

RSAs provide their optimum return when conducted at the design stage/s.

Where the above table is not followed, a formal **EXEMPTION** must be recorded on <<insert ref. to local exemption form>>, including full justification and sign off by the person/s responsible for authorising that exemption.

Audit Team

An audit team should consist of at least two auditors, with one assigned as lead auditor and fulfil the client liaison role. Where this is not practicable, a formal **EXEMPTION** must be recorded on <<insert ref. to local exemption form>>, including full justification and sign off by the person/s responsible for authorising that exemption. <<maybe include for a local council?.....where appropriate a reciprocal partnership agreement will be arranged with other local governments to create opportunities for audit teams to include qualified independent team members from partnering local councils>>

All members of the audit team must be registered as competent for the role they are undertaking and the project/works that they are auditing [<<insert reference to local accreditation protocol>>].

Application

RSAs shall be conducted in accordance with the Austroads *Guide to Road Safety Part 6: Road Safety Audit* (2021) and [insert audit client organisation] complementary audit prompt list and procedures {insert local references].

The findings of all audits shall be recorded using the [insert audit client organisation] audit report proforma [insert local reference]

All RSAs shall be repeated if the project design changes materially, if there are many minor changes which together could impact on road user safety, or if the previous audit for the relevant stage is more than <insert local policy> years old. Should a project not begin the next stage in its development within <insert local policy> years of the completion of the previous audit, the project must be re-audited. This is to ensure that due consideration is given to the project's interface with the existing road network.

'Close out'

Once received from the audit team, the client / client team shall complete the audit report [<<insert local reference>>] with their responses to the audit team's findings and recommendations as soon as possible following an audit, but no later than <<insert local policy>> month after the audit.

The audit report shall be signed off/'closed out' and retained as specified in <<insert local doc retention / record keeping policy>> and a copy forwarded to the lead auditor.

The client/client team shall ultimately be responsible for the planning, design and delivery of the mitigation actions to be undertaken.

Appendix D Examples of Safety Risks and Hazards by Audit Type

This Appendix contains pictorial examples of the road safety related risk and hazards typically identified, by audit stage. It is important to note that the examples do not cover all audit scenarios nor are they exhaustive. Additionally, it is not possible to provide full background or context for each example. Some of the risks and hazards shown will apply to more than one audit type (stage).

While the intention is for these examples to be useful to auditors (ally) and others (generically in understanding the audit process), they are no substitute for RSA training, where good practice in identifying and expressing risks and hazards is a key component, and field experience.

D.1 Design and Pre-opening Audits

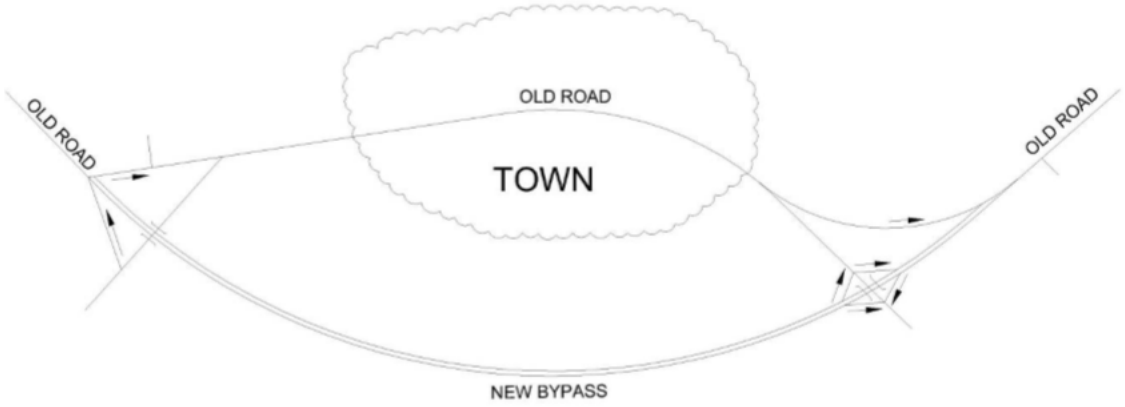
Figure D 1 is an example of a 100-lot phase of a 550 dwelling sub-division (housing development). The green polygon on the image shows its footprint. The largest orange circle highlights the location of a local school a distance of 2.5 km from the subdivision. The remaining two (smaller) orange circles highlight the position of amenities (the closest local shops and a recreation club), located 2.7 km from the sub-division and a bus stop, 1.8 km away. It is understood that a bus service will not serve the area until the ring (loop) road is completed around the site. Notwithstanding, the lower image shows the signposted 80 km/h road with very narrow shoulders due to major utilities and other constraints.

The RSA of the design failed to identify that the occupants of the subdivision will need to access the school and amenities, for which there is no safe walking or cycling access placing them at considerable risk of vehicular impact. The dirt track on the opposite edge of the road (as shown in the lower image) is in theory traversable, but it is uneven and unsealed with no formal streetlighting provision (some secondary/overspill lighting is present). Pedestrians would have to cross the road twice at uncontrolled locations leaving them exposed to live traffic. In this situation the audit team should have considered the location beyond the physical footprint of the project – these are significant issues in the future operation of this infrastructure. With Safe System principles in mind, the potential for a fatal collision between a vehicle at 80 km/h and a pedestrian is very high, with the prospect of fatal and serious injury.

Figure D 1: Example of a concept design that would benefit greatly from an audit at the earliest opportunity

Figure D 2 is an example from a previous version of the RSA Guide which shows the importance of conducting a feasibility stage RSA. The upper image shows an extract from a concept plan. The lower image shows how a competent auditor has detected significant risks/hazards relating to the most severe crash types (e.g. head-on collision, run off road incidents) during the audit at this early stage – such that a revised, more safety aligned, concept can be identified.

Figure D 2: Shows the early detection of significant road safety risks/hazards requiring a re-design



A feasibility road safety audit has assessed the concept (in relation to the other concepts), the broad safety issues on the bypass and how the concept fits within its environment. Figure 5.2 shows some of the safety problems which were identified. Many of these problems are well away from the bypass boundaries, but are a direct result of the proposed layout.

Figure 5.2: The fuller picture

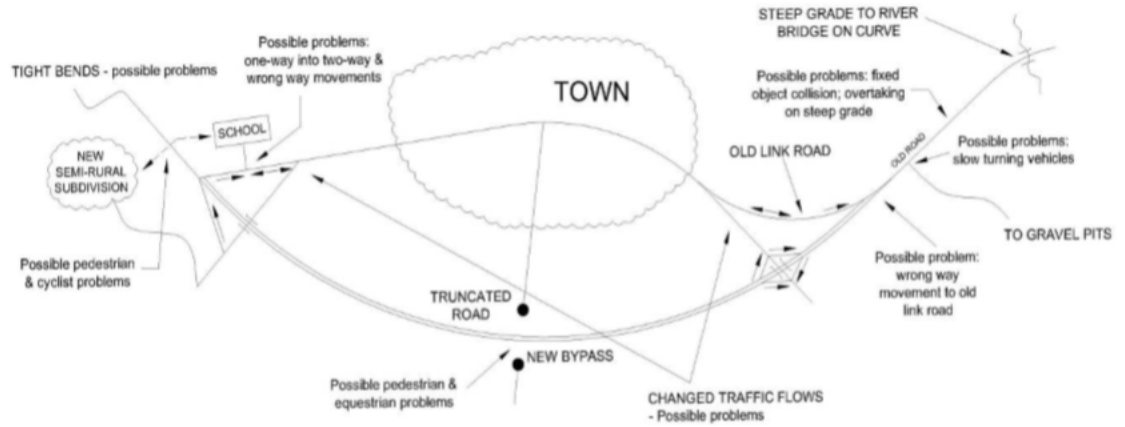


Figure D 3 is a further example from a past version of the Austroads Guide which shows an aerial photograph of a local road network, the layout of which is clearly alignment with good traffic management principles – a clearly defined and logical road hierarchy. Due consideration has been given to conflict points and potentially significant risks, for example the use of grade separation has eliminated a number of potential conflict points at the major intersecton to the left of the photograph. This is the sort of characteristic of a project/scheme design that can be checked during a feasibiity stage RSA.

Figure D 3: How a well-considered and audited concept has been taken forward and built

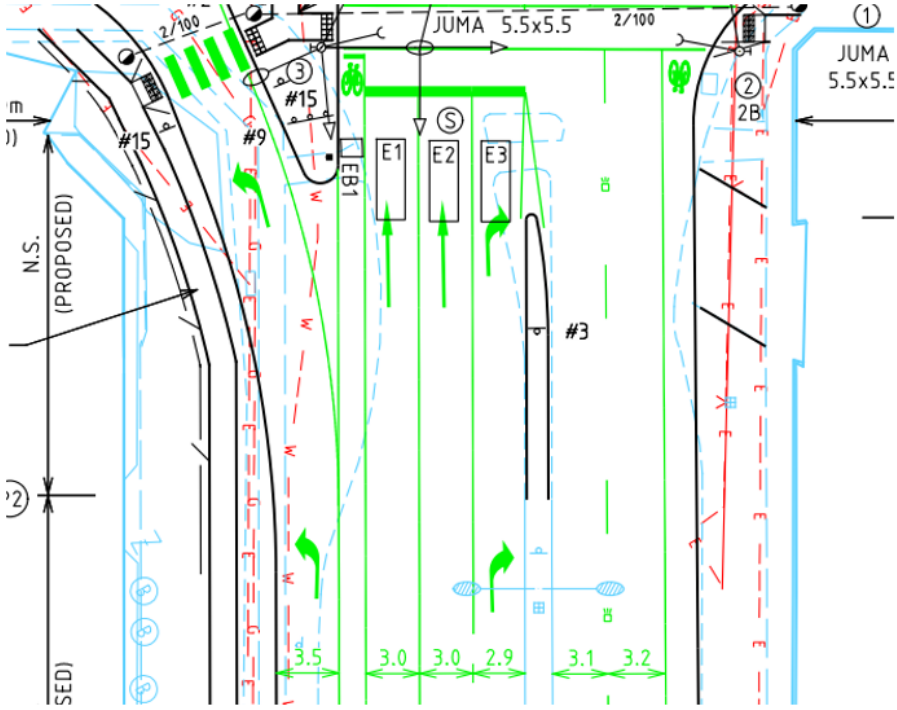
Figure D 4 provides an example of where landscaping specified to be planted next to a shared path needs to be appropriate for its location. The species selected (Bursaria Spinosa) is known to be a local native plant with spiky leaves, which rapidly overgrows. The risk is that riders will be scratched by the vegetation and may swerve to avoid overgrowth, with potential to lose control of their bicycle next to a 70 km/h road, with the potential for any impacts between vehicles and cyclists to result in a fatality or serious injury. Experience is that all large plants planted too near to a shared path will overgrow and narrow the effective path width.

Figure D 4: Construction and operation of a cycleway has given rise to a number of safety issues

Source: Transport for New South Wales.

Figure D 5 is a design where a 2.9 m wide right turn lane has been provided at a new set of signals, but wider lane widths have been provided next to it. This gives rise to an increased risk of side impacts with vehicles positioning in the adjoining lanes.

Figure D 5: Planned provision of a right turn lane which would have benefitted from an audit



Source: Safe System Solutions Pty Ltd.

Figure D 6 shows a historical upgrade project where an RSA was not conducted at the design stage. The short length – a rising and tightly curved off ramp presents a risk/hazard in several ways, including the potential for run-off-road incidents, due to factor such as late decision making, or uncertainty caused by the layout.

Figure D 6: Poorly conceived off slip

Figure D 7 shows a historical upgrade project where an RSA was not conducted at the design stage. The safety barrier provided is not matched to the 'point of need' i.e. it does not extend far enough to protect errant vehicles from running off the road and entering the open drainage ditch at the roadside and ultimately striking an unguarded, non-traversable, roadside culvert. It is also possible that given the likely operating speed of the location, that an impact with the culvert face could lead to an errant vehicle being launched. In both scenarios, fatal or serious outcomes are possible.

Figure D 7: Disconnected thinking at a carriageway upgrade project

Figure D 8 and Figure D 9 are at a recent road upgrade where an RSA was not conducted at design stage. It can clearly be seen that the new barrier system installed does not extend far enough such that it can protect an errant vehicle from striking the culvert end wall and tree. Additionally, the culvert end wall design will make vehicles unsettled when approaching the barrier end terminal. The risk of a fatal or serious injury incident is considered significant at this location given the road environment and high operating speed (assumed to be the most likely open road speed limit of 100 km/h).

Figure D 8: Unprotected drainage channel and culvert end

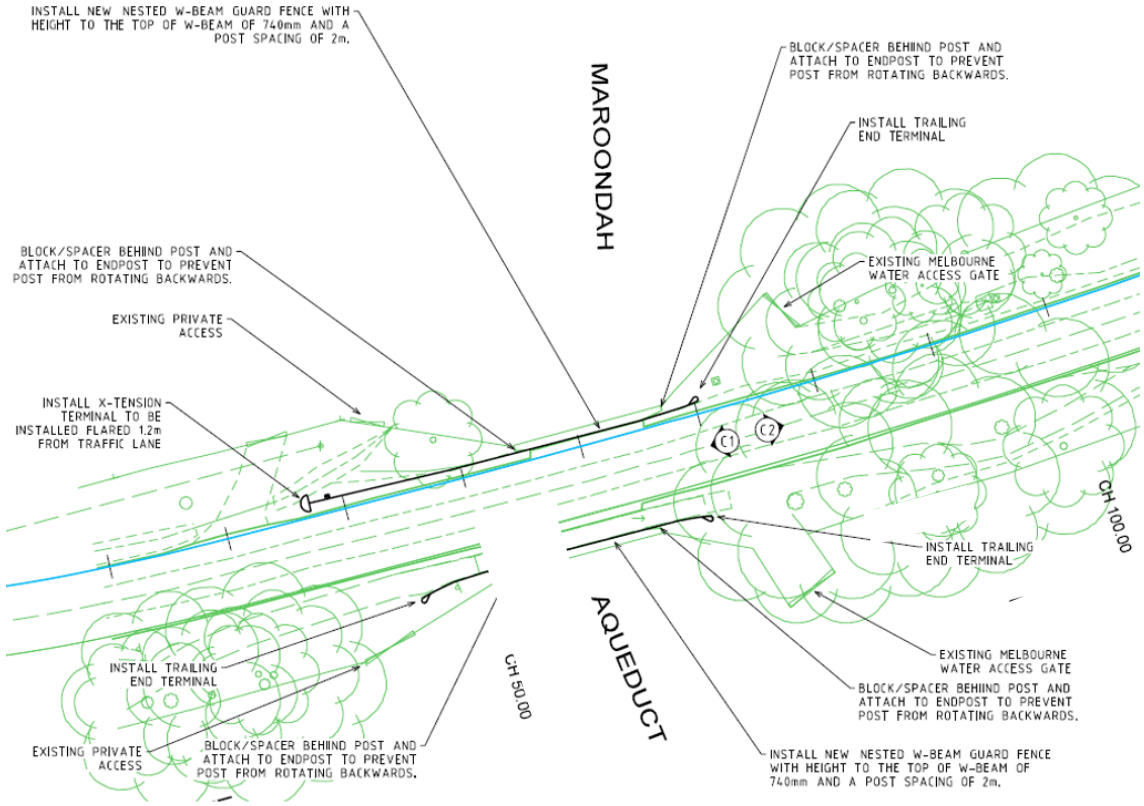
Source: Safe System Solutions Pty Ltd.

Figure D 9: Unprotected drainage feature

Source: Safe System Solutions Pty Ltd.

Figure D 10 provides an example where a design stage RSA identified the incorrect usage of trailing terminals. Energy absorbing terminals would have been a better (good practice) solution to potentially reduce the severity of any impact.

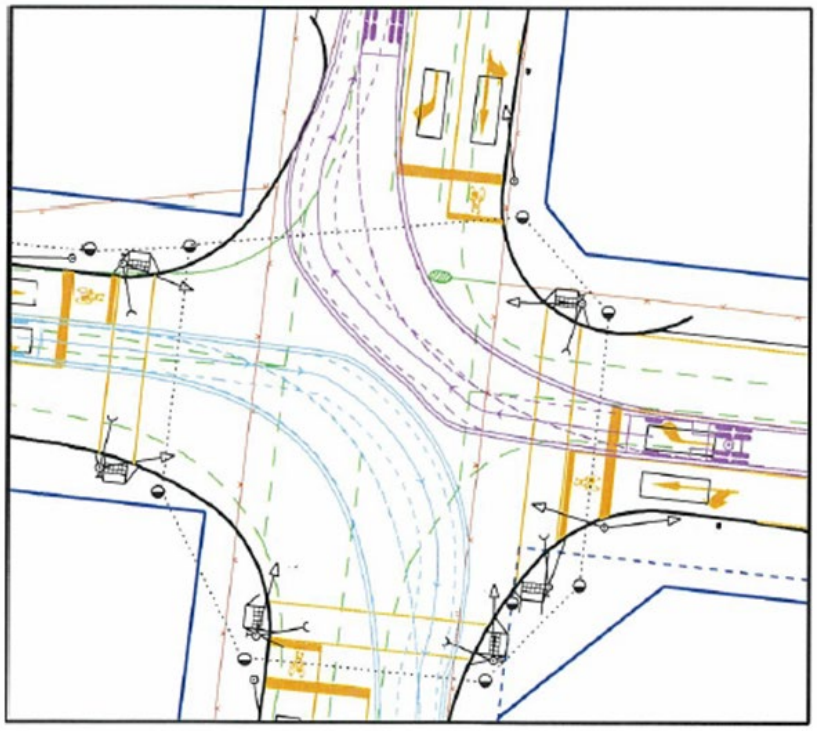
Figure D 10: Incorrect specification of barrier terminals



Source: Safe System Solutions Pty Ltd.

Figure D 11 is an example where a design stage RSA identified that swept path adjustments would be required to ensure the project/scheme operated more safely and effectively and hence mitigate the risk of side swipe and offset head-on impacts occurring.

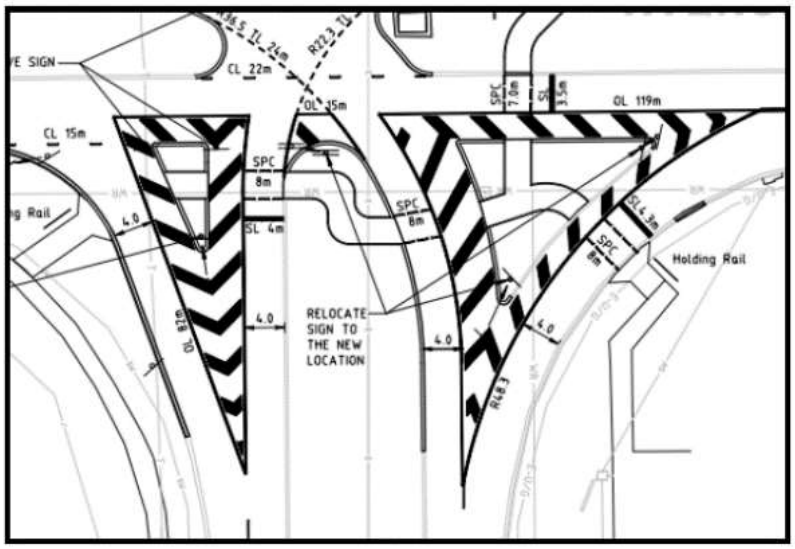
Figure D 11: Swept path analysis identifies issue at an intersection upgrade project



Source: VicRoads.

Figure D 12 shows where a design stage RSA detected that no raised reflective road markers (RRPMs) had been incorporated within this proposed line marking based improvement. These relatively low costs infrastructure items would improve the delineation of the intersection, especially at night-time, and hence the likelihood of road users correctly perceiving the layout and what is expected.

Figure D 12: Audit has detected an incomplete intersection design



Source: Safe System Solutions Pty Ltd.

Figure D 13 and Figure D 14 show where a construction/pre-opening RSA identified the temporary, water-filled barrier system was not correctly restrained. This would have the effect of significantly reducing the systems effectiveness in containing and redirecting any errant vehicles at the location. In the worst case, there is a risk of the system being breached with an errant vehicle passing through into the protected road environment and its adjoining area.

Figure D 13: An incorrectly assembled/deployed barrier system

Source: ARRB.

Figure D 14: An incorrectly assembled/deployed barrier system

Source: ARRB.

Figure D 15 shows where a longitudinally orientated (i.e. in direction of travel) grating was provided as part of a road upgrade project, presenting significant risk of destabilisation and ultimately unseating to two wheeled road users (particularly cyclists on narrow tyred racing bicycles).

Figure D 15: Cycling hazard which would have been detected during an early audit

Source: ARRB.

D.2 Existing Roads

Figure D 16 shows where an existing road audit made note of the 'potentially hazardous landscaping provision, which could dramatically increase the risk for any errant vehicles at this location'. The selection of rock boulders at this location is aggressive and not appropriate.

Figure D 16: Landscaping at this location has introduced a number of safety risks

Source: Austroads (2019)

Figure D 17 shows an example of poor delineation of the edge of steps for descending pedestrians found during an existing road audit. There is a risk of pedestrian tripping or mis-stepping, which may also lead them into the path of vehicular traffic or in collision with other point objects present, with resultant personal injury.

Figure D 17: Hazardous provision of access steps

Source: ARRB.

Figure D 18 shows an inappropriately blunt temporary barrier end detected during an existing road audit. This is a significant risk to errant vehicles, particularly head-on/offset head-on collisions, on a road with an operating speed of at least 60–70 km/h and likely higher.

Figure D 18: An inappropriate usage of a temporary barrier system

Source: ARRB.

Figure D 19 and Figure D 20 show poor road marking provision at a location during an existing road audit which could have been detected during a design stage audit. There is a very real possibility of road users misinterpreting and/or being confused by the provision and what is expected of them, particularly at night-time and/or in adverse weather, with the risk of head-on, side and rear impacts.

Figure D 19: Obsolete line markings

Source: ARRB

Figure D 20: Obsolete line markings

Source: ARRB.

Figure D 21 is an example of where roadside structures have been found to obscure the vision of pedestrians (especially children) during an existing road stage audit on this crossing approach. This significantly increases the risk of pedestrian-vehicle incidents resulting in personal injury, even in what is a relatively low speed environment.

Figure D 21: Reduced/obscured sight lines at an urban interchange

Source: ARRB.

Figure D 22 shows where changes in the road surface height should be ramped to avoid trips and missteps by pedestrians, which would most likely result in personal injury. This scenario was detected during an existing road audit but should ideally have been detected during a design stage audit.

Figure D 22: Failure to provide ramps creates a safety risk at this location

Source: ARRB.

Figure D 23 shows where a detailed design or existing road audit would have detected how the introduction of the right turn lane for traffic coming towards the reader has fundamentally altered the school zone provision. This has increased the risk of head-on crashes at the location.

Figure D 23: Unsafe introduction of a right turn lane

Source: Transport for New South Wales.

Figure D 24 shows where a conflict with car doors can be foreseen on this cycleway provision. This scenario was detected during an existing road audit but should ideally have been detected during a design stage audit and an alternative provision identified. This would ideally physically separate vehicles (both parked and moving) from cyclists or allow a greater clearance between parked vehicles and the main run of the cycleway.

Figure D 24: Risks to cyclists were identified at this cycle way provision

Source: ARRB.

Figure D 25 shows where a crest has been identified immediately prior to an intersection being reached, which can obscure directional and other signage. There is an elevated risk of rear-end collisions. The risks associated with the presence of a pedestrian crossing beyond the crest are recognised to some degree through the provision of the pertinent warning sign, but an audit would need to determine whether the sign alone was sufficient and/or effective, and there is not an unacceptable level of risk of vehicle-pedestrian impacts at the crossing. There is considerable demand placed on the road user at this location, having to assimilate signage and determine their desired way ahead, at a location where there is also a crossing point with sub-optimum sight distance.

Figure D 25: A restricted sight line reduces visibility of traffic management signage

Source: ARRB.

Figure D 26 is an example of where an existing road audit has identified that road signage provision is obscured by the safety barrier provision. In this instance, the signage is in the form of curve alignment markers (CAMs) which are provided to warn and guide the road user. Not being able to detect the CAMs adequately increases the risk of a road user not recognising and adjusting to the curve, not least traveling through it at an inappropriate speed. This could result in run-off-road incidents, with the errant vehicle colliding with the barrier system. In the worst case, this in turn could lead to an errant vehicle being re-directed into the path on oncoming traffic resulting in head-on impacts.

Figure D 26: Provision of the safety barrier has obscured the visibility of existing signage

Source: ARRB.

Figure D 27 shows where an existing road audit has identified a scenario where the safety barrier system provided does not protect a pole (a significant point hazard) located immediately at the edge of the road. An errant vehicle has the risk of engaging head-on or collide in a side impact with the pole, with the potential for a severe outcome depending upon the speed of travel. Again, the preference would have been for this to have detected during a design stage audit and the pole removed or relocated behind the barrier, or with other alignment changes, the barrier placed in front of the point object.

Figure D 27: A pole (point object) which is not protected by the barrier system

Source: ARRB.

Figure D 28 shows where a night audit of an existing road audit has identified the ineffective removal of centreline marking. This introduces confusion and uncertainty and as a result elevates the level of risk of head-on collisions between opposing vehicles and/or collisions with vehicles in the parking spaces adjacent to the live traffic lanes.

Figure D 28: Obsolete line markings have not been properly erased or covered

Source: ARRB.

Figure D 29 shows where a ramped terminal end has been detected during an audit of this existing high-speed road. Additionally, the plant/machinery shown parked in the picture is not protected by the barrier. There is an elevated level of risk of either an errant vehicle impacting the ramped end of the barrier and being launched to collide with the parked plant/machinery, or a direct impact with the plant/machinery, with the potential for a fatal or serious injury crash.

Figure D 29: Issues with the location and type of the end of the barrier system

Source: Safe System Solutions Pty Ltd.

Figure D 30 shows the installation of a new directional sign in the middle of a shared path. There is a considerable risk of vulnerable road users deciding to avoid the sign and re-route into the live traffic lane, with potential for an impact with a vehicle/s. It is also foreseeable that a vulnerable road user may not perceive they have enough space and not wishing to enter the live traffic, incur the risk of a collision with the sign supports, which in turn could lead to personal injury.

Figure D 30: The poles of this sign prevent safe usage of the footway

Source: Safe System Solutions Pty Ltd.

Figure D 31 shows where scaffolding is protruding into/immediately next to an existing road and is also creating sight line issues. The risk of vehicular side-impacts at the intersection is significantly elevated, and as with Figure D 30 there is a real challenge presented to vulnerable road users in using the section of the footway impinged by the scaffolding and hoardings.

Figure D 31: Scaffolding introducing a hazard at this busy location

Source: Safe System Solutions Pty Ltd.

Figure D 32 shows how roadworks associated with an upgrade project can result in a road safety hazard at night if the road lighting coverage does not extend past the works i.e. in this example, the left slip lane is not visible past the limit of works and is not adequately illuminated or delineated. This is elevating the risk of rear-end vehicular impacts and vehicle-pedestrian incidents given the presence of the pedestrian crossing on the slip lane. This locality is receiving some secondary lighting from the traffic signals, which would be much reduced if these signals were updated to LED in the future.

Figure D 32: Sub-optimal lighting provision

Source: Transport for New South Wales.

Figure D 33 shows how a curve realignment at this location has left a misleading impression of the curve through different pavement textures and previous markings not being effectively removed and would be particularly prevalent in wet weather. The risk of run-off-road, offset head-on collisions and to some extent, side impacts, is elevated.

Figure D 33: Classic overshoot scenario detected during an existing road audit

Source: Transport for New South Wales.

Figure D 34 is an example of where a blackspot funded curve realignment and shoulder widening has taken place without the formation also being widened. This sort of action has tended to lead to sharper curves and steeper non-recoverable batters being created. The presence of non-frangible point objects (the trees) in the batter should also be formally risk assessed. It is considered that there is a much elevated risk of fatal or serious injury run-off-road crashes.

Figure D 34: Non-recoverable batter created/introduced at this road improvement scheme

Source: Transport for New South Wales.

Figure D 35 shows where an audit of an existing road has identified potential confusion/uncertainty of priority – do pedestrians or vehicles have right of way? Albeit in a low-speed environment, the provision nonetheless gives rise to an elevated risk of vehicle-pedestrian impacts and/or incidents involving other vulnerable road user groups.

Figure D 35: Unclear road user movement and priority has been created by this infrastructure provision

Source: Safe System Solutions Pty Ltd.

Figure D 36 shows a significant drop off (measured on site at 3.6 m wide, slope 44%, depth 1 m) at a location on an existing cycleway. There is an elevated level of risk of a vulnerable road user inadvertently entering/falling into the drainage facility resulting in significant personal injury.

Figure D 36: A significant drop located immediately adjacent to a cycleway

Source: Safe System Solutions Pty Ltd.

Figure D 37 shows the scene of an existing road audit. A point object (a pole) is located in the vicinity of a proposed intersection (entry point) to a new shopping centre (present to the right of this photograph). With this layout and speed environment, there is an elevated risk of a fatal or serious injury run-off-road crash, if an errant vehicle strikes the partially guided utility pole. This outcome can also result from an avoidance or post-impact manoeuvre related to the operation of the intersection e.g. a road user misjudges turning out of the intersection to travel into the picture and ends up immediately ahead of a vehicle traveling on the major leg, causing the latter to take evasive action to the left of the road and heading towards the pole.

Figure D 37: The partially guarded utility pole constitutes a risk to errant vehicles

Source: Central Coast Council.

Figure D 38 shows where a commercial access point has been provided which supports/allows inappropriate speed of entry and/or fails to inform that vehicular traffic should 'yield' to pedestrians at the crossing point. This significantly elevates the risk of a vehicle-vulnerable road user impact.

Figure D 38: A risk to pedestrians has been created by geometry and provision

Source: Victoria Walks LinkedIn page.

Appendix E Specimen Audit Brief

The specimen audit brief below is provided solely to illustrate the format, style, and coverage of such a document and can be adapted for local purposes. The assistance of MRWA in preparing this specimen brief is acknowledged.

An editable version can be secured from the Austroads website.

<<<insert company logo – audit client>>>

ROAD SAFETY AUDIT BRIEF

The completed brief was issued to: <<insert lead auditor name>>
<<insert lead auditor's organisation>>
<<insert lead auditor's personal & organisation contacts>>

This Road Safety Audit (RSA) is to be conducted in accordance with the Austroads *Guide to Road Safety Part 6 – Road Safety Audit* (2021) and <<insert title/ref of applicable local strategy/policy>>.

The results of the audit and associated recommendations shall be reported on <<insert title/ref of road safety audit report template>>.

A. Project details (to be completed by the client / client team)	
RSA stage	
Project name:	
Project location:	
Project description:	
Project number / task number:	
B. Client / client team contact details	
Dept./ organisation:	
Contact name:	
Contact telephone no.	
Contact e-mail address:	
Date this audit is required by:	

C. Previous RSA undertaken				
Previous RSA undertaken:	Yes/No			
Stage/s of previous RSA/s:				
Date of previous RSA/s:				
Dept./organisation of previous RSA/s:				
Contact name/s:				
Previous audit team leader/s:				
Copy of RSA report/s provided:	Yes/No:			
D. Previous Safe System Assessments (SSAs) undertaken				
Previous SSAs undertaken:	Yes/No:			
Life cycle stage of previous SSA/s:				
Date/s of previous SSA/s:				
Dept./organisation of previous SSA/s:				
Contact name/s				
Previous lead assessor/s:				
Copy of SSA/s provided:	Yes/No			
E. Project information				
Project objective/s?				
Design speed & design vehicle?				
Proposed/posted speed limit?				
Guidance/standards adopted in design and any departures:				
Existing traffic flows available?	Yes/No	Volume/s & date/s:		
Forecast traffic flows available?	Yes/No	Volume/s & date/s:		

Crash data available?	Yes/No	Time period:
Speed survey data available?	Yes/No	Time period:

F. List of documents supplied			
Doc ref./version	Document title	Scale	Date

Audit requested by Print name, signature:		Date:	

To be completed by lead auditor	
Date request received:	
Audit ref. allocated	
Lead auditor Print name, signature & accreditation ref/no.	
Other audit team members Print names & provide accreditation ref/s / no./s	

Appendix F Specimen Audit Findings Proforma and Audit Report

This Appendix contains an example of an audit findings proforma (with accompanying case study), and a specimen audit report. An editable version of both documents can be secured from the Austroads website.

F.1 Example Audit Finding Proforma (Top Table) and Case Study Learning Example (Bottom Table)

Audit results Audit finding ref.	Audit finding (risk/hazard, extent, crash type)	Risk level	Recommendation/s	Client response	
				Accept Yes/No	Action/comments

This learning example shows how the case study in Section 5.1 of the Guide is ultimately recorded using the example proforma above.

Audit results Audit finding ref.	Audit finding (risk/hazard, extent, crash type)	Risk level	Recommendation/s	Client response	
				Accept Yes/No	Action/comments
Intersection 001	The right-turn lane from Main Road into Side Road is not wide enough to adequately store right turning vehicles, which could result in encroachment into the same direction traffic lane while either performing the turning manoeuvre or waiting in the lane, especially if more than one vehicle is queuing. This will increase potential for sideswipe or rear end crashes, particularly in wet weather and at night. The traffic volumes are high, it is in a 60 km/h speed zone and the risk identified can result in minor injuries & vehicular damage.	Likelihood – Likely Severity – Minor Risk Rating – Medium (within the Safe System)	Increase the width of the right-turn lane. The Austroads *Guide to Road Design* states that the minimum traffic lane width should be 3.3 m. This is a Safe System supporting treatment. The Risk rating of medium indicates that this risk should be corrected or the risk significantly reduced, if the treatment cost is moderate, but not high.		

F.2 Example Audit Report

<<Insert audit client organisation name and logo>>

Road Safety Audit Report
<<insert stage/audit type>>
<<insert audit location>>

Audit reference: <<insert local reference>>

Prepared for: <<insert audit client name & organisation>>
By: <<Insert lead auditor and their organisation | Report issue date: <<insert date>>

<<Insert audit client organisation and logo>>

Table of Contents

[<<insert audit ref. no.>>]

<<Insert audit client organisation and logo>>

1 INTRODUCTION

1.1 Scope

This Road Safety Audit (RSA) has been conducted in accordance with the Austroads *Guide to Road Safety Part 6: Road Safety Audit* (2021) and in accordance with the requirements contained in the <<insert audit client organisation name>> <<insert name/ref to local audit strategy/policy>>>.

This report results from a <<audit stage/type>> RSA carried out at the following location - <<insert project or existing road location, as applicable>>.

Background information on the project/existing road <<delete as required>> is contained within the following documents <<insert list of information supplied by the client, including the audit brief, here or if preferred, reference and include as an Appendix>>.

This audit was undertaken by a team led by <<insert name of lead auditor>> of <<insert name of organisation of lead auditor>> in compliance with the audit brief.

All the risks/hazards identified in Section 2 of this report require action in order to improve the safety of the proposed project/existing road <<delete as applicable>> and to minimise the risk of crash occurrence and reduce potential crash severity.

The audit team has examined and reported only on the road safety implications of the project as presented and has not examined or verified the compliance of the design to any other criteria.

1.2 The audit team

Auditor ref no.	Name	Role	Organisation
[Insert here]	[Insert name]	Lead auditor	[Enter name of organisation]
[Insert here]	[Insert name]	Auditor	[Enter name of organisation]

<<as applicable – add additional rows to incorporate auditor names>>

<<include details of the any trainee auditors – delete if not applicable>>

A listing of any specialist advisors and key stakeholders is provided as sub-section 1.3. <<delete if not applicable>>

The audit team visited the site on [<<insert date>>] at [<<insert time, suggest use 24hr clock>>]. At the time of the site visit it was in daylight, the ambient conditions were [<<insert ambient lighting and weather conditions>>] and the existing road surface was [<<insert prevailing road conditions>>].

<<Insert audit client organisation and logo>>

A night-time site visit was also undertaken on [<<insert date>>] at [<<insert time, suggest use 24hr clock>>]. At the time of this site visit the weather was [<<insert ambient lighting and weather conditions>>] and the existing road surface was [<<insert prevailing road conditions>>].

1.3 Specialist Advisors and Key Stakeholders

<<delete sub-section of not applicable>>

Other persons present during the <<<insert day and/or night>> audit/s were:

Name	Role/status	Job title and organisation
[Insert name]	[Insert role/status, e.g. specialist advisor/key stakeholder]	[Insert job title and organisation]
[Insert name]	[Insert role]	[Insert job title and organisation]
[Insert name]	[Insert role]	[Insert job title and organisation]

<<add additional rows, as required>>

1.4 Safe System and RSA

<<<Unless specified otherwise within the audit brief>>> This audit has focused on the specific crash types that are known to result in higher severity outcomes at relatively lower speed environments to meet Safe System requirements of reducing the risk of fatal and serious injury crashes.

<<insert local note on how this is to be achieved – inc. front loaded prompt lists>>

1.5 Previous RSA

It was advised that a <<insert stage>> audit <<insert audit ref.>> was undertaken by <<insert organisation of lead auditor>> in <<insert month and year>>

<<capture all previous RSAs undertaken>>

The items raised in the earlier report/s have been considered by the audit team as part of this subsequent audit unless stated below.

<<insert any exceptions here>>

<<Insert audit client organisation and logo>>

1.6 Background data

1.6.1 Crash history

A basic study of the recent crash history has been conducted in the vicinity of this audit for the <<insert local policy>> year period between <<insert date range>>. This showed that there were <<insert total number>> of reported crashes within the extracted data which is summarised below:

- [details of crash analysis – crash type groupings / severity / common factors etc];

1.6.2 Traffic and speed data

A summary of recent traffic data is provided below:

Location	Vehicles per day (% heavy vehicles)	Date	Source of data
<<insert road name, site reference / section number etc>>	<<insert number>> (%)	<<insert time period / date>>	<<insert>>

A summary of recent speed data is provided below:

Location	Average speed (km/h)	85th percentile speed (km/h)	Date	Source of data
<<insert road name, site reference / section number etc>>	<<insert value>>	<<insert number>>	<<insert time period / dates>>	<<insert>>

1.7 Appendices

Appendix A – Audit findings location plan

Appendix B – Audit findings table

Appendix C - Audit photographs

Appendix D – Crash reports

<<add specific items to rear of this document>>

<<Insert audit client organisation and logo>>

2 AUDIT TEAM STATEMENT

I hereby certify that the audit team as identified within this report has examined the documents provided and have inspected the site in undertaking this RSA. I also confirm that this audit has been carried out independently of the designer/s in accordance with the Austroads *Guide to Road Design Part 6: Road Safety Audit* (2021) and in accordance with the local <<insert organisation, name of audit strategy/policy doc, inc. version/year of doc.>>.

The audit has been carried out for the sole purpose of identifying any risks found within the <<insert subject e.g. design, existing road etc.>> which could be mitigated to improve the safety of the project. The risks and associated recommendations and mitigation measures have been recorded this report for consideration by the client for implementation.

Lead auditor

[<<insert name>> please print]

[<<insert any auditor registration ref., no.r>>]

[<<insert lead auditor's organisation>>]

[<<insert contact details – mobile number and e-mail address for lead auditor>>]

{<lead auditor to insert signature and date below>>

Signature

Date

5

[<<insert audit ref. no.>>]

<<Insert audit client organisation and logo>>

Disclaimer:

This report contains findings and recommendations based on examination of the site and/or relevant documentation. The report is based on the conditions viewed on the day/time of each site inspection/s and is relevant at the time of production of the report. While the information and data provided in this report has been prepared with due care by members of the audit team, the team cannot guarantee its accuracy.

Readers should not solely rely on the contents of this report or draw inferences to other sites. Users must seek appropriate expert advice in relation to their own particular circumstances.

The audit team does not warrant, guarantee or represent that this report is free from errors of omissions or that the information is exhaustive. Information contained within may become inaccurate without notice and may be wholly or partly incomplete or incorrect. Before relying on the information in this report, users should carefully evaluate the accuracy, completeness and relevance of the data for their purposes.

Subject to any responsibilities implied in law which cannot be excluded, the audit team is not liable to any party for any losses, expenses, damages, liabilities or claims whatsoever, whether direct, indirect or consequential, arising out of or referrable to the use of this report, however caused whether in contract, tort, statute or otherwise.

Appendix G Example Auditor Code of Conduct

The example given below is based on the current auditor code of conduct, developed by Main Roads Western Australia (MRWA) and the Institute of Public Works Engineers (IPWEA) Western Australia.

An editable version of the example can be secured from the Austroads website.

Some jurisdictions include the code of conduct within their local RSA strategy/policy document.

SPECIMEN CODE OF CONDUCT (CoC) FOR ROAD SAFETY AUDITORS

1. Purpose

This CoC outlines the professional and ethical standards, responsibilities, and commitments that auditors are required to meet and maintain in carrying out their professional work. It is an essential item, as the on-going contribution and standing of RSA and auditors depend on the technical and ethical excellence demonstrated by all auditors.

It is vital that every auditor, regardless of seniority / level:

- personally respects and adheres to the principles expressed in this CoC,
- encourages and support adherence by other auditors, both generally (as a profession) and directly (as colleagues on an audit team).

Compliance with the provisions of this CoC is a requirement of registration as an accredited auditor in <<insert state/territory/local jurisdiction>> Auditors who do not follow the provisions of this CoC, or engage in gross misconduct, may have their accreditation revoked by <<<<insert accreditation body>>>> upon determination by its <<<insert appropriate governance team>>> in accordance with <<<insert relevant local guidance/procedure>>>.

It is important to remember that the conduct and findings of audits can have legal ramifications, which can ultimately result in proceedings against <<insert audit client organisation>>.

2. General principles

Auditors shall always be committed to the general principles of:

2.1 acting in the interest of all road users [including vulnerable and the (vision and ambulatory) impaired];
2.2 operating only within their competency and field of expertise;
2.3 upholding the dignity of their professional role; and
2.4 independence - not engaging (ideally) or advising promptly (minimum) of any activities or issues that could constitute a conflict of interest.

3. Core responsibilities

Auditors shall:

3.1 place the safety of all road users and the community before all other interests.

3.2 carry out their work in a careful and diligent manner in accordance with recognised industry and local guidelines, standards and practices and shall express opinions, make statements, or give evidence with fairness and honesty and on the basis of their competency.

3.3 when fulfilling the lead auditor role, that auditor must ensure that the audit team includes accredited auditor with the relevant competency to undertake the audit in hand and are independent of a design (for new projects) or management (of an existing road) being audited.

3.4 actively avoid conducting audits where they are the only accredited auditor.

3.5 ensure that the audit identifies immediate road safety hazards and report them to the pertinent responsible body as a matter of urgency. Other road safety issues that are likely to impact on the specific project or road being audited are also to be identified during the audit and reported, even if these are located beyond the boundary of the section of road to be audited or are beyond the scope set by the client within the audit brief. (nb. such issues may be reported outside of the formal audit report)

3.6 ensure that audits include a site inspection wherever practicable, and that where relevant, the site is inspected during specific traffic conditions such as peak periods, school commencement and conclusion times. Road environmental issues such as wet, dry, day, night, sunrise, and sunset must be taken into consideration even if not experienced firsthand.

3.7 inform the client/client team of the audit findings and recommendations and where appropriate, the potential consequences if corrective actions are not initiated..

3.8 understand and acknowledge that in the event of legal proceedings requiring attendance at court or tribunal by the pertinent auditor/s, that they have an overriding duty to assist on technical matters relevant to their competency, and that they shall not act as advocates for the body engaging them.

3.9 actively update and enhance their competency in road safety auditing and road and traffic engineering and related disciplines (including relevant guidelines etc.)

3.10 keep a record of, and where required, register, the details of all audits, including;

i. location and project name and type;
ii. client name and contact details;
iii. date of site visit; and
iv. composition of audit team (names, contact details etc).

3.11 fully cooperate with the investigation of any complaints against an auditor or audit team, as set out in the <<<<insert audit client organisation and/or pertinent auditor registration body>>> complaints procedure.

4. Acceptance of the CoC

As an accredited road safety auditor I will;

4.1 uphold and promote the general principles and core responsibilities of this CoC.

4.2 recognise and treat violation of any provision of this CoC as inconsistent with the professional and ethical standards expected of an auditor.

Name (please print)

Signature

Auditor reference no.(if applicable)

Date

Witnessed by:

Name (please print)

Signature

Date

Appendix H Prompt Lists

H.1 Principles

Audit prompt lists (termed audit check lists in previous versions of this Guide) are recognised as a useful practical tool in assisting auditors (especially those with limited experience) in the identification of risks and hazards during various stages of audit and across a range of scenarios. Notwithstanding they are only intended to be an aid and should not be relied upon to be inclusive, nor is all of the standard content applicable to all projects. Rigidly auditing to prompt lists (often described as a 'tick box approach') serves no purpose or value. Prompt lists should not be reproduced in the audit report.

To prepare the current prompt lists, previous examples from Austroads *Guide to Road Safety Part 6A* (2019) and the Safe System Assessment Framework guidelines have been reviewed and updated and enhanced, where possible, utilising a range of resources[15].

An approach known as **front loading** has been adopted to remind auditors to:

- apply Safe System thinking
- give consideration to vulnerable road user groups, and
- be cognisant of changing road environments in accordance with sustainable transport and Movement and Place principles.

Front loading requires site information (such as traffic composition, volumes, and the speed environment) and design parameters to be collated and considered in response to a series of questions across several headings. However, the process must not be seen as exhaustive in the consideration of Safe System principles, nor is it a substitute for Safe System training and experience.

The second part of the prompt lists contains category/feature prompts by audit stage. The auditor will then tick any/all applicable questions.

Inclusion of prompt lists in this Guide does not preclude organisations and/or individual auditors from adding items and/or developing their own local lists. As auditors become more experienced, their reliance upon prompt lists is likely to decrease. However, they can still serve as a useful check upon completion of a site visit and/or initial drafting of the audit report to ensure that all aspects of the audit brief and the project or existing road itself have been considered. It is more advantageous to detect any omissions at this point than to have to revisit a site or in the worst case, hand over an incomplete report or a report that has not considered all relevant issues.

Further revisions to the prompt lists provided within this Guide are likely to be required to fully reflect the influx of Intelligent Transport Systems (ITS) and automated vehicles.

Further guidance on the undertaking of thematic audits (road user specific) is included in Appendix I.

15 Including: the Highways England RSA standard GG119 (Highways England 2019); Safe System Checklists from TfNSW and TMR Qld; and Austroads network level safety principles.

Prompt lists for construction/temporary traffic management sites have not been provided within this Guide. Information can be found in Austroads guidance relating to temporary traffic management (Austroads 2021e).

H.2 Prompt List for Front Loading

Table H 1 below has been developed as an example prompt list for front loading, applicable to new build and infrastructure modification projects.

Table H 1: Prompt list for front loading, applicable to new build and infrastructure modification projects

Objectives of the project/network considerations	Audit team observations/comments (Yes/No, as applicable, plus text as required)
What is/are the reason/s for the project?	
Is there a specific risk of a crash type/s with the most severe likely outcomes? (e.g. run-off-road and head-on)	
If so, what are the causal factors of this crash type and how are they going to be addressed?	
Does the project reduce exposure, likelihood, and/or severity of the crash types identified above?	
Does the project address specific issues such as poor speed limit compliance, road access, congestion, future traffic growth, freight movement, amenity concerns from the community, maintenance/asset renewal, etc?	
Have operating speeds and impact angles been managed to minimise crash energy?	
Have the needs of all vulnerable road user groups been adequately considered?	
Does the project fit strategically within the overarching objectives or strategy pertinent to the network/link?	

Objectives of the project/network considerations	Audit team observations/comments (Yes/No, as applicable, plus text as required)
Has consultation been undertaken with key internal and external stakeholders, e.g. regarding potential impacts of the project?	
Were Safe System principles considered and addressed during the planning/conceptual design phase? (e.g. has an SSA been done?)	
Were road safety data, crash reports, and road safety engineering toolkits etc. considered during the planning and design stages?	
Have incremental safety principles been planned/applied?	
Does the project encourage road users to be alert and compliant, as well as aiming to reduce the severity of crashes through protective infrastructure treatments, speed reductions and vehicle/safety features?	
Has specific 'road safety expertise' been engaged during the planning and/or design of the project and the procurement requirements of contractors (if applicable)?	
Have there been any changes to the scope of the project or original design which do not align with the safe system approach?	
Have there been any design exceptions identified and applied (e.g. Extended Design Domain) and if so, have safety measures been implemented in ongoing operational and maintenance plans etc?	
Is the project consistent with the safety vision for the corridor in which it is located?	
Have decisions regarding the design standards and guidelines to be applied been taken with consideration of the complete corridor in which the project is located, as part of sustainable network safety planning	

Objectives of the project/network considerations	Audit team observations/comments (Yes/No, as applicable, plus text as required)
How does the design/project consider key aspects at macro/context level as well as at the specific micro (project specific) level? For example: • is the context appropriate – is the site appropriate within the wider/bigger picture – corridor and network? • will the project be self-explaining within the corridor? • is there strategic alignment of the project with network and corridor plans and visions? • is the project maximising the safety value contribution to the network or is it obligating more effort in lieu of other locations? • is the design sustainable over say 10 years and achieve a self-explaining result over that period? • are the project parameters (e.g. operating speed) aligned to the corridor and the level of risk at the location? • is the level of risk of the project higher or lower than other locations – and is the design appropriate when this is considered?	

It is suggested that in using the following prompt lists (Table H 2 to Table H 6 inclusive), auditors tick off the questions that apply using the boxes provided, before recording any notes and/or findings on the audit findings proforma (Appendix F.1).

H.3 Prompt List covering Local Alignment

Table H 2: Prompt list covering local alignment issues

Feasibility (concept)	Preliminary design	Detailed design	Pre-opening	Existing roads (post-opening)
Visibility				
☐ Are all aspects associated with the location of the route and/or its alignment safe?	☐ Are horizontal and vertical alignments consistent with required visibility?	Are sight lines obstructed by: ☐ safety fences; ☐ boundary fences; ☐ street furniture; ☐ parking facilities; ☐ signs;	☐ Are the sight lines clear of obstruction?	☐ Is sight distance adequate for the speed of traffic using the route?

Feasibility (concept)	Preliminary design	Detailed design	Pre-opening	Existing roads (post-opening)
☐ If the route follows existing roads what are the effects of this? ☐ If the route is in 'green fields' (undeveloped corridor), is the alignment safe? Could it be safer? ☐ Does the scheme fit in with the physical constraints of the landscape? ☐ Does the scheme take account of major network considerations? ☐ Have all harmful safety effects of this scheme upon the surrounding road network been identified? Have they been adequately dealt with? Is sight distance generally satisfactory: ☐ at intersections? (if not, what implications?) ☐ at entry and exit ramps? ☐ at property entrances? ☐ at emergency vehicle access points?	☐ Will sight lines be obstructed by permanent or temporary features e.g. bridge abutments and parked vehicles?	☐ landscaping; ☐ structures; ☐ environmental barriers; ☐ crests; ☐ features such as buildings, plant, or materials outside the highway boundary? ☐ Is the forward visibility of at-grade crossings sufficient to ensure they are conspicuous?		☐ Is adequate sight distance provided for intersections and crossings? (for example, pedestrian, cyclist, cattle, railway) ☐ Is adequate sight distance provided at all private driveways and property entrances? ☐ Are there any visual clues which give a false impression of the vertical or horizontal geometry, including the presence of intersections? Is the horizontal and vertical alignment suitable for the (85th percentile) traffic speed? If not: ☐ are warning signs installed? ☐ are advisory speed signs installed? ☐ Are the posted advisory speeds for curves appropriate? ☐ Is the speed limit compatible with the function, road geometry, land use and sight distance? ☐ Are safe overtaking opportunities provided? Is the road free of elements that may cause confusion? For example:

Feasibility (concept)	Preliminary design	Detailed design	Pre-opening	Existing roads (post-opening)
☐ Are there any curves which are compliant but are obviously out of character with those curves adjacent/close to it?				☐ is alignment of the roadway clearly defined? ☐ has disused pavement (if any) been removed or treated? ☐ have old pavement markings been removed properly? ☐ do tree lines follow the road alignment? ☐ does the line of streetlights or the poles follow the road alignment? ☐ Is the road free of misleading curves or combinations of curves? ☐ Are medians and islands of adequate width for the likely users? ☐ Are traffic lane and carriageway widths adequate for the traffic volume and mix? ☐ Are bridge widths adequate? ☐ Are shoulders wide enough to allow drivers to regain control of errant vehicles? ☐ Are shoulders wide enough for broken-down or emergency vehicles to stop safely? ☐ Are shoulders sealed?

Feasibility (concept)	Preliminary design	Detailed design	Pre-opening	Existing roads (post-opening)
				☐ Are shoulders trafficable for all vehicles and road users? (i.e. are shoulders in good condition) ☐ Is the transition from road to shoulder safe? (no drop-offs) ☐ Is appropriate superelevation provided on curves? ☐ Is any adverse crossfall safely managed (for cars, trucks, etc.)? ☐ Do crossfalls (carriageway and shoulder) provide adequate drainage? ☐ Are batter slopes traversable by cars and trucks that run off the road?
New/existing road interface				
☐ Are all sections/transitions where the proposed road scheme connects with the existing network free of potential problems? ☐ Have any railway level crossings been identified and are they treated adequately? ☐ Have other distractions (for example, low-flying aircraft, advertising, etc.) been adequately dealt with?	☐ Will the proposed project be consistent with the standard of provision on adjacent lengths of road and if not, is this made obvious to the road user? ☐ Does interface with other roads occur near any potential hazard, i.e. crest, bend after steep gradient?	☐ Where a new road joins an existing road, or where an on-line improvement is to be constructed, will the transition give rise to potential hazards? ☐ Where the road environment changes (e.g. urban to rural, restricted to unrestricted) is the transition made obvious by appropriate signing and carriageway markings?	☐ Is there a need for additional signs and/or road markings?	☐ Where another road joins does this give rise to potential hazards? ☐ Where the road environment changes (e.g. urban to rural, restricted to unrestricted) is the transition made obvious by appropriate signing and carriageway markings? ☐ Have safe run-off areas been provided where high speed merges are present or there are other conflict points?

Feasibility (concept)	Preliminary design	Detailed design	Pre-opening	Existing roads (post-opening)
☐ Has the potential of the location to attract roadside stalls been considered? ☐ Have all unusual or hazardous conditions associated with special events been considered?				

H.4 Prompt List covering General Aspects

Table H 3: Prompt list covering general aspects

Feasibility (concept)	Preliminary design	Detailed design	Pre-opening	Existing roads (post-opening)
Departures from Standards				
☐ What are the road safety implications of any approved departures from standards or relaxations?	☐ What are the road safety implications of any approved departures from standards or relaxations?	☐ Consider road safety aspects of any departures granted since the preliminary design stage	☐ Are there any adverse road safety implications of any departures from standard granted since the detailed design stage?	
Cross-sections and cross-sectional variation				
	☐ How safely do the cross-sections accommodate drainage, ducting, signing, fencing, lighting, and pedestrian and cycling routes? ☐ Could the scheme result in the provision of adverse camber?			

Feasibility (concept)	Preliminary design	Detailed design	Pre-opening	Existing roads (post-opening)
	☐ What are the road safety implications if the standard of the proposed scheme differs from adjacent lengths of highway?			
Landscaping/Environmental				
☐ Is the surrounding terrain free of physical or vegetation defects which could affect the safety of the scheme? (for example, heavy planting, forestry, deep cuttings, steep or rocky bluffs which constrain the design) ☐ Has safety been considered in the location of environmental features? (for example, noise fences) ☐ Does the scheme deal adequately with potential animal conflicts? (for example, kangaroos, wombats, cattle, etc.) ☐ Are visual distractions (for example, scenic vistas) adequately dealt with? (for example, by providing areas for people to stop safely) ☐ Has the issue of unstable country been considered? (for example, mine subsidence)	☐ Could areas of landscaping conflict with sight lines (including during windy conditions)? ☐ Has consideration been given to weather records or local experience that may indicate a particular problem? (for example, snow, ice, wind, fog)	☐ Could planting (new or when mature) encroach onto the carriageway or obscure signs or sight lines (including during windy conditions)? ☐ Could earth embankments obscure signs or visibility? ☐ Could trees (new or when mature) be a hazard to an errant vehicle? ☐ Could planting affect lighting or shed leaves on to the carriageway?	☐ Could planting obscure signs or sight lines (including during periods of windy weather)? ☐ Do earth embankments obscure signs or visibility? ☐ Could trees (new or when mature) be a potential hazard to an errant vehicle? ☐ Could planting affect lighting or shed leaves onto the carriageway?	☐ Is landscaping in accordance with guidelines? (for example, clearances, sight distance) ☐ Will existing clearances and sight distances be maintained following future plant growth? ☐ Does the landscaping at roundabouts avoid visibility problems?

Feasibility (concept)	Preliminary design	Detailed design	Pre-opening	Existing roads (post-opening)
Climatic conditions				
☐ Do the gradients, curves and general design approaches fit in with the likely weather or environmental aspects of the terrain? (for example, fog-prone areas) ☐ Will the scheme perform safely at night when it is wet, or there is fog? ☐ Has the issue of providing lighting for the design been considered?		☐ Is there a need for specific provision to mitigate effects of fog, wind, sun glare, snow, and ice?	☐ Are any extraordinary measures required?	☐ Are climatic conditions giving rise to any safety related risks or hazards, and if so, is any mitigation effective?
Drainage				
☐ Does drainage facilities appear to be adequate?	☐ Will the new road drain adequately, or could areas of excess surface water result? ☐ Could excessive water drain across the highway from adjacent land?	☐ Do drainage facilities appear to be adequate? ☐ Are features such as utility covers located within footpaths, cycle routes or equestrian routes? ☐ Are features such as utility covers or gratings located in the likely wheel tracks for motorcyclists or cyclists? Do they give concern for motorcyclist/cyclist stability? ☐ Is surface water likely to drain across a carriageway and increase the risk of aquaplaning under storm conditions?	☐ Does drainage of roads, cycle routes and footpaths appear adequate? ☐ Are drainage features such as utility covers located within footpaths, cycle routes or equestrian routes? ☐ Are features such as utility covers or gratings located in the likely wheel tracks for motorcyclists or cyclists? Do they give concern for motorcyclist/cyclist stability?	☐ Are roadside drains and culvert end walls traversable? ☐ Are all sections of the route free from ponding or flow across the road during wet weather? ☐ If there is ponding or flow across the road during wet weather, is there appropriate signposting? ☐ Are floodways and causeways correctly signposted? ☐ Are all culverts or drainage structures located outside the clear roadside recovery area? ☐ If not, are they shielded from the possibility of vehicle collision?

Feasibility (concept)	Preliminary design	Detailed design	Pre-opening	Existing roads (post-opening)
Stopping areas				
☐ Has adequate provision been made for vehicles to stop off the carriageway including rest and picnic areas?	☐ Has adequate provision been made for vehicles to stop off the carriageway including rest and picnic areas? ☐ How will parked vehicles affect sight lines? ☐ Could stopping areas be confused with intersections? ☐ Is the stopping area located in a safe location (e.g. away from vertical crests or tight horizontal alignments with limited visibility)?	☐ Have stopping areas been positioned safely? ☐ Could parked vehicles obscure sight lines? ☐ Are stopping areas adequately signed? ☐ Are rest and picnic areas properly segregated from vehicular traffic?		
Public utilities				
☐ Will utility infrastructure/equipment introduce safety issues?	☐ Could utility infrastructure/equipment be struck by an errant vehicle? ☐ Could utility infrastructure/equipment obscure sight lines?	☐ Can maintenance vehicles stop clear of traffic lanes? If so, could they obscure signs or sight lines? ☐ Is utility infrastructure/equipment located in safe positions away from locations that may have a high potential of errant vehicle strikes? ☐ Does infrastructure/equipment interfere with visibility? ☐ Has sufficient clearance to overhead cables been provided? ☐ Have any special accesses/parking areas been provided and are they safe?	☐ Can maintenance vehicles stop clear of traffic lanes? If so, could they obscure signs or sight lines? ☐ Is utility infrastructure/equipment located in safe positions away from locations that may have a high potential of errant vehicle strikes? ☐ Does infrastructure/equipment interfere with visibility? ☐ Have any special accesses/parking areas provided safe? ☐ Are there any utility inspection chambers in live traffic lanes and/or wheel tracks?	

Feasibility (concept)	Preliminary design	Detailed design	Pre-opening	Existing roads (post-opening)
		☐ Are there any utility inspection chambers in live traffic lanes and/or wheel tracks including those of motorcyclists or cyclists? Do they give concern for motorcyclist/cyclist stability?	☐ Has any loose material around utility covers or gratings located in the verge been compacted down and made level with the surrounding ground?	
Access				
	☐ Can all accesses be used safely? ☐ Can multiple accesses be linked into one service road? ☐ Are there any conflicts between turning and parked vehicles?	☐ Is the visibility to/from accesses adequate? ☐ Are the accesses of adequate length to ensure all vehicles clear the main carriageway? ☐ Do all accesses appear safe for their intended use?	☐ Is the visibility to/from accesses adequate? ☐ Are the accesses of adequate length to ensure all vehicles clear the main carriageway?	☐ Is the visibility to/from accesses adequate? ☐ Are the accesses of adequate length to ensure all vehicles clear the main carriageway?
Surfacing/surface friction/skid resistance				
		☐ Are there locations where high friction surfacing (such as on approaches to junctions and crossings) would be beneficial? ☐ Do surface changes occur at locations where they could adversely affect motorcycle stability? ☐ Is the colour of any high friction surfacing appropriate?	☐ Do any joints in the surfacing appear to have excessive bleeding or low friction? ☐ Do surface changes occur at locations where they could adversely affect motorcycle stability?	☐ Is the condition of the pavement edges satisfactory? ☐ Is the transition from pavement to shoulder free of dangerous edge drop offs? ☐ Is the pavement free of defects (for example, excessive roughness or rutting, potholes, loose material, etc.) that could result in safety problems (for example, loss of steering control)?

Feasibility (concept)	Preliminary design	Detailed design	Pre-opening	Existing roads (post-opening)
				☐ Does the pavement appear to have adequate skid resistance, particularly on curves, steep grades, and approaches to intersections? ☐ Has skid resistance testing been carried out where necessary? ☐ Is the pavement free of areas where ponding or sheet flow of water could contribute to safety problems? ☐ Is the pavement free of loose stones and other material e.g. fallen leaves, nuts/seeds, branches?
Emergency vehicles				
	☐ Has provision been made for safe access and egress by emergency vehicles?	☐ Has provision been provided for safe access and egress by emergency vehicles?		☐ Is provision for emergency vehicles unhindered and effective?
Agriculture				
☐ Are there any adjoining agricultural areas? Have the safety implications of this been adequately considered?		☐ Have the needs of agricultural vehicles and plant been taken into consideration (e.g. room to stop between carriageway and gate, facilities for turning on dual carriageways)? ☐ Are such facilities safe to use and are they adequately signed?		☐ Is adjoining agriculture having an adverse effect on road safety? If any mitigation measures have been affected, are they effective?

Feasibility (concept)	Preliminary design	Detailed design	Pre-opening	Existing roads (post-opening)
Fences and safety barriers				
	☐ Is there a need for safety barriers to protect road users from signs, gantries, parapets, abutments, steep embankments, or water hazards?	☐ Is there a need for safety barriers to protect road users from signs, gantries, parapets, abutments, steep embankments, or water hazards? ☐ Do the safety barriers provided give adequate protection? ☐ Are the safety barriers provided long enough? ☐ Are specific barrier systems required for motorcyclists? ☐ If there are roads on both sides of the fence is an interlocking-design necessary to prevent impalement on impact?	☐ Is the safety barrier system adequate? ☐ In the case of boundary fencing, are the rails placed on the non-traffic side of the posts? ☐ Have specific barrier systems been provided for motorcyclists?	☐ Is the safety barrier system provided appropriate and well maintained? ☐ In the case of boundary fencing, are the rails placed on the non-traffic side of the posts? ☐ Have specific barrier systems been provided for motorcyclists?

Feasibility (concept)	Preliminary design	Detailed design	Pre-opening	Existing roads (post-opening)
Adjoining/adjacent development				
☐ Will adjoining/adjacent development cause interference/confusion?	☐ Does adjoining/adjacent development cause interference/confusion? (e.g. lighting or traffic signals on adjacent roads may affect a road user's perception of the road ahead) ☐ Is screening required to avoid headlamp glare between opposing carriageways, or any distraction to road users?	☐ Has screening been provided to avoid headlamp glare between opposing carriageways, or any distraction to road users? ☐ Are there any safety issues relating to the provision of environmental barriers or screens?	☐ Have environmental barriers been provided and do they create a potential hazard?	☐ Are adjoining/adjacent development causing interference/confusion such that road safety is adversely affected?
Basic design principles				
☐ Is the proposed concept appropriate for the predicted level of use for all road users?	☐ Are the overall design principles appropriate for the predicted level of use for all road users?			
Bridge parapets				
		☐ Are parapet heights appropriate for the adjacent road user groups?	☐ Is the projection of any attachment to the parapet likely to be struck by road users?	☐ Are bridge parapets well maintained and adequately protected?
Specific/Vulnerable Road Users				
☐ Does the concept provide specific consideration of vulnerable groups? (i.e. the young, older users, mobility and visually impaired, motorcyclists.)	☐ Is specific provision required for vulnerable groups? (i.e. the young, older users, mobility and visually impaired, motorcyclists.)	☐ Are gradients appropriate for mobility scooters? ☐ Are timings at controlled crossings sufficient for all users?	Are the following adequate for specific and vulnerable groups? ☐ visibility; ☐ signs; ☐ surfacing; ☐ other guardrails; ☐ drop kerbing/flush surfaces; ☐ tactile paving;	☐ Are the measures provided for specific/vulnerable road users effective and well maintained?

Feasibility (concept)	Preliminary design	Detailed design	Pre-opening	Existing roads (post-opening)
		☐ Do surface changes or excessive use of carriageway markings occur at locations where they could adversely affect motorcycle stability? ☐ Are specific barrier systems required for motorcyclists? ☐ Are features such as traffic calming, utility covers or gratings located in the likely wheel tracks for motorcyclists or cyclists? Do they give concern for motorcyclist/cyclist stability?	☐ gradients; ☐ lighting levels; ☐ restraint systems; ☐ positioning of utility covers/gratings.	☐ Does adjoining landscaping and/or vegetation lead to items being on the surface that can impinge upon the safety of a vulnerable road user (e.g. make the surface particularly slippery for a young or ageing pedestrian or cyclist)

H.5 Prompt List covering Intersections

Table H 4: Prompt list covering intersections

Feasibility (concept)	Preliminary design	Detailed design	Pre-opening	Existing roads (post-opening)
Layout				
Are all aspects of intersections (for example, spacing, type, layout, etc.) appropriate with respect to: ☐ the broad concept of the project ☐ the function of this road and intersecting roads ☐ the traffic mix on this road and intersecting roads	☐ Is provision for right turning vehicles required? ☐ Are acceleration/deceleration lanes required? ☐ Are splitter islands required on minor arms to assist pedestrians or formalise road users' movements to/from the intersection? ☐ Are there any unusual features that affect road safety?	☐ Are the intersections and accesses adequate for all vehicular movements? ☐ Are there any unusual features, which may have an adverse effect on road safety? ☐ Have guardrails/safety fences been provided where appropriate?	☐ Have guard rails/safety fences been provided where appropriate? ☐ Do any roadside features (e.g. guard rails, safety fences, traffic bollards signs and traffic signals) intrude into drivers' line of sight? ☐ Have bollards been provided to assist pedestrians or formalise road user movements?	☐ Are all intersections and accesses operating effectively/safely for all vehicular movements?

Feasibility (concept)	Preliminary design	Detailed design	Pre-opening	Existing roads (post-opening)
☐ types which are consistent within the scheme ☐ and consistent with adjacent sections? Is the frequency of intersections appropriate (neither too high nor too low): ☐ for safe access? ☐ to avoid impacts on the surrounding network? ☐ for emergency vehicle access? ☐ Has the vertical and/or horizontal alignment been considered regarding the style or spacing of intersections? ☐ Have all physical, visibility or traffic management constraints which would influence the choice or spacing of intersections been considered? ☐ Are all the proposed intersections necessary or essential? ☐ Can any unnecessary intersections be removed? ☐ Can access safety be improved by changes on the surrounding road network?	☐ Are widths and swept paths adequate for all road users? ☐ Will large vehicles overrun pedestrian or cycle facilities? ☐ Are there any conflicts between turning and parked vehicles? ☐ Are any intersections sited on a crest? ☐ Is the intersection type appropriate for the traffic flows and likely vehicle speeds?	☐ Do any roadside features (e.g. guard rails, safety fences, traffic bollards signs and traffic signals) intrude into drivers' line of sight? ☐ Are splitter islands and bollards required on minor arms to assist pedestrians or formalise road users' movements to/from the intersection? ☐ Are parking or stopping zones for buses, taxis and public utilities vehicles situated within the intersection area? Are they located outside visibility splays? ☐ Are any utility covers or gratings located in the likely wheel tracks of motorcyclists or cyclists?		

Feasibility (concept)	Preliminary design	Detailed design	Pre-opening	Existing roads (post-opening)
Visibility				
☐ Will the angle of the intersecting roads and the sight lines be adequate for the safety of all road users?	☐ Are sight lines adequate on and through junction approaches and from the minor arm? ☐ Are visibility splays adequate and clear of obstructions such as street furniture and landscaping? ☐ Will the use of deceleration or acceleration lanes obscure junction visibility?	☐ Are the sight lines adequate at and through the junctions and from minor roads? ☐ Are visibility splays clear of obstruction?	☐ Are all visibility splays clear of obstructions?	☐ Are all visibility splays clear of obstructions?
T, X, Y intersections				
		☐ Have ghost island right turn lanes and refuges been provided where required? ☐ Do intersections have adequate stacking space for turning movements? ☐ Can staggered crossroads accommodate all vehicle types and movements?	☐ Are priorities clearly defined? Is signing adequate?	
All roundabouts				
		☐ Are the deflection angles of approach roads adequate for the likely approach speed? ☐ Are splitter islands necessary? ☐ Is visibility on approach adequate to ensure drivers can perceive the correct path through the roundabout?	☐ Can the roundabout be seen from appropriate distances and is the signing adequate? ☐ Where chevron signs are required, have they been correctly sited?	☐ Are any roundabouts provided operating effectively and safely?

Feasibility (concept)	Preliminary design	Detailed design	Pre-opening	Existing roads (post-opening)
		☐ Where chevron signs are required, have they been correctly sited? ☐ Are dedicated approach lanes required? If provided, will the road markings and signs be clear to all users? ☐ Are any utility covers or gratings located in the likely wheel tracks of motorcyclists or cyclists?		
Traffic signals				
		☐ Will speed discrimination equipment be required? ☐ Is the advance signing adequate? ☐ Are signals clearly visible in relation to the likely approach speeds? ☐ Is 'see through' likely to be a problem? If so, would lantern filters assist? ☐ Is the visibility of signals likely to be affected by sunrise/sunset? ☐ Would high intensity signals and/or backing boards improve visibility? ☐ Would high-level signal units be of value? ☐ Are the STOP/Give Way markings in the correct location? ☐ Are any pedestrian crossings excessively long?	☐ Can the traffic signals be seen from appropriate distances? ☐ Can drivers see traffic signal heads for opposing traffic? ☐ For the operation of signals: Are the signal phases working correctly, are unnecessary delays being created? ☐ Do pedestrian and cycle phases give adequate crossing time? ☐ Can pedestrians or cyclists mistakenly view the green signal for other pedestrian or cycle phases?	☐ Are traffic signals operating correctly? ☐ Are the number, location and type of signal displays appropriate for the traffic mix and traffic environment? ☐ Where necessary, are there provisions for visually impaired pedestrians? (for example, audio-tactile push buttons, tactile markings) ☐ Where necessary, are there provisions for elderly or disabled pedestrians? (for example, extended green or clearance phase) ☐ Is the controller located in a safe position? (i.e. where it is unlikely to be hit, but maintenance access is safe)

Feasibility (concept)	Preliminary design	Detailed design	Pre-opening	Existing roads (post-opening)
		☐ Are the proposed tactile paving layouts correct? ☐ Are the markings for right turning vehicles adequate? ☐ Is there a need for box junction markings? ☐ Is the phasing appropriate? ☐ Will pedestrian/cyclist phases be needed? ☐ Does the number of exit lanes equal the number of approach lanes? ☐ If not is the taper length adequate? Is the required intersection intervisibility provided?		☐ Is the condition (especially skid resistance) of the road surface on the approaches satisfactory? ☐ Are traffic signals clearly visible to approaching motorists? ☐ Is there adequate stopping sight distance to the ends of possible vehicle queues? ☐ Have any visibility problems that could be caused by the rising or setting sun been addressed? ☐ Are signal displays shielded so that they can be seen only by the motorists for whom they are intended? ☐ Where signal displays are not visible from an adequate distance, are signal warning signs and/or flashing lights installed? ☐ Where signals are mounted high for visibility over crests, is there adequate stopping sight distance to the ends of traffic queues? ☐ Is the primary signal free from obstructions on the nearside footway to approaching drivers? (trees, light poles, signs, bus stops, etc.)

H.6 Prompt List covering Walking and Cycling

Table H 5: Prompt list covering walking and cycling

Feasibility (concept)	Preliminary design	Detailed design	Pre-opening	Existing roads (post-opening)
Adjacent land				
☐ Will the project adversely affect adjacent land?	☐ Will the scheme have an adverse effect on safe use of adjacent land?	☐ Are accesses to and from adjacent land/properties safe to use? ☐ Has adjacent land been suitably fenced?	☐ Has suitable fencing been provided?	☐ Is fencing provided complete and well maintained? ☐ Is the risk of incursion onto the road from the adjacent land minimal?
Public transport				
☐ Is provision made for public transport?	☐ Are any bus stops to be provided safely located with adequate visibility and clearance to the traffic lane? ☐ Are shelters and seats to be provided located safely to ensure that sight lines are not impeded? Is clearance to the road adequate?	☐ Are bus stops safely **located** with adequate visibility and clearance to the traffic lane? ☐ Are bus stops in rural areas signposted in advance? ☐ Are shelters and seats located safely to ensure that sight lines are not impeded? Is clearance to the road adequate? ☐ Is the height and shape of the kerb at bus stops suitable for pedestrians and bus drivers?	☐ Are bus stops safely located with adequate visibility and clearance to the traffic lane? ☐ Are bus stops in rural areas signposted in advance? ☐ Are shelters and seats located safely to ensure that sight lines are not impeded? Is clearance to the road adequate? ☐ Is the height and shape of the kerb at bus stops suitable for pedestrians and bus drivers?	☐ Are bus stops safely located with adequate visibility and clearance to the traffic lane? ☐ Are bus stops in rural areas signposted in advance? ☐ Are shelters and seats located safely to ensure that sight lines are not impeded? Is clearance to the road adequate? ☐ Is the height and shape of the kerb at bus stops suitable for pedestrians and bus drivers?
Pedestrians				
☐ Does the concept appropriately consider the requirements of pedestrians?	☐ Have pedestrian routes been provided where required? ☐ Do shared facilities take account of the needs of all user groups?	☐ Have the needs of pedestrians been considered especially at intersections and roundabouts?	Are the following adequate? ☐ visibility; ☐ signs; ☐ surfacing; ☐ other guardrails;	☐ Do actual crossing points relate to desire lines? And if not, does this introduce increased levels of significant risk?

Feasibility (concept)	Preliminary design	Detailed design	Pre-opening	Existing roads (post-opening)
	☐ Can verge strips dividing footways/cycleways and carriageways be provided? ☐ Where footpaths have been diverted, will the new alignment permit the same users free access? ☐ Are footbridges/subways sited to attract maximum use? ☐ Is specific provision required for special and vulnerable groups? (i.e. the young, older users, mobility and visually impaired?) ☐ Are tactile paving, flush kerbs and guard railing proposed? ☐ Is it specified correctly and in the best location? ☐ Have all walking needs been considered, especially at intersections? ☐ Are these routes clear of obstructions such as signposts, lamp columns etc.?	☐ Are any proposed drop kerbs flush with the adjacent highway? ☐ Is tactile paving proposed? ☐ Is it specified correctly and in the best location?	☐ drop kerbing or flush surfaces; ☐ tactile paving.	☐ Are there appropriate travel paths and crossing points for pedestrians? ☐ Is a safety fence installed where necessary to guide pedestrians to crossings or overpasses? ☐ Is a safety barrier installed where necessary to separate vehicle and pedestrian flows? ☐ Are pedestrian facilities suitable for night use? ☐ Is there adequate separation distance between vehicular traffic and pedestrians on footways? ☐ Is there an adequate number of pedestrian crossings along the route? ☐ At crossing points is fencing oriented so pedestrians face oncoming traffic? ☐ Is there adequate provision for the elderly, the disabled, children, wheelchairs, and baby carriages? (for example, holding rails, kerb and median crossings, ramps) ☐ Are adequate handrails provided where necessary? (for example, on bridges, ramps)

Feasibility (concept)	Preliminary design	Detailed design	Pre-opening	Existing roads (post-opening)
				☐ Is signing about pedestrians near schools adequate and effective? ☐ Is signing about pedestrians near any hospital adequate and effective? ☐ Is the distance from the stop line to a cross walk sufficient for truck drivers to see pedestrians?
Cyclist				
	☐ Have cycle routes been provided where required? ☐ Do shared facilities take account of the needs of all user groups? ☐ Can verge strips dividing footways/cycleways and carriageways be provided? ☐ Is specific provision required for special and vulnerable groups? (i.e. the young, older users, mobility impaired?) ☐ Have all cycling needs been considered, especially at intersections? ☐ Are these routes clear of obstructions such as signposts, lamp columns etc.?	☐ Have the needs of cyclists been considered especially at intersections and roundabouts? ☐ Are cycle lanes or segregated cycle tracks required? ☐ Does the signing make clear the intended use of such facilities? ☐ Are cycle crossings adequately signed? ☐ Has lighting been provided on cycle routes? ☐ Are any proposed drop kerbs flush with the adjacent highway? ☐ Are any parapet heights sufficient? Is tactile paving proposed? ☐ Is it specified correctly and in the best location?	Do the following provide sufficient levels of road safety for cyclists on, or crossing the road? ☐ visibility; ☐ signs; ☐ guardrails; ☐ drop kerbing or flush surfaces; ☐ surfacing; ☐ tactile paving.	☐ Is a safety fence installed where necessary to guide cyclists to crossings or overpasses? ☐ Are there appropriate travel paths and crossing points for cyclists? ☐ Is a safety barrier installed where necessary to separate vehicle and cyclist flows? ☐ Are cycling facilities suitable for night use? ☐ Is the pavement width adequate for the number of cyclists using the route? ☐ Is the bicycle route continuous? (i.e. free of squeeze points or gaps) ☐ Are drainage pit grates bicycle safe?

H.7 Prompt List covering Traffic Signs, Line Markings and Lighting

Table H 6: Prompt list covering traffic signs, line markings and lighting

Feasibility (concept)	Preliminary design	Detailed design	Pre-opening	Existing roads (post-opening)
Signs				
	☐ Is there likely to be sufficient highway land to provide the traffic signs required? ☐ Are sign gantries needed? ☐ Have traffic signs been located away from locations where there is a high strike risk?	☐ Do destinations shown align with signing policy? ☐ Are signs easy to understand? ☐ Are the signs located behind safety fencing and out of the way of pedestrians and cyclists? ☐ Is there a need for overhead signs? ☐ Where overhead signs are necessary is there sufficient headroom to enable designated walking and cycling usage? ☐ Has sign clutter been considered? ☐ Is intersection signing adequate, consistent with adjacent signing and easily understood? ☐ Have the appropriate warning signs been provided? ☐ Are signs appropriately located and of the appropriate size for approach speeds?	☐ Are the visibility, locations, and legibility of all signs (during daylight and darkness) adequate? ☐ Are signposts protected from vehicle impact or passively safe? ☐ Will signposts impede the safe and convenient passage of pedestrians and cyclists? ☐ Have additional warning signs been provided where necessary?	☐ Have all signs been installed in accordance with the appropriate guidelines? ☐ Are all signs conspicuous and clear? ☐ Are all necessary regulatory, warning and direction signs in place? ☐ Are the correct signs used for each situation, and is each sign necessary? ☐ Are all signs effective for all likely conditions? (for example, day, night, rain, fog, rising or setting sun, oncoming headlights, poor lighting) ☐ If restrictions apply for any class of vehicle, are drivers adequately advised? ☐ If restrictions apply for any class of vehicle, are drivers advised of alternative routes? In daylight and darkness, are signs satisfactory regarding visibility and: ☐ clarity of message? ☐ readability/legibility at the required distance?

Feasibility (concept)	Preliminary design	Detailed design	Pre-opening	Existing roads (post-opening)
		☐ Are sign posts and sign structures passively safe or protected by safety barriers where appropriate? ☐ Are traffic signs illuminated where required and the correct reflectivity provided? ☐ Are traffic signs located in positions that minimise potential strike risk? ☐ Is the mounting height of sign faces appropriate? ☐ Are traffic signs orientated correctly to ensure correct visibility and reflectivity?		☐ Are signs able to be seen without being hidden by their background or adjacent distractions? ☐ Is driver confusion due to too many signs avoided? ☐ Is sign retroreflectivity or illumination satisfactory? Are sign supports out of the clear zone? If not, are they: ☐ frangible? ☐ protected by barriers (for example, guard fence, crash cushions)? ☐ Are curve warning signs and advisory speed signs installed where required? ☐ Are advisory speed signs consistent along the route? ☐ Are the signs correctly located in relation to the curve? (i.e. not too far in advance) ☐ Are the signs large enough? ☐ Are chevron alignment markers (CAMs) installed where required? ☐ Is the positioning of CAMs satisfactory to provide guidance around the curve? ☐ Are the CAMs the correct size? ☐ Are CAMs confined to curves? (not used to delineate islands, etc)

Feasibility (concept)	Preliminary design	Detailed design	Pre-opening	Existing roads (post-opening)
Lighting				
	☐ Is the project to be street lit? ☐ Has lighting been considered at new intersections and where adjoining existing roads? ☐ Are lighting columns located in the best positions? (e.g. behind safety fences)	☐ Has lighting been considered at new intersections and where adjoining existing roads? ☐ Is there a need for lighting, including lighting of signs and bollards? ☐ Are lighting columns passively safe? ☐ Are lighting columns located in the best positions, e.g. behind safety fences and not obstructing walking and cycling routes?	☐ Does the street lighting provide adequate illumination of roadside features, road markings and non-vehicular users to drivers? ☐ Is the level of illumination adequate for the road safety of pedestrians and cyclists? ☐ Is lighting obscured by vegetation or other street furniture?	☐ Has lighting been adequately provided where required? ☐ Is the road free of features that interrupt illumination? (for example, trees or overbridges) ☐ Is the road free of lighting poles that are a fixed roadside hazard? ☐ Are frangible or slip-base poles provided? ☐ Ambient lighting: if it creates special lighting needs, have these been satisfied? ☐ Is the lighting scheme free of confusing or misleading effects on signals or signs? ☐ Is the scheme free of any lighting black patches?
Posts/columns				
	☐ Will poles/columns be appropriately located and protected?	☐ Are poles and columns passively safe? ☐ Are poles and columns protected by safety fencing where appropriate?		☐ Do all poles and columns have structural integrity and are well maintained?
Lines, other markings and delineators				
	☐ Are any road markings proposed at this stage appropriate?	☐ Do the carriageway markings clearly define routes/priorities? ☐ Are the dimensions of the road markings appropriate for the speed limit/design speed of the road?	☐ Are all road markings/studs clear and appropriate for their location? ☐ Have all superseded road markings and studs been removed adequately?	☐ Does all linemarking conform with these guidelines? ☐ Is there advance warning of approaching auxiliary lanes?

Feasibility (concept)	Preliminary design	Detailed design	Pre-opening	Existing roads (post-opening)
		☐ Have old road markings and road studs been adequately removed? ☐ Are road markings appropriate to the location? ☐ Are centre and edge lines; hatching; road studs; text/destinations etc approved and/or conform to the local Manual of Uniform Traffic Control Devices (MUTCD)	☐ Do the carriageway markings clearly define routes and priorities? ☐ Have all superseded road markings and studs been removed adequately?	Is the linemarking and delineation: ☐ appropriate for the function of the road? ☐ consistent along the route? ☐ likely to be effective under all expected conditions? (day, night, wet, dry, fog, rising and setting sun position, oncoming headlights, etc.) ☐ Is the pavement free of excessive markings? (for example, unnecessary turn arrows, unnecessary barrier lines, etc.) ☐ Are centrelines, edge lines, lane lines provided? If not, do drivers have adequate guidance? ☐ Have RRPMs been installed where required? ☐ If RRPMs are installed, are they correctly placed, correct colours, in good condition? ☐ Are profiled (audible) edge lines provided where required? ☐ Is the linemarking in good condition? ☐ Is there sufficient contrast between linemarking and pavement colour? ☐ Are guideposts appropriately installed?

Appendix I Fact Sheets on Thematic Audits

The following fact sheets on thematic audits of pedestrian, cycle and motorcycle audits have been generously provided by Safe System Solutions Pty Ltd.

I.1 Pedestrians

INTRODUCTION

The purpose of the pedestrian audit guidelines is to provide systematic guidance on conducting Road Safety Audits (RSAs) when considering the specific road safety concerns for pedestrians and when assessing pedestrian focused infrastructure.

This information supplements, and should be read in conjunction with, the guidance found in the Austroads Guide to Road Safety Part 6A: Implementing Road Safety Audits.

Figure 1 Raised priority crossing, Moray Street, Melbourne

PROCEDURE

SELECTING THE AUDIT TEAM

The audit team shall consist of at least two people of which one person shall be knowledgeable of the standards and guidelines relating to pedestrian infrastructure.

When assembling the audit team, it is important to consider who the main user group is within the space. For instance, if it is a strip shopping centre or a school zone, personnel with local knowledge would be beneficial.

The auditors should note that the Road Safety Audit is not a Disability Discrimination Act check against the relevant standards. However, accessibility of these users should be considered.

REVIEW BACKGROUND INFORMATION

The audit team should conduct a desktop review of the area and collate as much background data as possible, which may include:

- Pedestrian volumes
- Traffic volumes
- Crash data
- Design drawings
- Public enquiries / community concerns

SITE INSPECTION

The site inspection shall involve walking the route in both directions. The site inspection should be conducted during peak pedestrian times, such as school start and end times or during usual commuting hours. A night-time inspection is also required.

Where the pedestrian facility is on a Shared Path, the audit team should also consider any safety issues for cyclists (refer to Specialist Audits – Cyclist Guidelines).

When on site, the auditors should consider and pay particular attention to:

- Vehicle sight lines of pedestrians at property accesses, driveways and intersections
- Pedestrian crossing points and hierarchy of priority
- Pedestrian desire lines and destinations that may alter behaviour, such as bus stops
- Adjacent land use, such as aged care facilities or schools
- Times of increased activity, such as Friday or Saturday nights
- Surface quality – are there cracks or similar resulting in vertical deflections that could cause tripping or limit travel by mobility scooters, or wheelchairs?
- Public lighting – does the area feel safe at night?

I.2 Cycling

Thematic Audits – Cycling

Introduction

The purpose of these guidelines is to provide specific guidance when conducting Road Safety Audits (RSAs) of cycling facilities or where the primary focus is on cycling facilities and their operation.

This information supplements, and should be read in conjunction with, the guidance found in the Austroads Guide to Road Safety Part 6A: Implementing Road Safety Audits.

Figure 1 Raised priority crossing, Moray Street, Melbourne

Procedure

SELECTING THE AUDIT TEAM

The audit team shall consist of at least two people of which one person shall be knowledgeable of the standards and guidelines relating to cycling infrastructure, that is also a confident rider that will ride the route. The team may also benefit from having a team member from a non-technical background, who either:

- Regularly rides the route and has local knowledge/experience
- A confident rider that is not familiar with the route

When assembling the audit team, it is important to consider what the typical rider within this space is. For instance, if there are significant e-bike volumes in the area, there would be great benefit in having a member of the team that is familiar with e-bikes and conducting the audit on an e-bike.

REVIEW BACKGROUND INFORMATION

The audit team should conduct a desktop review of the area and collate as much background data as possible which may include:

- Cyclist and pedestrian volumes
- Traffic volumes
- Crash data
- Design drawings
- Public enquiries / community concerns

SITE INSPECTION

The site inspection shall involve cycling the route in both directions or a regular inspection if still in design phase and it is not possible to ride the route. If there is noted concern about riding at certain times or in certain conditions, efforts should be prioritised to conduct the site investigation during these periods (e.g. school end times, wet weather, low-light conditions etc). A night-time inspection is highly recommended, particularly if riding at night is prevalent.

Where the cycling facility is on a Shared Path, the audit team should consider inspecting the site on foot to reveal any safety issues for pedestrians (refer to Specialist Audits – Pedestrian Guidelines).

The site should be ridden at a speed that is consistent with the general movements in the area. For instance, if the route is a common commuter route, the audit should be ridden at a faster pace (20-30km/h), whereas if the route is on a shared path in a local area, the speed should be more leisurely.

Photos of audit findings should be taken, and video recording of the entire audit length is an excellent resource for later reference and possible inclusion in the report.

When on site, look beyond the limits of the audit scope. It's important to pay extra attention to wider cycling safety infrastructure issues such as:

- Sight lines and stopping distances at property accesses, driveways and intersections
- Where would a cyclist travel next? Is there a safe connection to another cycling facility to enable this movement?

The audit riders must wear a high visibility vest with retroreflective bands and must wear a helmet. The riders must also obey all road rules, governed by each state. The audit team may also benefit greatly with the preparation of a Safe Work Method Statement.

COMMON AUDIT FINDINGS

The below images show common road safety audit findings for cycling facilities. This list is by no means exhaustive.

On-street parking (dooring):

On-street parking (angled):

Drop-offs:

Path width:

Surface condition:

Horizontal alignment:

Vertical alignment:

Hazards:

Vertical clearance:

Interactions at roads:

I.3 Motorcycle

THEMATIC AUDITS – MOTORCYCLES

INTRODUCTION

The purpose of the motorcycling auditing guidelines is to provide systematic guidance on conducting Road Safety Audits (RSAs) when considering the specific road safety concerns for motorcycling.

The items in the sections below provide guidance to ensure that the needs of riders have been considered thoroughly, and to ensure that conditions are not inadvertently made worse by focusing on other road users. It is therefore essential that the personnel conducting audits of routes with high motorcycle usage are experienced in and knowledgeable of the specific needs of riders.

PROCEDURE

This section will go through items to assist with the audit process of assessing routes that may have high motorcycle usage.

SELECTING THE AUDIT TEAM

The audit team shall consist of at least two people of which one person shall be an experienced motorcycle rider and knowledgeable of the typical requirements for motorcyclists. The motorcycle rider shall also be an accredited Road Safety Auditor. The team may also benefit from having input from a rider without specific road safety audit knowladge, who either:

- Regularly rides the route and has local experience;
- Considers themselves a confident rider that is not familiar with the route; and/or
- Is part of a community user group

When assembling the audit team, it is important to consider what the typical rider within this space is. For instance, if it is a suburban/rural recreational route or a more urban commuter area.

REVIEWING BACKGROUND INFORMATION

The audit team should conduct a desktop review of the area and collate as much background data as possible, including:

- Motorcycle volume in relation to vehicle volume
- Motorcycle crash data
- Any available drawings
- Public enquiries / community concerns

SITE INSPECTION

The site inspection shall involve riding the route in both directions by the experienced rider. The site inspection should also include a trailing vehicle to also assess the route. It is highly recommended that the route is recorded by a camera from the viewpoint of the rider, this can be supplemented with

recordings of the rider's commentary whilst riding the route. The footage and commentary can later by analysed and form part of the audit. A night-time inspection may also be required.

The motorcycle used for the audit should be representative of the typical motorcycle utilised on that route. For example, a cruiser or sport bike for a touring route and a scooter/moped for an urban environment. The route should be ridden at a speed that is comfortable for the road geometry.

Given the high-risk nature of the inspection, the audit team shall create a specific Safe Work Method Statement (SWMS). The following list shall be used to assist the audit team in preparing the SWMS:

Motorcycle Auditor must:

- Wear high standard protective clothing including helmet, boots, pants, jacket and gloves
- Wear a high visibility vest, with retroreflective bands
- Ride in a controlled manner well within their limits
- Obey all road rules
- Ride a registered and maintained motorcycle
- Have a valid motorcycle licence

Where possible, the Auditor is to:

- Maintain radio contact with the trailing car
- Maintain a safe distance from any lead car to be able to brake
- Keep in view (mirror) or the trailing car
- Make obvious signals and give advanced warning when pulling over or making any turns

The trailing car must:

- Have a mounted rotating beacon or flashing lights operating during the audit
- Maintain a safe distance from the rider to be able to break
- Have a driver dedicated to the driving task ONLY (i.e. not taking notes or looking for audit issues)
- If danger is identified, warn the rider via the radio and/or using the car horn
- Obey all road rules

Any lead car (if applicable) must:

- Have a mounted rotating beacon operating
- Have a driver dedicated to the driving task ONLY (i.e. not taking notes or looking for audit issues)
- If danger is identified, warn the rider via the radio and/or using the car horn
- Obey all road rules

The Audit Group (rider and cars) should:

- Pre plan stops and plan the audit sections before departing
- Test radio communications before departure
- Be conscious of weather conditions and postpone the ride if weather conditions are not favourable.

COMMON AUDIT FINDINGS

The below images show common road safety audit findings for cycling facilities. This list is by no means exhaustive.

Poor pavement condition:

Gravel on road:

Installation of barrier kerb on high speed corners:

Pits within braking and cornering zones:

Exposed barrier posts without underrun protection:

Appendix J Potential Ideas for the On-going Development of RSA

Section 13 of this Guide introduced Appendix J as a repository of ideas towards the on-going development of RSA and the value of outcomes from the process. The lead author of this Guide would like to acknowledge the contribution of Fabian Marsh and Jessica Rattray of the New Zealand Transport Agency (NZTA) to the development of this Appendix.

The following items are put forward for note and further consideration:

- develop tools/a toolkit to assist auditors e.g. site data and risk capture, further guidance on auditing for VRUs
- improve design standards and guidelines across the board to be a practical mechanism of 'driving' road safety improvements and positive outcomes – this will align current designs more with current safety knowledge and thinking
- develop initiatives to further break the misperceptions and misunderstandings of RSA e.g. it is only a design check, audits only consider cars and the roadway. Transport safety audits or similar maybe an alternative title to consider for the future
- seek ways to ensure that audits focus on the system and its operation, not more 'traditional', often asset management focused type issues such as drainage, condition of signage etc.
- find ways to ensure that design standards and guidelines are not used to justify 'no action' in response to audit findings i.e. an innovative mitigation measure is rejected as an option, and/or an action is required, but a 'cautious' approach is adopted e.g. more traditional mitigation measures are favoured even when they might not be the best option
- find ways to ensure that designers and auditors do not get 'wed' to mitigation measures and outcomes, making it hard to move away from these. This often leads to 'run of the mill' issues identified, and conservative solutions identified
- actively 'selling' RSA throughout the life cycle, including the identification and dissemination of case studies/BCRs etc. The process must be viewed through the lens of all stakeholders
- embed the concept of, and ensure usage of, the 'front loading' approach – with audit proformas etc. being headed by Safe System and network level safety prompts, including the prefilling of site data. This could extend in time to prompts for auditors to secure certain data types, sets or even analysis, to further inform/support their findings
- continue the concept of allowing 'exemptions' for the time being, but the local approach must be formalised and viewed on a case by case/location by location basis i.e. exemptions must be justified, not assumed
- many practitioners have expressed that they like the quantitative nature of an SSA. This concept and the possible use of numerical weighting factors are something that can perhaps be considered during further development of the risk assessment component of the audit process
- obtaining an SSA 'score' at each audit stage (pre and post mitigation measures proposed) would be a useful practice to give further appreciation of the road safety benefits that can be accrued at each audit stage
- further promote the concept that an auditor code of conduct is an important factor in 'raising the bar' in RSA and ensuring that the most contemporary approach is adopted across the industry. This could see the addition of a clear statement of the objectives of auditing and a responsibility, accountability, consultation and information (RACI) matrix covering the process
- further emphasis should be given to the 'acceptance of risk' aspects of RSA. The fact that a client decides not to follow an audit recommendation in full or decides to take no action must not be seen as reflection on the work of the auditor, the audit report, or the audit process in general, and should not be used as an argument against the commissioning or undertaking of audits in the future. The response to an audit is a risk management matter for the client organisation, not the audit team. This becomes a significant issue where the project audited will ultimate revert to being part of the public road network in the future, and this issue required further consideration, to ensure that the prospective road agency is consulted throughout the RSA process.

Austroads' **Guide to Road Safety Part 6: Road Safety Audit** provides practical guidance on the procurement, management and implementation of road safety audits. The Guide emphasises the responsibilities of road and transport managers and key players such as project managers, project sponsors and auditors to maximise alignment with Safe System principles by integrating them into the road safety audit process.

Guide to Road Safety Part 6

Austroads

Austroads is the association of Australasian road and transport agencies.

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