

Best-practice guidelines for risk management on road networks

VERSION 2 ■ OCTOBER 2014

RIMS
Roading Infrastructure Management Support

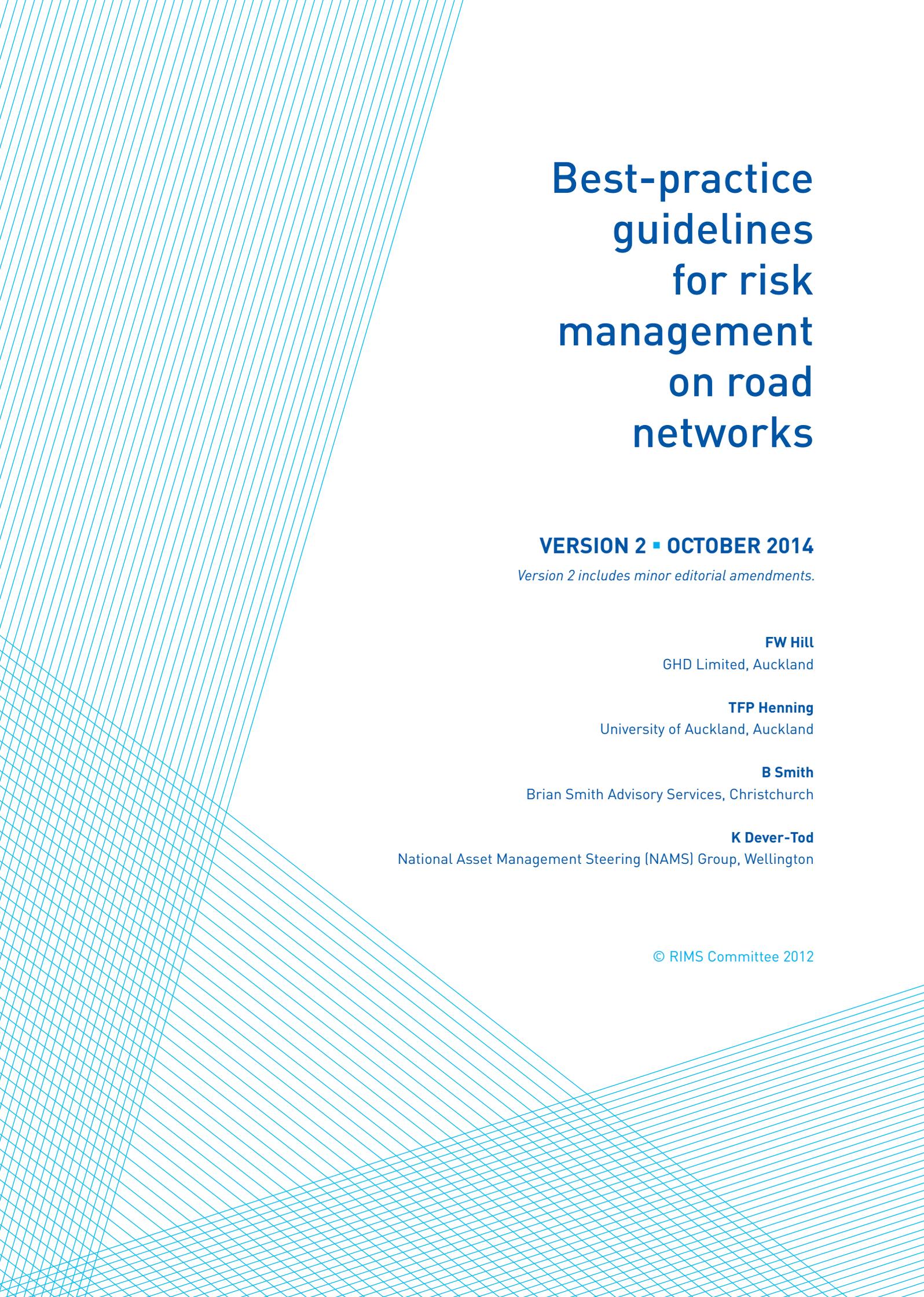
New Zealand



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 **Road Controlling**
AUTHORITIES FORUM (NZ) INC



Best-practice guidelines for risk management on road networks

VERSION 2 ■ OCTOBER 2014

Version 2 includes minor editorial amendments.

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FOREWORD

The National Asset Management Support Group (NAMS Group) is pleased to endorse this publication, *Best-Practice Guidelines for Risk Management on Road Networks*.

The research, case studies and guidance on risk management in such a critical area of New Zealand's service infrastructure is an important contribution to the body of knowledge about road network management, and provides clear signals to organisations on how to develop the risk management discipline. While this publication's focus is on transportation activities, its concepts and good practice guidance are equally applicable to other infrastructure service areas.

There is a close inter-relationship between asset management and risk management. One shapes and influences the other. We in the NAMS Group are conscious that perhaps the nexus between asset and risk management has not been adequately explored in the past. This publication helps to fill that gap.

Sound, ongoing and integrated risk management is an essential part of good business practice. The *Best-Practice Guidelines on Risk Management Road Networks* provides an excellent springboard for organisations to do better in risk management. We commend it to business managers, asset and risk management practitioners.

Brian Smith

Director, New Zealand NAMS Group

4 April 2011

Disclaimer:

The guidelines in this document are based on NZ Transport Agency Research Report 415 which studied risk management practices undertaken by New Zealand's territorial local authorities' roading and transport services managers. That study's scope covered the service provider's activities and assets, which include, for example, roads, footpaths, traffic management systems, signs, markings, structures, cycleways. The scope did not include road safety and transportation construction projects, or the types of wider transportation service not generally provided by territorial local authorities, such as passenger transport, ports, busways, airports and rail. Therefore the examples provided in these guidelines focus solely on the roading and transport activities most territorial local authorities provide.

Furthermore, as this document focuses on the overall risk spectrum in relation to roading network provision and management, and there are more intensive processes involved with activities such as Lifelines risk¹ and project risk analysis and management, these specific risk analyses are also outside this document's scope.

¹ *The Civil Defence Emergency Management Act 2002 (CDEMA 2002) provided for certain designated "Lifeline Utilities" to act as necessary to restore services in an emergency situation. This resulted in "Lifelines" exercises being undertaken to identify these services and plan responses to events.*

ABBREVIATIONS AND ACRONYMS

AM	Asset management
AMP	Asset management plan
CD	Civil Defence
CE	Chief executive
CEO	Chief executive officer
LCM	Life cycle management
LGA	Local Government Act (LGA) 2002
LOS	Levels of service
LTCCP	Long-term council community plan
LTNZ	Land Transport New Zealand (now NZ Transport Agency)
LTP	Long-term plan
MoH	Ministry of Health
NAMS	National Asset Management Steering Group
NZTA	New Zealand Transport Agency
RCA	Road controlling authority
RIMS	Road Information Management Steering Group
RMC	Risk management charter
RMF	Risk management framework
RMP	Risk management plan
RTA	Roads and Traffic Authority
SH	State highway
SMS	Safety management system
SMT	Senior management team
SOLGM	The New Zealand Society of Local Government Managers

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1. Introduction

1.1 BACKGROUND TO RISK MANAGEMENT IN TRANSPORTATION

During recent years there has been increased attention in organisations throughout the world to identify and manage risks and opportunities. In its most basic form, risk is about awareness of, and reaction to, potential circumstances that could impede an entity's ability to achieve its goals and objectives. When viewed from this perspective, it makes good sense for managers to formalise ways of identifying those circumstances, and develop steps to reduce or avoid the risks.

In New Zealand, the Local Government Act 2002 (LGA 2002) requirements have led to organisations placing greater emphasis on approaching risk management holistically. However, it is widely considered that in the transportation arena, there has not yet been sufficient progress regarding risk management's practical application. As an indication of the breadth of the issue, the NZ Transport Agency's ² 2007 review of the asset management plans (AMPs) of all 74 road-controlling authorities (RCAs) in New Zealand noted:

- Risk had generally been poorly carried out
- Those RCAs that scored above-average results had made reference to AS/NZS 4360, and most had completed a risk register
- In general, transportation risks had not been integrated into corporate risk policies. From an organisational perspective, however, these transportation risks should link with corporate risk policies and be incorporated into transportation risk registers.

In general terms, poor risk management processes can lead to a number of negative consequences. This can reduce RCAs' overall resilience and also have a more day-to-day impact, including:

- Poor decision making because not all options (and the risk profiles of options) are considered – this can result in both inefficiencies (economic and financial considerations) and ineffectiveness (eg decisions are made that could reduce the life of network assets)
- Top management or the governing board being unaware of potential road network issues that deserve their attention
- Failure of critical assets, which reasonably could have been foreseen if a robust risk management process had been in place
- Risk registers showing costs (and any specific consultation required) inadequately translated into specific programmes or projects to be implemented.

It is recognised that risk management related to transportation covers a wide range of activities. For example, there is a complete risk management process involved with activities such as construction project management and safety management.

² Formerly Land Transport NZ and Transit NZ.

2. Risk management process

The entire risk process recommended through these guidelines is summarised in Figure 1. The respective steps within this process are discussed further in subsequent sections. Figure 2 is a summarised version of this process and is used throughout the guidelines.

Figure 1 – Recommended risk management process

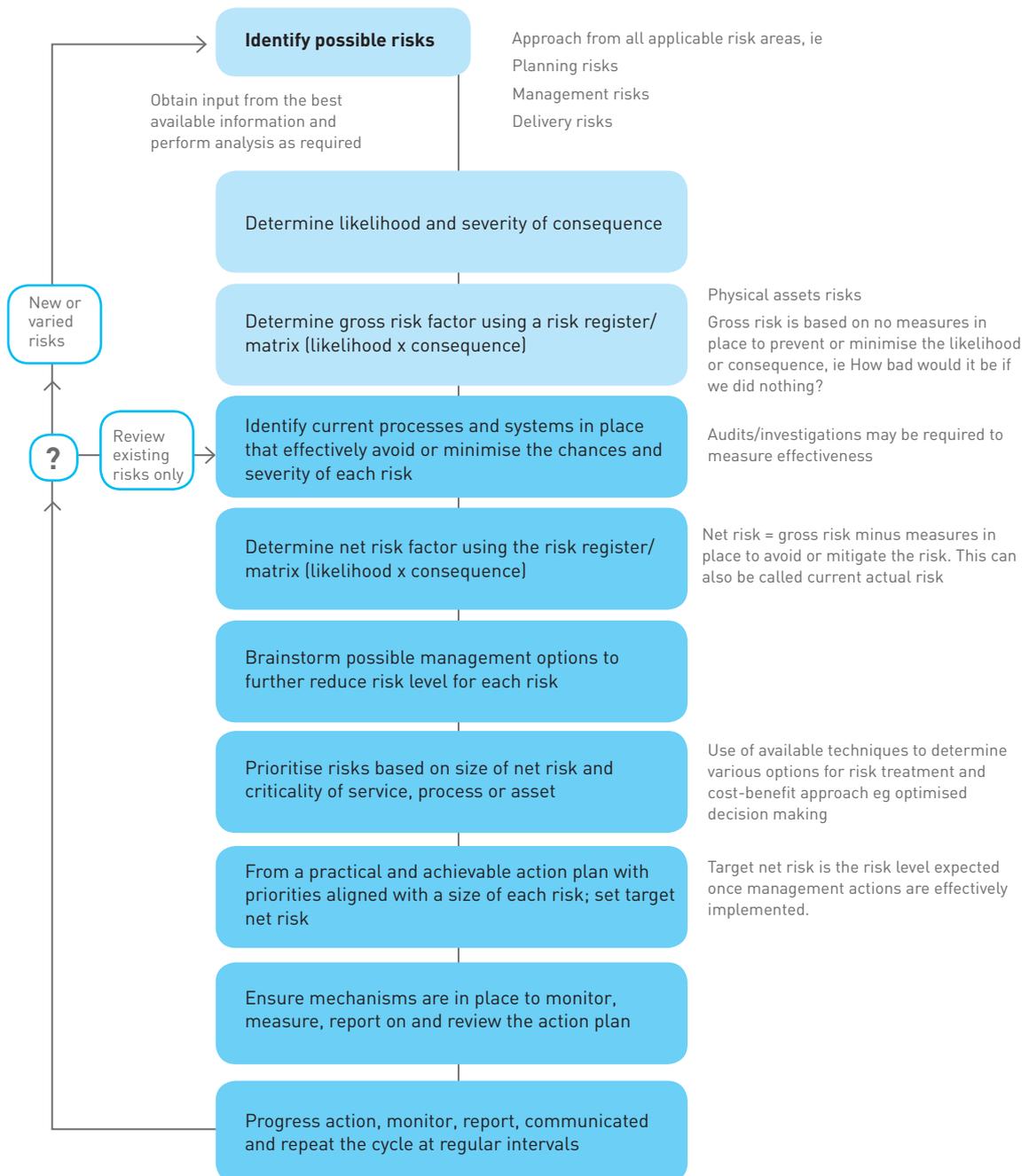
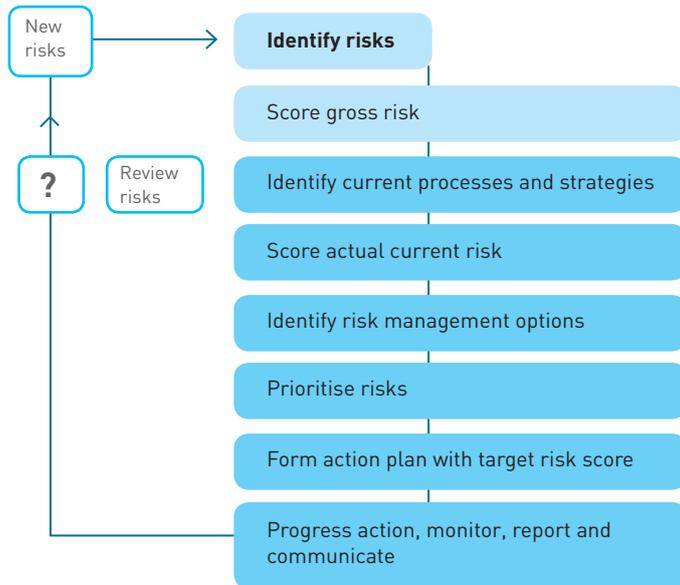


Figure 2 – Summary risk management process



3. Establish organisation-wide risk management

A council should have an organisation-wide (corporate) risk policy or framework that demonstrates and sets the context for the transport/roading activity risk. This is not mandatory, but is an advantage when establishing a transport/roading risk management framework (RMF). If an RMF is not already in place, the transport group should promote its establishment to the wider council.

Good practice includes:

- A good level of management (corporate) buy-in to the risk management process, and an established council-wide risk management culture
- Establishing a corporate risk policy or guideline, and an RMF
- Establishing links between any corporate risk and transport/roading activity risk
- Setting guidelines for the transport/roading activity, and an organisational context for risk management.

There is potential for the risk register format to be applied successfully across the council for corporate and all activity risks.

The asset management plan (AMP) is a good location for publishing a summary of the risk policy, context and guidelines.



RESEARCH LEARNING

Organisation-wide risk

Case studies demonstrate cultural buy-in when risk is reinforced by corporate support, and that that buy-in and culture will continue even if personnel in key positions change. However, a risk culture's effectiveness can still be constrained by the RMFs quality.

4. Establishing a risk management framework

The risk approach that results from having a risk management framework (RMF) gives council staff strong guidance towards the expected inputs and outcomes. This ensures a robust risk management process is established, and also helps with effectively implementing the risk mitigation and follow-up actions. This process entails identifying the drivers and barriers that affect the transport/roading risk framework's implementation.

Good practice means there is an established:

- Corporate risk management framework
- Transport/roading risk management framework
- Set of roles and responsibilities regarding risk
- Awareness of risk and a risk management culture.

The drivers establishing a risk management framework include:

- External audits or reviews by independent parties
- Recognition of the need for, and value of risk management , eg through Lifelines³ initiatives undertaken
- Recommendations within various Asset Management Plan (AMP) templates established by the National Asset Management Steering Group (NAMS) and various consultants
- Project-specific risk exercises that have demonstrated the value of an activity-based risk framework.

The barriers to establishing a risk management framework include the lack of:

- Consequences for not undertaking risk management
- Perceived need, or perceived value, in risk management
- Resources and time to establish the RMF
- Knowledge about where to start.

To establish a risk management culture, awareness and understanding needs to be established with all staff. This will allow a risk awareness focus to be created across the organisation.

³ *The Civil Defence Emergency Management Act 2002 (CDEMA 2002) provided for certain designated Lifeline Utilities to act as necessary to restore services in an emergency situation. This resulted in 'Lifelines' exercises being undertaken to identify these services and plan responses to events.*



RESEARCH LEARNING

Establishing a risk management framework

In an environment where a great deal of energy is expended just to comply with requirements, risk management has often merely been seen as nice to have. Increasingly, however, the philosophy has gained enough momentum to overcome these initial barriers.

Case studies show that where a corporate risk policy is in place, responsibilities are clear, and at the transport/roading activity level, it is acknowledged that the asset manager had a key responsibility to manage risk. This is achieved mainly through the requirement to incorporate risk into the asset management plan.

Risk management does not necessarily have to be complex to be effective. However, when risk management's wider objectives and integration with business operation are not understood, engineers can often overlook risk simply because they don't understand the risk management process.

A risk management culture involves all staff, who need to be aware of risk and how to respond to it. It will then become part of the organisational culture of that workplace.

4.1 WHY IS RISK MANAGEMENT IMPORTANT?

Risk and opportunity management's global profile has increased. At the most basic level, risk is about awareness and reaction to potential circumstances that could impede an entity's ability to achieve its goals and objectives. When viewed from this perspective, it makes good sense for managers to formally identify those circumstances and develop steps to reduce or avoid the risks. The owners of organisations want assurance that their managers have systems in place for managing routine or low risks, and for identifying early warning signals of potentially high risks.

The macro-influences that have contributed to the increased focus on risk management include:

- The increased separation of ownership from the management of entities
- The complexity of modern society, with its many inter-relationships and interdependencies
- The increased threat of litigation for perceived contractual and service failures
- Increased attention to environmental and sustainability issues, including the effects of climate change
- Governmental regulatory requirements for risk management processes, and regulatory penalties for non-compliance
- The presence of an influential standard setter, such as the Treadway Commission, promoting good governance and risk practices in major corporates.

During the past 15 years in New Zealand's public sector, there has been a trend towards increased awareness of risk management as an important element of good governance. The catalysts for this awakening have been:

- Public sector entities' more accountable legislative footing
- Central agencies taking an active interest in overseeing public sector entities' risk management
- Several tragedies and service breakdowns that have focused the public spotlight on risk management.

In the central government sector, the Cave Creek tragedy⁴ in 1995 prompted increased efforts in risk management, particularly in the areas of safety and asset failure. The State Services Commission prepared “good-practice guidance” on risk management and encouraged government agencies to introduce risk management frameworks and regimes. During this time, the A/NZ Risk Management Standard 4360:1995 was introduced, providing a solid foundation and methodology for risk management practices.

In local government, there is no legislative imperative for integrated risk management, and the development of risk management practices has been fragmented.

Some of the influences on risk management in local government have included the following:

- **The Local Government Act 2002.** Local authorities are required, in their 10-year plans, to “identify all the significant forecasting assumptions and risks underlying financial estimates” (clause 11, schedule 10). This linked risk management with financial management, rather than isolating it as a separate required council policy along with investment policies, funding policies, and the like.
- **“Risk management for local government handbook”** (NZS HB 4360:2000). This was developed to provide more detailed guidance on the A/NZ Standard 4360. It listed various areas of risk typically found in local government. However, the handbook has not found widespread favour or uptake.
- **Asset management planning.** The introduction, from 1996 onwards, of formalised integrated asset management has probably been the most significant springboard for enhanced risk management. Risk management is seen as an important element of asset management.
- **Legal compliance good-practice modules.** The Society of Local Government Managers (SOLGM) has developed, under a risk management umbrella, a series of good-practice modules to help local authorities navigate their way through complex processes and avoid legal pitfalls. These modules mainly relate to consents-type processes.
- **Public Health risk management plans.** The plans specifically relate to the security of water source, treatment and reticulation.
- **NZ Transport Agency (NZTA) risk requirements for managing transport projects.** Several years ago, Land Transport NZ (now NZTA) introduced a requirement for Road Controlling Authorities (RCAs) to identify and manage potential risks for those projects that were above a given financial threshold and to which NZTA funding was attached.

The above points illustrate that the path to integrated risk management in local government has not been smooth or direct, and there is no solid foundation of legislative certainty. There are a number of risk side paths that have been added to the main path by various agencies for their own particular purposes and needs. No one doubts that integrated risk management is important in local government, but it is not yet a fundamental precept that is recognised in statute, carried out in practice, or monitored by a central agency.

In 2002 the then retiring Auditor General, in a valedictory report to Parliament on local government issues, said, “Unfortunately integrated risk management in local government has not developed as quickly or broadly as in central government.” Perhaps that observation is still pertinent seven years later.

⁴ This was tragic event where seven students were killed when the viewing platform they were standing on collapsed because of poor workmanship.

4.2 LEGISLATION AND RISK MANAGEMENT

The most important legislation governing local authorities is the Local Government Act (LGA) 2002. In many respects, this is a far-reaching and progressive Act that sets out the well-being councils are required to deliver to their communities, their governance and accountability arrangements, corporate planning, and a myriad of policies each council is obliged to formulate.

Unlike the Canadian, United Kingdom and Australian legislation, one notable omission in New Zealand is the lack of reference to risk management. While councils need to prepare many different policies and plans, there is no legislative requirement for a risk management framework or a risk policy.

Schedule 10, clause 11 of the LGA requires New Zealand local authorities to specify, in their 10-year long-term council community plans (LTCCPs), “all the significant forecasting assumptions and risks underlying the financial estimates”. If there is a “high level of uncertainty in a significant forecasting assumption”, it also requires an estimate of that uncertainty’s potential effects on the financial estimates being provided. The main focus of the Act is on explaining councils’ activities. For many councils, the roading or transport activity is significant and therefore it would be expected that most LTCCPs should include a reference to risk and uncertainty in the roading and transportation area. Instead, the risk and uncertainty relates to the effect on financial estimates, rather than a holistic assessment of all types of transport-associated risks.

SOLGM has issued good-practice guidance for New Zealand local authorities, to help them prepare good-quality LTCCPs. It has issued two papers that enlarge on the legislative provisions and help councils interpret what is meant by the legislation. The SOLGM paper “Living through the LTCCP” (2007) stresses the need for a risk register, and the publication *Dollars and Sense* (2007) provides more guidance on the assumptions that should underpin financial forecasts, and how to record the uncertainty surrounding those assumptions.

SOLGM has also helped New Zealand local authorities’ risk management by detailing good legal compliance practice in a number of activities undertaken by councils, based on A/NZ Risk Management Standard 4360. The activities covered by the legal compliance modules mainly relate to consenting processes and do not traverse transport-specific risks.

New Zealand territorial authorities that are RCAs are also subject to the Land Transport Management Act 2003 (as amended in 2008). This Act’s objective is to “contribute to the aim of achieving an affordable, integrated, safe, responsive and sustainable land transport system”. In respect of regional land transport programmes, local authorities, through Regional Land Transport Committees, must conduct land transport programmes that meet the purpose of the Act and of the Government Policy Statement on land transport. The 2008 Amendment to the Act establishes the NZTA’s mandate, operating principles and accountability mechanisms (for example, the annual Statement of Intent). However, this Act is silent regarding risk management philosophies or processes, either generally or specifically. There are references to ways of working, but these tend to dwell on consultation processes, procurement, and transparency of decision making.

4.3 ORGANISATIONAL REQUIREMENT TO UNDERSTAND RISK

Risk management is the same as any other aspect of good governance or management. The owners of an organisation should be responsible for ensuring they have a policy on risk that connects with other policies, such as governance policies or financial policies. The policy should be public and transparent. The owners should then ensure that the chief executive implements the risk policy

and reports on the major issues arising from it. The chief executive should engage and harness the resources needed to ensure the risk management processes underpinning the policy are implemented.

In New Zealand roading and transportation, a territorial local authority should be designated as an RCA. In a medium-sized rural authority, the roading or transportation activity will form a significant proportion of its total operations – typically, roading expenditure in such councils comprise around one-third to two-thirds of total council annual expenditure. Therefore it would be expected that risk management covering the transport activity would be a significant part of the council's risk management regime.

The people involved in risk management, and the extent of their understanding and involvement, are:

- **A mayor and councillors** who are elected every three years. Under local government legislation, they are mandated to focus on overall governance (employing a chief executive), strategic planning, setting service levels, and a variety of publicly released policies. Councils often have committees, one of which may focus on works and services.
- **A chief executive** who is responsible for implementing the policies and strategic direction, and who is the employer of all other local authority staff.
- **A risk co-ordinator.** Some councils appoint people who are the risk co-ordinators of the council-wide risk management effort. This role is often attached to a role within internal auditing. However, a risk co-ordinator should not be considered the risk manager, as this implies that one person is managing the risk, whereas all staff in the council should be doing this to some degree. The risk co-ordinator should ensure a consistent approach, an ongoing effort, and a facilitation/help role for those who need it. It is an “oil in the engine” role.
- **The transportation/roading asset manager** and associated team, which has the primary role in developing risk information that is relevant to the transportation activity. It not only identifies transport-specific risks, but is also involved with their ranking, monitoring and mitigation. The team and the manager should be responsible for assessing which risks need to be reported to the chief executive and, if necessary, communicated to the elected council. See Section 16.4 for more detail on the asset manager's role in the risk management process.
- **Other asset management teams** in council. It is important that other network personnel, particularly those from the area of stormwater and land drainage, are involved in the transportation team's risk management efforts. Similarly, transportation personnel should contribute to other interconnected network risk management efforts. There are increasing interdependencies between council- and non-council-owned networks, and this should be recognised in the risk management approach, to avoid silo thinking.
- **Council support functions**, such as information technology and finance, have a dual role in the risk management approach. Firstly, they can contribute their specific and expert input to risk identification and risk assessment – such expertise may be lacking in the transportation team. Secondly, council support functions (particularly information technology and information security) can provide the ongoing systems and information to monitor risk.
- **Contractors and service deliverers**, (whether external or internal) are at the front line of work on the networks – maintenance, resealing, rehabilitation, and new works. They have a first-hand appreciation of asset-related risks such as asset failures; they can also advise on what will or won't work in mitigation actions. Thus, their involvement in the risk identification process and the risk mitigation process is important.

Table 1 presents a suggested approach to the required understanding of the risk management process and the extent of various people's involvement.

Table 1 – Levels of understanding and management of risk suggested for a medium-sized rural local authority RCA

CORPORATE RISK REGIIME							TRANSPORTATION-SPECIFIC RISKS											
Organisation personnel	Risk policy	Risk framework	Risk monitoring and reporting	Risk identification	Risk ranking	Risk monitoring	Risk reporting	Risk mitigation	Mayor and councillors	Understand and approve	Understand	Periodically consider risk status reports	-	-	-	-	-	-
CEO	High understanding	High understanding	Approves risk status reports to councillors	-	-	-	Understanding of status of high risks	Overview of mitigation actions	Council risk coordinator	Intimate understanding	Intimate understanding	Preparation of risk status reports	Overview to ensure consistent approach	Co-ordinated with TAM	Co-ordinated with TAM	Co-ordinated with TAM	Monitoring effectiveness of mitigation actions	
Transportation asset manager (TAM)	Understanding	Understanding	Responsible for transport aspects of risk status report	Leader or champion of risk identification team	Consensus seeker or arbiter of rankings	Overview of monitoring actions	Prepares regular risk status reports	Supervision of mitigation actions	Transportation team	Understanding	Understanding	Understanding	Core part of identification team	Co-ordinated with support functions	Submits information for TAM	Submits information for TAM	Undertakes mitigation actions	
Other asset teams	Understanding	Understanding	Understanding	Understanding and input (interconnected networks)														

4.4 THE ASSET MANAGER'S ROLE AND RESPONSIBILITIES IN RISK MANAGEMENT

The transportation asset management team's primary role is in developing risk information that is relevant to the transportation activity. The team identifies transport-specific risks, and is closely involved with their ranking, monitoring and mitigation.

The team and the manager should be responsible for assessing which risks need to be reported to the chief executive and, if necessary, communicated to the elected council. Asset managers need to have a unique insight into risk through their professional training, their role as service providers, and their responsibility for the assets. They will understand the potential risk events that could affect the assets themselves, as well as the service that the assets provide. Asset managers are thus the best people to suggest practical and cost-effective risk mitigation procedures.

The risks in transportation networks are often overlooked. They may not be fully understood at the executive management or board level, or may be overlaid with more generic or corporate risks, and receive more management attention. Assets' and services' interdependencies and the interrelationship of risk events may also be overlooked. Asset managers need to be proactive in asserting their case in risk identification, assessment and mitigation, and making their voices heard at the senior level of an organisation.

4.4.1 Ensuring risk information is heard and acted upon

The following points can help asset managers to ensure that their information on risk is effectively heard and acted upon:

- Endeavour to speak the same language as the decision makers. Avoid technical jargon wherever possible.
- Use actual examples to illustrate risk issues. These can be examples from the organisation itself, or from other similar organisations. It's important that the examples show the potential ramifications and (often unintended) consequences.
- Make sure the asset management processes fall within the organisation's risk management processes, and are not at odds with it.
- Ensure the risk management effort in a particular infrastructure network is a team product, not just the ideas or views of one person.
- Look beyond the network to consider the interdependencies of risk
- Be proactive; workshop risk issues with professionals from a range of disciplines.
- Give management feedback that reports on risk events or risk mitigation procedures.

4.5 GET BUY-IN FROM THE TOP

Transportation is just one area of the organisation where risk will exist. Some organisations may only consider transportation risk, whereas others will take a risk-based approach to all business decisions. Taking a risk management approach for one asset group in isolation from the rest of the business creates a number of issues.

Risks identified in isolation will have not considered the domino effect that could occur to other activities and assets. For example, because stormwater assets have a significant impact on transportation assets the high risk associated with a stormwater structure's failure also implies a high risk to the roads and associated assets around that area. The consequential financial impact of a stormwater component failure should also include the consequential cost on the transport activities. Continuing with this example, there is a consequential impact on other parts of the organisation in a chain of events where overlapping risk sensitivity was not considered. Furthermore, the organisation is unlikely to prioritise resources into a process that appears to only affect one part of the organisation.

It is recommended that an organisational view of risk should be established. The first step is to establish the risk management context which includes the strategies, goals, objectives and the scope of the risk management process.

The organisation's risk management goals and objectives are usually presented in an organisation policy document. This covers the reasons for undertaking risk management, and the commitment to risk management across the whole organisation. This policy is a key step in getting organisational buy-in to the risk management process.

Because the policy is an organisational document, the opportunity for input into the draft policy document should be extended to all parts of the organisation. The risk management process implementation will have different resource impacts on different parts of the organisation (eg staff time, required staff skills, and changes to existing business processes). These need to be understood at the time the policy is drafted. These resource costs should be considered alongside the benefits for each part of the business, to provide a useful indicator as to the extent to which risk management should be adopted across the organisation. For example, if the cost of collecting and maintaining data on risks at a detailed level outweighs the benefits in terms of reduced risk exposure, then the decision may be taken to have a less detailed risk register.

The draft policy document presented to senior management for consideration should:

- Be easy to understand
- Be relevant to all levels of the organisation
- Clearly state the extent to which risk is to be used as a factor in business decision making
- List the policy's costs and benefits
- State who will be responsible for developing the risk framework
- State the process by which risks will be identified and assessed
- Assign responsibility for the risk register's ongoing management.

In adopting the policy, the management team will also need to commit to resourcing and supporting the risk management process. This may mean that extra resources need to be found, or that other organisational outcomes need to be sacrificed if the risk management process cannot be supported by the current business plan.

It is important that the organisation has an ongoing commitment to implementing the risk management policy. An effective way to facilitate this is for the organisation to view risk management as a project, and develop key performance indicators that align the project with the risk management policy's goals and objectives. Ideally the organisation will "ring-fence" risk management costs within the organisation's business plan, down to a departmental level if necessary, and report to the organisation on the performance of the project against the key performance indicators (including financial) on a quarterly basis.

4.6 GETTING STARTED

Simply developing and adopting a risk policy is not enough to make an organisation one that recognises risk as a key driver influencing decision making. A good risk management process needs to be integrated with other business processes and be one of the factors considered in all the organisation's decisions. When establishing the risk context, the organisation needs to establish processes to ensure risk management becomes part of business as usual.

For any organisation embarking on risk management, staff commitment will be a big issue. In order to become committed to a new business process, people need to understand:

- The need (why risk management is important)
- What is required
- How it will be implemented
- Benefits and/or gains of the policy.

4.6.1 Why risk management is important

It is important for the organisation to ensure the risk management policy and any resulting management decisions are communicated throughout the organisation. The risk management co-ordinator should develop a timely communication strategy where everyone receives the same message.

Briefing forums for each area of the organisation, led by the senior manager responsible for that area, with all forums following the same script

- Internal newsletter articles about the project
- Meetings with the key risk management teams
- Ongoing one-to-one conversations with key staff to ensure risk remains a regularly discussed topic
- Quarterly reports from the project team to senior management on the risk project, with input coming from all directly involved staff as key activities are completed.
- Celebrating key milestones by sending out regular emails.

4.6.2 What does risk management require?

Individuals need to understand what it is that is required of them. AS/NZS 4360 provides an easily understood risk management framework and is a useful tool for explaining how business will change when risk management is taken.

4.6.3 How is risk management implemented?

Risk management should be undertaken in a planned way across the organisation, with the risk management project plan covering how it will be implemented. The risk co-ordinator needs to communicate to others how the organisational changes will occur. All staff need to know:

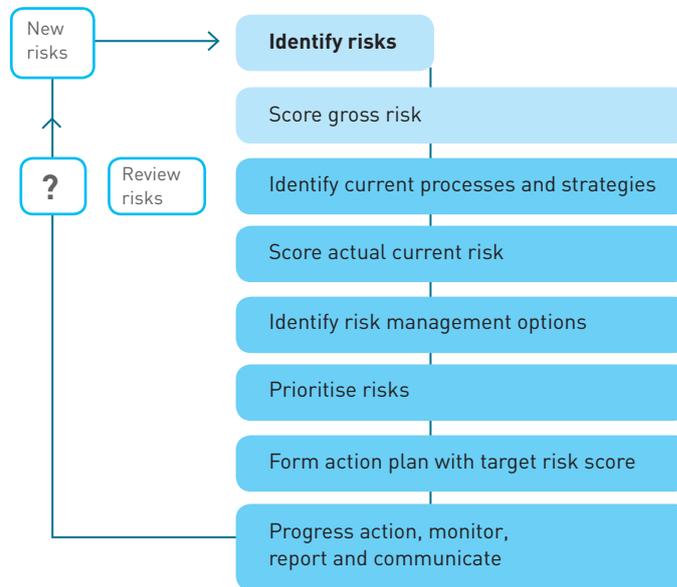
- The names and roles of project team members
- Who will receive risk management training, when, and where
- How risks will be identified in the risk register; how the consequence and probability of failure will be assigned to each risk; and who will have the ongoing responsibility for updating the risk register
- The organisation's approach to managing risk, once the total risk exposure has been identified
- How risk information will be accessed
- The organisation's expectation of how risk information will be incorporated into standard procedures and decision-making processes. This will include, for example, only differences for different-sized projects; criticality of assets; risk impact; and how risk management will be used to prioritise projects
- The relationship between the risk management process and existing emergency management practices.

4.6.4 Benefits and/or gains of the policy

Regardless of the benefits to an organisation, individuals need to understand the personal benefits the change offers before committing to it. Risk management practices carry many benefits for individuals, and it is important these are communicated to operational staff. The benefits include:

- Organisational recognition of the uncertainty associated with the routine decisions individual staff members make
- A means for identifying where unacceptable risks exist and a justification for managing them
- A fair platform on which one person's projects can be assessed alongside those from other units
- Training in a new skill area that is of marketable value in a wide range of organisations, and can be added to *curricula vitae*.

5. Identifying transport/roading activity risks



This section discusses establishing a suitable transport/roading risk register. Staff awareness of the register, and its usability, will affect the number and types of risks they identify. It is important risk is identified from a range of perspectives.

Good practice means:

- A robust process is undertaken to initially identify risks
- A full range of risk types is identified at the activity level
- Asset risks are identified
- A suitable, usable risk register is established
- The risk register is available to key staff, and all staff are aware of its purpose
- Risk descriptions are clear and unambiguous
- There is balance in the number of risks types considered for the wide spectrum of risk types.

5.1 RISK IDENTIFICATION PROCESS

Workshops can be a useful for bringing a wide range of input and knowledge into the risk identification process.

Before assigning responsibility for risk events, check the asset register to identify which group/s are responsible for the asset.

For some assets, there will only be one type of risk event that will impact on it; for others, there will be a number. For example, a bridge may: physically fail; have capacity failure (ie be too narrow for the traffic wanting to use it); be over- or under-sized for the volumes of traffic using it; or become impassable at times because of natural events, etc.

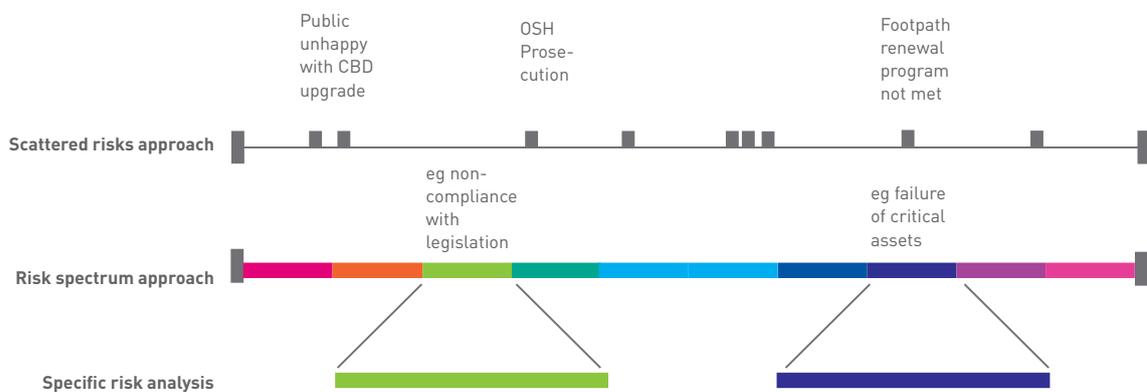
While identifying the risks for the risk register, it is also important to identify critical assets. Critical assets are usually ones for which there serious consequences if they fail. While critical assets do not necessarily have a high probability of failure, the high consequence of their failure means the approach to managing them may be different from other assets.

Once these steps have been completed, risk ranking can be undertaken. This involves assigning consequences and probabilities to each risk event for each asset group. This will complete the current risk assessment and the organisation will be able to quantify its current exposure to risk.

5.1.1 Covering all risks – the Risk Spectrum approach

Figure 3 below gives an example of a full risk spectrum, specific risk areas and scattered risk.

Figure 3 – Overall risk spectrum (Based on GHD training material, 2009)



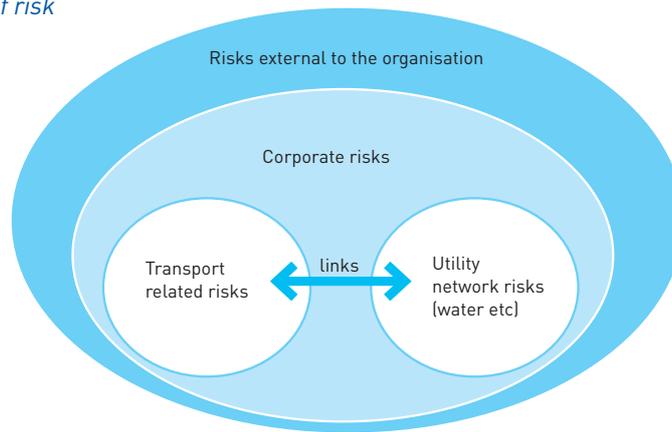
5.2 RISK AREAS TO INCLUDE

Figure 4 illustrates the following three broad elements to risk:

- A broad umbrella of overarching risks from external factors and influences reflecting the organisation’s operating environment
- The organisation-specific risks that can be attached to all an entity’s activities, including overall corporate, governance and financial risks
- The more specific organisational risks associated with transportation network management.

Any transportation network risk register or risk profile should include aspects of these elements.

Figure 4 – Three elements of risk



Having established the contextual framework, broad risk areas headings can be considered first, and then the specific risk areas.

The broad-risk areas could be labelled planning risks, management risks, delivery risks and physical asset risks. The specific-risk headings that can be included are illustrated in Figure 5. Each risk area is further expanded in subsequent sections.

Figure 5 – Specific risks for each risk area

Planning risks	<ul style="list-style-type: none"> ▪ Strategic planning risks ▪ Asset management planning risks ▪ Levels of service risks ▪ Natural event and environmental risks ▪ Strategic planning risks
Management risks	<ul style="list-style-type: none"> ▪ Systems/information risks ▪ People risks ▪ Financial risk
Delivery risks	<ul style="list-style-type: none"> ▪ Procurement risks ▪ Project management risks ▪ Contract management risks ▪ Communication risks
Physical Asset risks	<ul style="list-style-type: none"> ▪ Risks common to all assets ▪ Risks associated with specific asset types

5.3

EXAMPLES OF GOOD-PRACTICE RISK REGISTERS AND SCORING TABLES

Table 2 – Recommended (minimum elements) risk framework register for use by a council with limited resources (regardless of council size)

Risk description	Nature of risk	All existing practices and strategies in place	Effectiveness	Current risk score			Options to further manage risk	Defined actions	Responsibilities/ time frame/costs
				Consequence	Likelihood	Score			

Risk description	Nature of risk	All existing practices and strategies in place	Effectiveness	Current risk score	Options to further manage risk	Defined actions	Responsibilities/ time frame/costs	Link to forum, improvement plan items	Target residual risk

Table 4 – Recommended table for rating consequences

Consequence	Score	Factor				
		Financial	Livelihood	Reputation/image	Operational	Environmental
Catastrophic	5	<ul style="list-style-type: none"> Loss of at least \$10M 	<ul style="list-style-type: none"> Loss of life Loss of many properties 	<ul style="list-style-type: none"> Prolonged adverse national media and political attention 	<ul style="list-style-type: none"> Loss of capability and service levels for many weeks for many users, or permanent loss of a significant service for a few 	<ul style="list-style-type: none"> Widespread irreversible damage to ecosystems Permanent loss of one or more species
Major	4	<ul style="list-style-type: none"> Loss between \$1M and \$10M 	<ul style="list-style-type: none"> Serious injury Loss of property/livelihood 	<ul style="list-style-type: none"> Some adverse national media, prolonged regional media attention 	<ul style="list-style-type: none"> Loss of capability and service levels for up to two weeks for many users, or many weeks for a few users 	<ul style="list-style-type: none"> Widespread long-term damage to ecosystems Significant reduction in one or more species
Moderate	3	<ul style="list-style-type: none"> Loss between \$250,000 and \$1M 	<ul style="list-style-type: none"> Moderate injury Some personal loss 	<ul style="list-style-type: none"> Adverse regional media attention 	<ul style="list-style-type: none"> Loss of capability and service levels for up to a week for many users, or four weeks for a few users 	<ul style="list-style-type: none"> Localised medium-term reversible damage to ecosystems Moderate reduction in one or more species
Minor	2	<ul style="list-style-type: none"> Loss between \$50,000 and \$250,000 	<ul style="list-style-type: none"> Minor injury 	<ul style="list-style-type: none"> Adverse attention from community groups, some media attention 	<ul style="list-style-type: none"> Loss of capability and some disruption for a few users Occupies council time and resources 	<ul style="list-style-type: none"> Localised minor reversible damage to ecosystems Temporary reduction in one or more species
Insignificant	1	<ul style="list-style-type: none"> Loss less than \$50,000 	<ul style="list-style-type: none"> Nil 	<ul style="list-style-type: none"> No significant adverse comment 	<ul style="list-style-type: none"> Minimal or no loss of capability or service level Some council resources required 	<ul style="list-style-type: none"> Localised short-term reversible damage to ecosystems No species reduction

Table 5 – Recommended table for rating likelihood of occurrence

Likelihood	Descriptor	Frequency (use as a guideline)	Score
Almost certain	Is expected to occur in almost all circumstances	Continually	5
Often	Will probably occur often	3–5 times per year	4
Likely	Might occur from time to time	1–2 times per year	3
Unlikely	Could occur only very occasionally	Once every 2–5 years	2
Rare	May occur only in exceptional circumstances	Less than once every 5 years	1

Table 6 – Recommended risk assessment matrix

	Consequence				
Likelihood	Insignificant (1)	Minor (2)	Moderate (3)	Major (4)	Catastrophic (5)
Rare (1)	L	L	L	M	M
Unlikely (2)	L	M	M	H	H
Likely (3)	L	M	H	H	E
Often (4)	M	H	H	E	E
Almost certain (5)	M	H	E	E	E

Table 7 – Recommended ratings for risk reaction

E	Extreme	Requires immediate remedial action
H	High	Requires remedial planning and action via the AMP
M	Moderate	Address via new procedures and/or modification of existing practices and training
L	Low	No formal requirement for further action, unless escalation of risk is possible

Table 8 – Recommended ratings for the effectiveness of practices and controls

Excellent	Fulfils requirements thoroughly, very robust, with positive measurable effects
Good	Fulfils requirements, robust and measurable, some room for improvement
Fair	Barely fulfils requirements, effects hard to measure (or haven't been audited or measured), improvement required
Poor	Not fulfilling requirements, little measurement of effect on overall risk
Very poor	Totally ineffective in avoiding or mitigating associated risk events



RESEARCH LEARNING:

Number of risks

Research shows the number of risks identified has the most significant effect on the resources required to set up a framework. In cases where the framework was complex, and the process of analysing each risk was complicated, the level of resource required was exacerbated. Across the councils, there was a wide range in the number of risks identified – as few as seven and as many as 91.

Note: The research also shows there is always the potential to split risks so distinctly different impacts can be analysed. However the temptation to create too many risks from one generic risk should be avoided, unless the risk score justifies making a more specific analysis. The challenge is to firstly ensure the framework is of a suitable level of complexity and, secondly, to ensure the number of risks does not capture an inordinate amount of resources to establish or maintain the framework in future.

The risk register's form and clarity

The research also showed common agreement within councils that a simple risk management process and a simple application to record it, often resulted in a better uptake from staff. For the most part, the registers were easy to follow. Other findings on this topic showed:

- It was helpful when the columns were arranged left-to-right and followed the same order as the risk management process
- Column titles must be carefully thought out so they accurately reflect the contents and assist the user. Using colours or shading to indicate risk levels could highlight the main issues
- Having to reference notes on other pages in the document makes using the register more difficult. Full risk descriptions, rather than their acronyms, makes the register easier to understand
- The fewer columns the better
- A key success factor involves thinking about the register's presentation and its use by people without a technical mindset
- Availability and awareness of the risk register.



The availability of the register ranged between its publication in the AMP, to being accessible to all staff via the council intranet. While it is acknowledged that staff other than key transport/roading staff and management do not need specific knowledge of the register's detailed contents, there is benefit in ensuring there is a good awareness of its existence and the culture this represents. The councils studied had established a good awareness of the register and contents among key transport/roading staff and management, usually by involving these people in the risk management process. Some councils were active in making operational staff and contractors aware of the process and its outputs.

Risk descriptions

Most councils' risk descriptions were very clear and unambiguous. This was often aided by having a number of columns (such as what can happen, how it can happen, consequences, assets affected) to make sure each risk event was clearly described and differentiated from other risks. However, some risk descriptions were too brief and required additional information, as they did not accurately describe the risk impact.

Template

Many councils sought external assistance on what the framework should look like and what risks should be considered.

It was noted that the best way to offer this assistance was by adopting a risk template.

To facilitate this, two potential formats are presented in Section 5.3 (Examples of good-practice risk registers, and Scoring tables). One is a basic format that covers the key risk management elements of, and is designed for organisations that have limited resources, regardless of size. The second is a suggested format for a council that wants a more comprehensive approach and has the resources and time to develop it. It also contains suggested risk-scoring tables and criteria made up from a combination of different frameworks that are considered appropriate practice. It also offers a suggested list of risks typically faced at the transport/roading activity level as a starting point for councils to establish their own list of identified risks.

5.4 ROADING/TRANSPORT ACTIVITY RISK EXAMPLES

5.4.1 Planning risks

Note: many of these risks can be expanded into more detailed risk analysis (for example the Lifelines risks, elements of asset management, consequences of certain programmed items not being achieved). However the list below provides a minimum good-practice approach as a starting point.



- » **Inadequate asset management/infrastructure strategy planning** – this can involve, for example the planning not being up to date, or the processes and outputs being of insufficient quality
- » **Non-compliance with legislation and legal requirements** – inability or failure to comply with consents, statutes and national standards for example the OSH requirements, or inadequate signage
- » **Inability to comply with council's own standards** – for example not meeting benchmarks or milestones set by council
- » **Insufficient business continuity planning for disruptive events**
- » **Ineffective strategic planning (internal council)** – for example lack of integration between the different arms of the council; pursuing objectives that are at odds with each other; causing council-wide issues or funding issues
- » **Ineffective input into regional strategic planning** – results in reduced funding available to council, extra requirements, clashing objectives
- » **Risks associated with council-owned roads and bridges on private land** – for example council-owned bridges and walls on private property/privately owned bridges and walls on council property; unknown ownership; reliance on private structures
- » **Underestimating the effects of climate change** – inadequate council readiness, resulting in for example the sea encroaching onto roads; consecutive droughts causing subsidence
- » **Overestimating the effects of climate change** – resulting in conservative design and excessive use of funds
- » **Insufficient traffic demand management** – for example increased congestion leads to higher loading time and reduces the life of roads; inability to balance between commuters' and local short-trip users' needs
- » **Inappropriate number of car-parking facilities on the street** – under- or over-provision
- » **Inappropriate number of car-parking facilities off the street** – including car parks for the disabled
- » **Lack of transport alternatives** – for example cycleways and walkways

- » **Poorly defined levels of service** – affecting community expectations; increased costs; inferior assets and services
- » **Extreme natural hazards** – for example earthquake/volcano/tsunami causing damage to assets and/or hindering community growth
- » **Moderate natural hazards** – for example landslip/major storm event/heat wave causing damage to assets and/or hindering community growth
- » **Dust nuisance** – dust settling on adjacent properties, resulting in health issues for residents, negative environmental effects, and/or poor image because of unsealed roads or roadworks
- » **Hazardous materials** – for example leakage from a vehicle damaged in an accident or with a slow leak; bitumen spills and its effect on stormwater
- » **Surface water contamination** during the network's normal operation; lack of controls causing environmental impacts.

5.4.2 Management risks

Note: many of these risks can be expanded into a more detailed risk analysis (for example the risk of losing certain types of funding), but this table provides a minimum good-practice approach as a starting point.

- » **Lack of staff resources** – for example the inability to attract key staff and/or retain skilled staff
- » **Loss of system knowledge** – for example the inability to retain knowledge, loss of institutional knowledge; insufficient systems in place to manage data/information, especially regarding asset performance and condition; information technology (IT) failure, or inability to scope IT priorities
- » **Insufficient technology** – for example the inability to track technology, engineering developments/ techniques and local and national trends, and to utilise these where relevant
- » **External economic influences** – for example the cost escalation of oil/road materials/ quality aggregate – economic viability and sustainability
- » **Inability to utilise funding options** – both internal and external, for example failure to acquire external subsidies/not applying for funding on time/not identifying areas where funding is required, leading to inability to maintain levels of service
- » **Diminishing funding allocation** – for example reduced contribution from subsidies/property rates/ taxes/development charges, or a change of roading status, resulting in an inability to maintain levels of service
- » **Lack of political alignment** – for example the inability of elected members to fulfil roles and responsibilities, or a disregard for community/staff views
- » **Handover of low-quality assets** from property developers or council
- » **Shortage of local contractors and consultants**
- » **Inadequate event management.**

5.4.3 Delivery risks

Note: many of these risks can be expanded into a more detailed risk analysis (eg consequences of not complying with certain legislation), but this table provides a minimum good-practice approach as a starting point.

- » **Inadequate project management** – for example projects inadequately scoped, budgeted, managed, documented, and reviewed/inadequate consultation with owners/resource consent issues, resulting in excess time and cost, loss of image and other impacts
- » **Inadequate portfolio management** – failure to deliver on commitments because of over-/under-spending of budgets, or deferring transport/roading projects
- » **Inadequate maintenance contract management** – poor contractor performance resulting in unnecessary or excessive costs and/or insufficient output or quality
- » **Inadequate capital works contract management** – poor contractor performance resulting in unnecessary or excessive costs and/or insufficient output or quality
- » **Non-compliance with legislation and legal requirements** – inability or failure to comply with consents, statute and national standards for example increased OSH requirements, inadequate signage
- » **Inability to comply with council's own standards** – not meeting benchmarks or milestones set by council
- » **Service level agreements between transport/roading and other parties (internal or external) not met, or non-existent** or inadequate service provided to, or by, other activities (for example internal business units, regulatory departments)
- » **Unsatisfactory working relationships with utilities (for example power, telecommunications, council water and waste)** – causing delays to projects and negative impacts on service levels/ coordinating work programmes
- » **Handover of low-quality assets** – from property developers or council
- » **Shortage of local contractors and consultants**
- » **Inadequate event management**
- » **Ineffective enforcement measures** – for example of car parking, unauthorised vehicles using restricted lanes
- » **Inadequate public relations management** – resulting in public misunderstanding of infrastructure problems, projects and programmes
- » **Inadequate procurement practices** – not using optimal procurement options, resulting in for example cost increases/lost staff time/delays.

5.4.4 Physical asset risks

Note: many of these risks can be expanded into a more detailed risk analysis (for example damage to assets from various specific means), but this table provides a minimum good-practice approach as a starting point.

ALL ASSETS

- » **Inadequate condition/performance assessments** – lack of reliable data for renewals/replacements and valuations
- » **Damage to infrastructure through vandalism**

ROADS/PAVEMENTS

- » **Inadequate road design** – for example substandard geometry/surfaces/markings resulting in inefficient or unsafe operating conditions (loss-of-control accidents); road pavement not inadequately designed for ADT
- » **Inadequate road maintenance** – for example substandard surfaces resulting in higher long-term costs and inefficient/unsafe operating conditions (such as, for example loss-of-control accidents, potholing, or stone loss)
- » **Low-lying road** inundated by floods during heavy-rainfall events
- » **Loss of amenity and visibility caused by roadside vegetation** – for example noxious weeds and debris spreading within the road reserve; debris blocking stormwater drains/snow on roads – resulting in unsafe operating conditions (loss-of-control accidents)
- » **Road-user conflicts** – impacts due to conflict between different user types, for example cyclists in busways/pedestrians on roads

STREETLIGHTS

- » **Inadequate street lighting** – resulting in crime, safety considerations
- » **Damage to streetlights** – due to vandalism and/or vehicle damage, resulting in crime, replacement costs and safety considerations

FOOTPATHS/ACCESSWAYS

- » **Inadequate footpath quality** – because of for example poor design/construction/materials/funding/utilities reinstatements, resulting in pedestrian slips/falls, and inaccessibility
- » **Inadequate accessibility** – for physically and visually challenged persons, wheelchairs, strollers, walkers, prams, mobility scooters (including lack of footpaths, thus limiting accessibility)

SIGNAGE

- » **Inadequate signage/markings causing accident/damage** – non-compliant to standards or missing because of for example vandalism, deterioration (includes sight rails, chevrons, edge-marker posts, bridge-end markers, culvert markers)

GUARD RAILS/MEDIANS

- » **Guard rails/medians damaged and/or missing**

DRAINAGE

- » **Flooding affecting roads** – for example inadequate drainage/poor location/blocked drainage assets, causing inaccessibility or unsafe driving conditions

BRIDGES AND STRUCTURES

- » **Wall failure** resulting from a natural hazard (for example landslide/undermining) or vehicle impact, affecting accessibility
- » **Bridge collapse/damage/deterioration/erosion/blockage** – affecting accessibility, safety (but excluding catastrophic events)
- » **Damage to services on structures** – causing for example loss of water supply/electricity/telecommunications
- » **Structure damage from overloading** – causing faster deterioration of bridges/culverts/structures
- » **Vehicle, pedestrians or objects fall** (or objects are thrown) from bridge

CAR PARKS

- » **Inappropriate number of car-parking facilities on the street**
- » **Inappropriate number of car-parking facilities off the street** – including car parks for the disabled
- » **Inadequate quality of car parks** – for example signposting/design in regards to national standards (with reference to the national standard – Manual of traffic signs and markings (MOTSAM) (NZTA 2009)

PUBLIC TRANSPORT

- » **Lack of bus shelters** – resulting in reduced patronage, people exposed to the weather
- » **Lack of quality bus shelters** – resulting in reduced patronage, people exposed to the weather

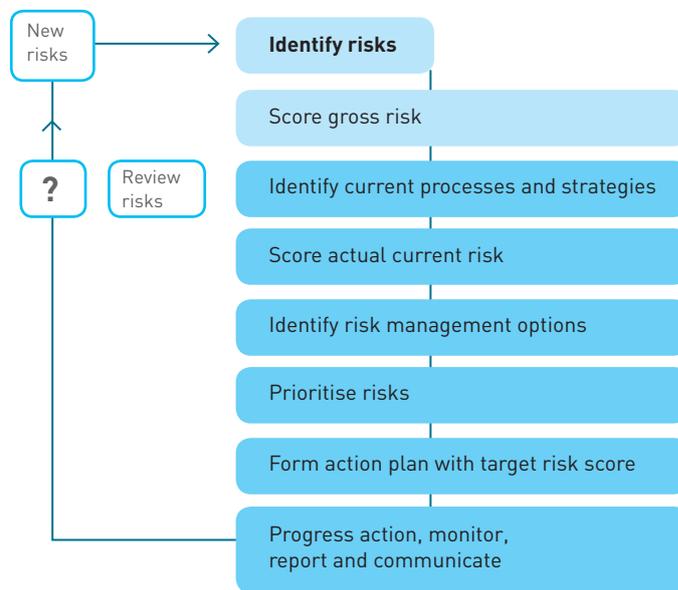
CYCLEWAYS

- » **Inadequate cycleway quality** – for example poor design/construction/materials/ funding/utilities reinstatement, resulting in accidents and inaccessibility

TRAFFIC SIGNALS/CONTROLS

- » **Power outage causing delays and potential accidents**
- » **Inadequate phasing of signals**

6. Evaluating and prioritising transport/roading activity risks



This section discusses the scoring methods councils use to evaluate identified risks, and the methods they use to prioritise risks. In addition, the various definitions of risk have been evaluated, to ensure risks are analysed unambiguously.

Good practice means:

- Risk-scoring criteria and tables are established
- Gross/total/inherent risk is scored
- Residual/net/actual current risk is scored
- Risks are prioritised.

Risk specialists have debated the value of the matrix scoring method. The consensus seems to be that it is a useful tool that can provide a good indication as to the degree of risk, but the matrix loses value if it is unnecessarily complex.

6.1 GROSS RISK

Gross risk considers what the risk impact would be if no measures were in place to avoid or mitigate it. It is essentially hypothetical, as it involves imagining and then defining what would happen if the council had no systems, processes or resources to manage a risk event.

The benefits of considering a gross risk scenario are significant:

- By comparing gross risk with current actual risk, the effect existing practices are having on risk impact are actively demonstrated and can reinforce the need to maintain the status quo. By determining the risks to levels of service, the risk profiles that could result if current resources were reduced can be demonstrated.
- More risks are likely to be addressed – scoring gross risk reduces the temptation to not list a risk simply because it is currently well managed. For example, it could be taken for granted that current staff know how to obtain funding for an activity, so the risk of not having the skills to obtain funding would not be listed, analysed or recognised.
- It makes analysis of the current actual risk much clearer and more transparent. If only current actual risk is evaluated, there can be a tendency to raise the risk level to demonstrate the probability of an event occurring if it is not managed. If, for example, an inability to obtain funding is seen as a low risk, but staff want to show that it is important, they might show it as a medium risk. By defining gross risk as medium and current risk as low, the effect of current practice can be clearly shown without exaggerating the current risk exposure.
- It reinforces understanding of the risk management process and the level of practitioners' competence.



RESEARCH LEARNING:

Gross risk

A gross risk score is not usually used to prioritise risks or actions, so a simpler approach appears to be sufficient. However, as noted, gross risk can be used to demonstrate the effectiveness of current practice and strategies. A complex approach to scoring gross risk may suit certain personalities and activities, but may make it difficult to gain acceptance as a general format across the organisation, or achieve buy-in from current or future staff.

While it is not essential to consider gross risk, there are several benefits to doing so.

6.2 SCORING CURRENT RISK

Estimating the current risk score is not always simple. During the evaluation, a good question is, “How many times has something this bad happened?” This is where information, data and analysis is invaluable in helping with a more realistic assessment of the likelihood or consequence of an event. When assessing this, experience can be drawn from other councils’ practice. There is potential for more dialogue between councils on the way actual risk is scored. When assessing current risks, identifying existing controls is important.

6.3 TARGET RISK

The concept of target risk means if there are nominated improvement actions, their effective implementation should result in a lower actual/net/residual risk score. It is good practice to consider a target risk if the time and resource is available. However, it is only of value when the risk has been prioritised for action, rather than attempting to score for every risk regardless of outcome or influence on the organisation. It is most useful as a check to indicate whether the improvement actions will actually affect the risk value or not.

6.4 PRIORITISING RISK AND RISK APPETITE

Risk appetite is the amount of risk an organisation is willing to accept in pursuit of its objectives. A good approach is to use the risk scores as a filter to identify the higher risk scores and prioritise the risk events from there. For example, each high-to-extreme risk could be discussed further and a decision made as to whether the risk should be accepted, or further measures adopted to avoid the event or mitigate its consequences. There is some research advocating that putting risks in priority order (eg in order of least acceptable) is more meaningful and effective than applying scores and prioritising by score order.

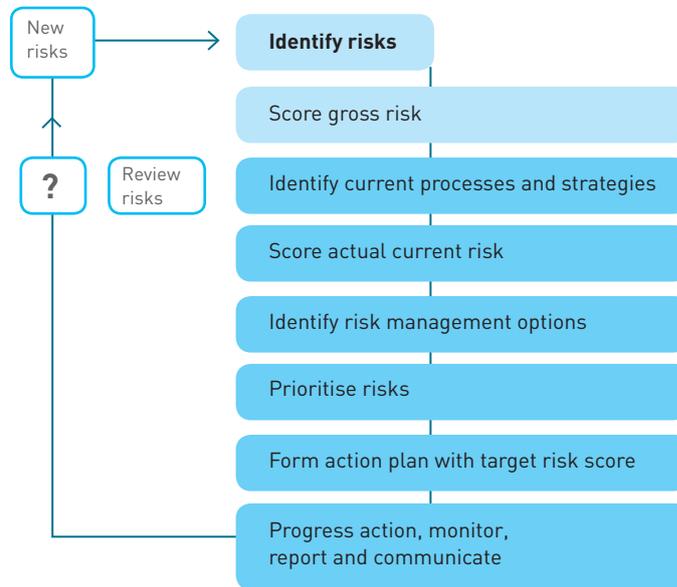


RESEARCH LEARNING:

Prioritising risk

Note: The predominant belief is that prioritising risk is based on the risk score (ie the higher the risk scores, the higher the priority). To a large extent that should hold true, but it does not automatically mean the management options proposed for the highest risk scores should have the highest priority. For example, it could be that a natural disaster risk scores the highest, but any amount of proposed action may not affect this score. Therefore, it may not carry as high a priority as other lower-scored risks.

7. Identifying current practices to avoid or mitigate risk events



This section deals with the methodology to identify and evaluate risk management strategies for effectiveness. This is critical to evaluating how much risk is avoided or mitigated by current practices, and allows a clear appreciation and more balanced scoring of the current risks faced.

Good practice is where current practices, controls, strategies and risk treatments that avoid or mitigate risks are listed and considered, and current practices are evaluated for effectiveness.

7.1 TERMS USED

Using the heading Controls in the register can limit the entries to only the processes dedicated to reducing risk, such as reviews, monitoring. Benefits can be gained by expanding the Controls list to include all the current practices and strategies being employed to avoid or minimise the risk impact (even those imposed via legislation, for example the LTCCP, or the annual plan processes).

Identifying existing controls is an essential step in the risk management process set out in AS/NZS 4360:2004, and is currently placed immediately before the current risk assessment. Existing controls are pivotal to accurately scoring this risk.

It is advisable for the Existing controls column on the register to be situated immediately before the Current risk scores column. This helps to focus the scoring. It is good practice to recognise what is already being done to maintain current risk levels, so that those practices and strategies are maintained. Ideally, a gross risk score should be entered before existing controls are scored, to provide a visible definition of how bad something could be.



RESEARCH LEARNING

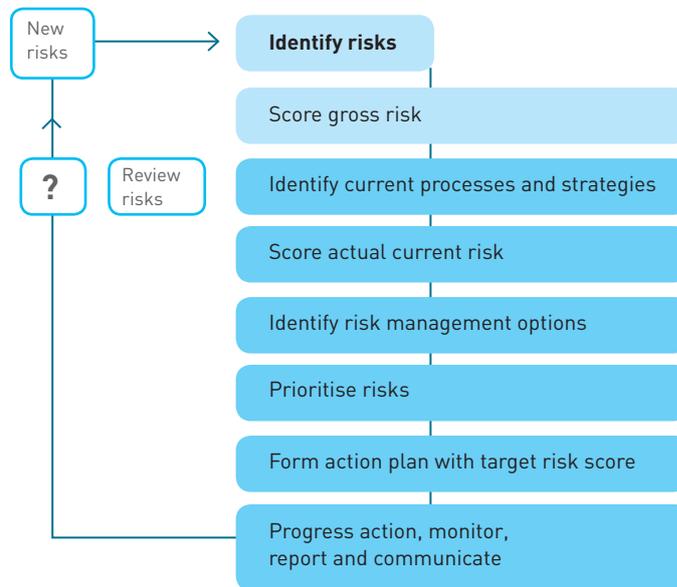
Risk terminology

The main issue with all these titles is that they do not prompt a list of all the current practices and strategies being used. The term Controls can limit the entries made to only the processes dedicated to reducing risk – such as, for example, reviews or monitoring. Controls are risk management jargon, and should be replaced with the terms practices and strategies, or something similar. Benefits could be gained by expanding the Controls list to include all the current practices and strategies being employed to avoid or minimise the risk impact (even those imposed via legislation such as the LTCCP and annual plan processes).

7.2 EFFECTIVENESS

Scoring a current practice as not effective does not necessarily mean it is ineffective in its totality (risk management may not be the focus of every practice), but merely that it doesn't do much to manage the risk that has been identified. It is important to consider the effectiveness of the established controls and practices, as it can be easy to fall into the trap of identifying a number of processes that should control a risk, and subsequently scoring the current risk on the assumption that all these processes are working well and effectively, when that may not be the case.

8. Identifying improvements and actions to avoid or mitigate risk events



This section discusses identifying improvement actions and options. The methods of following through on these actions have been investigated, including how options and actions are prioritised, costed, resourced and planned. The links between the proposed actions and the risk scores and priorities are also considered.

Good practice means:

- Possible improvement options are discussed and listed
- Defined improvement actions/future risk treatments are determined and listed
- The risk appetite is assessed and agreed on
- Responsibility for risks and improvement actions are assigned
- Resources, costs and time frames for improvement actions are assigned
- Improvement actions are linked to the risk event priorities.



An example of good practice is where a council requires an individual management plan to be formed and managed via the annual plan process for each extreme risk. It is important to have a link between the risk priorities and the need for actions, and to note that a high risk score does not automatically translate to priority of action – however, the risk score should be a filter that highlights items to consider for prioritising.

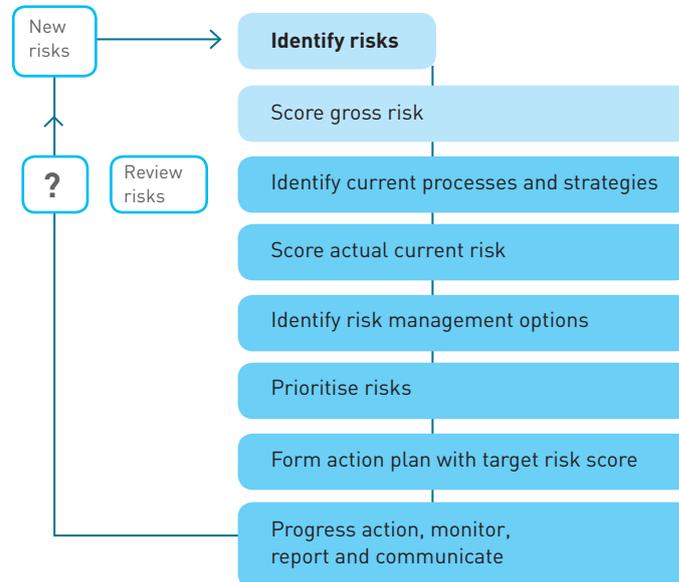
In many council management areas, there is often a reluctance to nominate actions, define responsibilities and create time frames. This can stifle innovation as there is little incentive or flexibility in the registers to effectively brainstorm possible courses of action, regardless of whether they are currently practical. To overcome this it is recommended that a possible management options column be used.

Expressing risk appetite to prioritise and assign action, or to simply accept the risk, would most logically occur at this point in the process.

From a concise list of the highest scored risks, a risk appetite exercise should take place to decide if any action is warranted or needed. Then priorities should be assigned to determine actions, resourcing and scheduling actions (ie what, who and when). This does not necessarily mean all the management options identified would automatically become the required actions, but that a concise course of action for each prioritised risk should be identified and monitored.

While the risk management process identifies improvement actions for reducing risk in future, there is also potential at this stage in the process to identify actions that form an assurance plan. Where it is demonstrated that current practices and strategies are effective in preventing a potentially large risk to the organisation, actions should be identified that will provide a level of assurance that current practices remain effective. A risk management plan alone does not strictly have to provide this output, but the value of identifying assurance actions is obvious if the groundwork has been done in the risk assessment and management framework.

9. Reporting, monitoring and reviewing risks, and identifying improvements and actions



This section discusses the risk framework continuity, and reviewing and updating responsibilities for reporting and monitoring.

Good practice means:

- Key staff are made aware of their responsibilities regarding risks and improvement actions
- The results of ongoing risk management are reported appropriately to a suitable forum
- There is an established process for adding and reviewing risks and the risk framework.

One of the most significant outputs of an RMF is reinforcing the importance of various risk management processes and practices to staff. The risk management process inevitably demonstrates the value of current practices and facilitates making improvements. It may not report anything new, but any resulting improvements need to be monitored and reported on appropriately.

Improvements to processes and practices, resulting in reduced risk, inevitably flow from the development of an RMF. These obviously should be noted in the RMF and followed through.

Processes could easily be improved by deciding the improvements required, assigning priority (based on risk appetite), time frame, responsibility and resources, and monitoring their progress by reporting to an appropriate forum. This would be considered standard good practice, in line with the expectations of the AS/NZS 4360 and ISO 9001 Standards.

The answer is not to create a risk management improvement plan that is unrelated to other improvement plans, but to incorporate it into a more central, regularly monitored register of improvements. An asset-management improvement plan would be a logical means of capturing improvements generated via the RMF. If a comprehensive asset-management gap analysis has been undertaken and improvements noted, the RMF actions identified tend to reinforce the importance of broader, integrated asset management improvements – any new actions identified via the RMF are the exception. Similarly, it assists when the overall improvement plan links to and references the RMF.



RESEARCH LEARNING: REPORTING, MONITORING AND REVIEWING

Responsibility for reporting, monitoring and reviewing risk

Case studies demonstrate that the asset management plan (AMP) is invariably the vehicle for publishing the RMF outputs, including any assigned actions. Because key transport/roading staff are usually involved in forming and updating the AMPs, there is knowledge of the roles and the responsibilities to manage risk amongst those involved.

The view of many asset managers is that they manage risk on a daily basis and are aware of the risks they are dealing with. However, this does not necessarily translate through to awareness of the responsibility for action arising from the risk analysis.

Reviews, adding and updating risks

Case studies show that the intention to manage a live document does not always occur in practice, with asset managers tending to wait until the next AMP review to review risks. While it would be good and prudent to update the register at any time, an urgent change or need justifying an update is rare in practice. Any urgent change is presumed to be in the immediate consciousness of the council, and being acted upon regardless of whether the risk register is updated, such as for a change in legislation affecting funding.

Reporting

Some councils have a formal process for reporting on risk, with risk being listed on standard meeting agendas for management.

Escalated risks are more likely to have been generated by events that are currently causing the biggest problems, rather than being generated as an output of the RMF. In case study interviews, it was rare to find direct examples where the RMF had generated an output that had come as a complete surprise to management.

One of the most significant outputs of an RMF is in reinforcing the importance of various risk management processes and practices to staff. The risk management process inevitably demonstrates the value of current practices and prompts improvements. Developing an RMF does not generally give rise to anything new, but any resulting improvement actions should be monitored and reported on appropriately.

Monitoring improvement actions

Councils often do not have any practical means of defining follow-through actions from the risk process in a comprehensive, formal, monitored way.

Standard good practice, in line with the expectations of the ISO 31000 and ISO 9000 standards is the weakest risk management process area across the councils studied.

10. Integrating risk management with the asset management plan

This section discusses how the asset management plan (AMP) is used to reflect the outputs of the risk management framework (RMF), and how risk is referenced or integrated throughout the AMP document.

Good practice means:

- Risks are incorporated into the AMP
- Outcomes from the risk management process are integrated throughout the AMP
- Any innovations related to linking between the risk management framework and other council systems are implemented.

There is merit in improving the way the AMP Risk section is written and integrated into the rest of the AMP. AMP Risk sections often comprise only the theory and methodology of risk management, but should be geared towards discussing the main risks determined by the framework, and how these risks are going to be addressed in terms of scheduled, resourced actions.

The results of the risk analysis should permeate, or at least flavour, other sections of the AMP. For example, the Life cycle section, Levels of service section, and especially the Improvement plan should all reflect how the risks to various assets and services are to be addressed.

Risk management is increasingly seen by councils as an integral input into asset management planning. Councils should not let risk management alone drive asset-related decisions, but use it to assist in making sound, defensible decisions.

Inherent risks are typically understated in an AMP. But although they are known to experienced local authority staff, they are not necessarily appreciated by less-experienced staff, politicians or the community. The RMF is a powerful vehicle for putting these risks in context as clearly as possible, so others can appreciate the full extent of the risks.



RESEARCH LEARNING:

Integrating risk into asset management plan

Councils with a transport/roading RMF invariably incorporate their RMF into a separate section of the AMP. In many cases, the AMP is the only published document that incorporated the RMF.

Despite adopting the AMP as the repository for the RMF, there is still potential to improve the way the AMP Risk section is written and integrated into the rest of the AMP. AMP Risk sections often include only the theory and methodology of risk management, rather than a discussion of the main risks determined by the framework, and how these risks are going to be addressed in terms of scheduled, resourced actions.

The results of the risk analysis often do not permeate or flavour other sections of the AMP. For example, the Life cycle section, Levels of service section, and especially the Improvement plan, do not reflect how the risks to various assets and services are being addressed.

Usually, AMP sections such as Life cycle management, Growth and demand and Levels of service for instance, do not directly reference the biggest risks. However they are written from the perspective of the trained professionals who are managing the inherent risk. For example, the inherent risk of bridge failure would drive the strategy adopted in the Life cycle section to inspect, maintain and upgrade a bridge – but it would be helpful to link it in with the RMF in some way.

11. Evaluating the risk management process's effectiveness and suitability

This section discusses each RMF's overall ability to influence council decisions and operations. While it is recognised that an RMF in itself will not reduce risk, there should be occasions where the outcomes of an RMF result in tangible actions that reduce risk levels or maximise opportunities. The suitability of the system and the surrounding culture are also discussed, as are the potential benefits of the RMF.

An RMF is effective and successful if:

- There are obvious perceived benefits from the risk management framework (see the list below)
- There is a positive risk culture
- The risk framework is suitable to the size and type of council
- The risk framework:
 - results in the successful implementation of any improvement actions
 - reinforces or justifies current practices
 - influences strategic decision making
 - raises issues not previously considered
 - justifies a reduction in, or cessation of, an existing programme or action
 - justifies an increase in resource or urgency of a current programme or action.

Some of the perceived benefits associated with establishing an RMF are:

- Awareness
- Succession planning
- Increased direction and focus
- Justification of current practice and courses of action
- Realistic assessment of perceived risk – improved perspective
- Increased appreciation of other council activities
- Reduced risk exposure for the activity.

A council's risk management culture needs to be strong, so current and future staff maintain the RMF at the right level of complexity.



RESEARCH LEARNING:

Risk framework's effectiveness and suitability

The framework's suitability

The majority of the frameworks used are fit for purpose but more explanation their use would make them a better tool. The scoring matrices and definitions in use are generally suitable, but can in some cases be too detailed and could eventually become difficult to maintain. The risk register columns allow for a robust framework but, in practice, some columns are not addressed or populated to their full potential, especially for existing practices/controls and defined management actions. Some of those deficiencies could be easily solved by providing clearer guidelines, or even by changing the terminology and renaming the columns in the risk register

Many of the councils say they would not want their frameworks to be any more complex than necessary, as it would discourage staff from adding risks to it, and would discourage staff from wanting to maintain the framework.

Culture

A council's risk management culture needs to be strong enough for current and future staff to maintain the RMF right level of complexity by. A strong culture may be capable of sustaining a very complex and comprehensive framework. However, if a complex framework is not owned or maintained, then this indicates that its complexity is a barrier to practical usage.

Some councils have a risk culture that has been established over many years, which has resulted in a succession of staff having a high level of awareness and commitment to risk management. However, this alone does not guarantee they have established any improvement actions or that a forum or improvement plan by which actions could be listed, scheduled, resourced and monitored has been created. A key success factor in developing a risk culture is well described by one council officer in the statement: This is recognised as a culture where risk is addressed. Yet actually addressing risks was the weakest area in all of the case studies examined.



RESEARCH LEARNING:

An RMF's tangible benefits

There are plenty of everyday examples of inherent risk management, where the staff's training and experience enabled them to recognise risks as they arose – this is what is expected from day to day – but it is difficult to attribute any changes purely to the risk management framework's development.

However, there are obvious benefits that effectively reduce risk but are difficult to measure. These positive outcomes become more obvious the longer a risk management process has been in place. Many councils are only just establishing their RMF, but can already see the potential benefits gained from carrying out a risk analysis.



RESEARCH LEARNING:

Perceived value of RMFs

The perceived benefits, associated with the establishment of an RMF can be summarised as:

- Awareness
- Succession planning
- Direction and focus
- Justification of current practices and courses of action
- Realistic assessment of perceived risks – improved perspective
- Increased appreciation of other council activities
- Reduced risk exposure for the activity.

The secondary benefits resulting from RMFs have been sufficient to prompt most councils into action.

Awareness

Staff cite the risk management process's usefulness, and the benefit of seeing things from a different perspective. Senior staff have bought in to the approach, transferring their experience and knowledge into the risk register; while junior staff learn about the organisation, its services and assets at an accelerated rate. Even those who were not involved in the process, but read the outcomes, came to understand the issues facing the councils.

Succession planning

Some state the risk culture and frameworks have been successfully tested by enduring through changes in key staff. One council, which has had good staff continuity, recognises the RMF as a key to transferring responsibilities to new staff in the coming years.

The RMF is seen to capture the inherent risk (regarding knowledge that existed in the heads of experienced staff members), and to communicate this clearly, usually via the Risk section in the AMP.

Other benefits

Other benefits noted are:

- Increased direction and focus
- It underlines the importance of justifying existing courses of action
- Obtaining a more realistic assessment of perceived risk, which otherwise could be exaggerated
- Cross-pollination with other sections and activities of council, resulting in a better appreciation and understanding of risk
- Reduced risks.

12. Making the RMF more effective – the next steps

The biggest difficulties with implementing and maintaining an RMF usually involve:

- Starting off – establishing the risk management framework, risk register, and identifying risks
- Lack of current practice records that contribute to risk reduction, or any evaluation of their effectiveness
- Accurately summing up the risk management process results, including providing assurance that appropriate response and reaction to risk is being undertaken or is planned (ie minimal follow-through from identifying risks into taking effective actions)
- Ensuring the framework is at a suitable level of complexity and number of risks, to ensure it doesn't commit an inordinate amount of resources to establish or maintain it in future
- Integrating the risk management process with decision making within authorities.

12.1 INTEGRATING RISKS INTO THE AMP

Risk management should be firmly established within asset management planning, with the AMPs being the vehicle for establishing, publishing and reviewing the risks faced by the activity. There is potential for better integrating the risk management results with the overall life cycle and service level management. Risk results should be cross-referenced with other key AMP sections, eg levels of service and life cycle management for various asset types and services.

There needs to be a balance between asset (operational) risks and corporate (general) risks.

12.2 INTEGRATING RISK FROM OTHER ACTIVITIES WITH ROADING/TRANSPORTATION RISK

One of the major benefits for councils of the risk management process is the potential of having more effective integration between activities. This integration can occur at two levels including:

- Integrating risks processes between activities that may influence each other – for example, risk management of a water main that is located on the critical transportation route (Lifeline) within a region
- Integrating risks at the corporate level, regardless of activity type – for example, any risk of failing to deliver a level of service to the community is equally important, regardless of the activity it refers to (although the treatment of that risk would be specific to the activity type).

In an earlier section, Figure 4 showed:

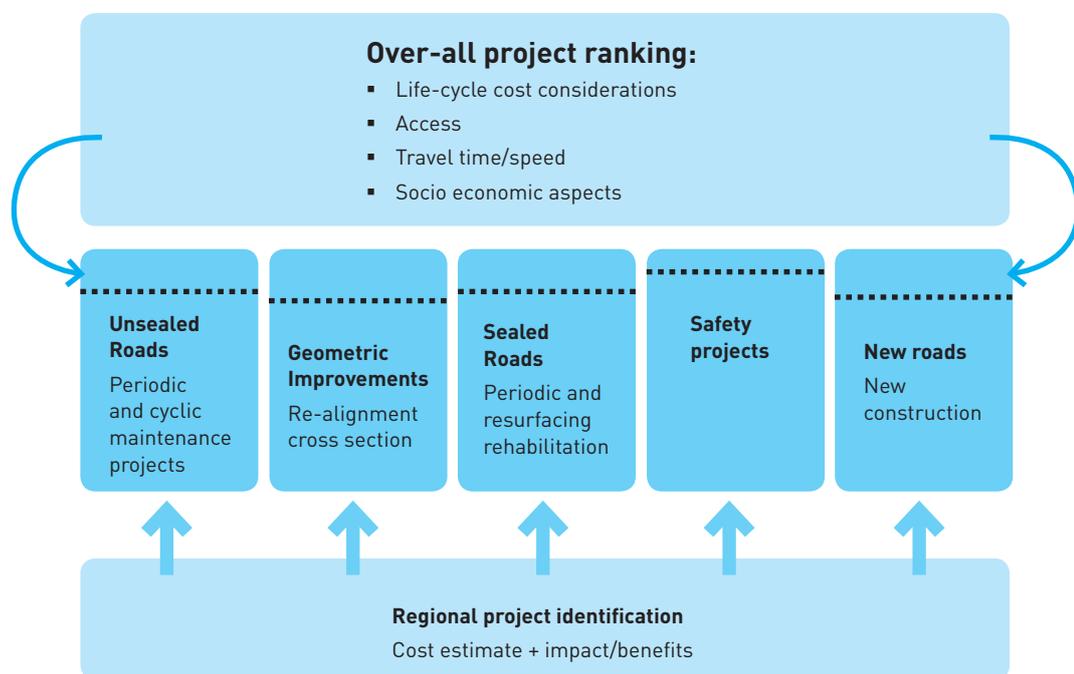
- The link between activities where the risks from one activity may have an impact on another activity
- At corporate level, risks are integrated through joint risk workshops and a common RMF.

12.3 INTEGRATING RISK MANAGEMENT INTO DECISION-MAKING PROCESSES

Some activities, such as road safety management, naturally lend themselves to risk management when projects are being selected and prioritised. Other activities, such as road maintenance, are planned according to financial processes, such as minimising the life-cycle cost. The only way to effectively draw together projects or initiatives from various planning processes is a multi-criteria analysis, as proposed in the NAMS Optimised decision making guidelines (2004). Eventually, all processes and planning should be done at a level where integrated cross-activity decision making can be achieved at a later stage.

An example of a fully integrated decision-making process is illustrated in Figure 6.

Figure 6 – Process proposed for Azerbaijan’s maintenance and construction planning (Brown et al 2009)



A two-stage process is recommended for a multi-project type of decision-making process.

The first stage involves identifying potential projects for each management criterion. For example, these could be divided into unsealed road projects, geometric improvements, sealed road maintenance, and safety projects. In each of these project groups, the first approximation ranking for each individual group would be undertaken using techniques associated with those projects. Sealed road maintenance would typically use a life cycle costing approach that includes road-user costs and benefits, while geometric projects would consider flow/capacity and travel time/speed as primary considerations. Other projects groups, such as safety management, would rely on a risk-based approach, and consider crash risk and probability of associated costs as the main criteria. Part of the analysis within each project group would also define the minimum list of projects that would be undertaken, given a set of defined guidelines.

The second stage compares all potential projects according to a common framework (multicriteria, translated costs, or benefits). The criteria typically take into account all considerations from an agency perspective, including factors such as:

- Cost effectiveness
- Providing access
- Minimising travel time
- Encouraging multipurpose projects (eg a sealed-road rehabilitation that includes geometric upgrading and improves safety)
- Benefit to overall socio-economic aspects.

Management of risk is one of the corporate drivers for local government due to New Zealand legislation.



RESEARCH LEARNING:

Making the RMF more effective – the next steps

The councils studied are all at different stages of RMF development and implementation, so when asked “What are the next steps that would make the RMF more effective?”, there were varying responses including the following:

- Simplification – Two councils note the need to simplify the risk management process, and one of these has already actioned this. This is seen as a forward step, to encourage buy-in and to make the system easier to manage and more meaningful
- Expand on the risks – One council saw the need to expand on the risks deemed to be the most important, after they recognised that the number and type of risks they had identified were limited
- Live RMF – The need to make the risk management processes dynamic and living is noted, especially to ensure that the processes are regularly used, monitored and updated
- Training, awareness and induction – Councils note that the next step is to use their RMF more effectively to train staff and induct new staff
- Software – Some councils are looking at using risk software to integrate business planning, linking actions and tasks
- NZTA risk management – One council said their network is heavily dependent on the state highway network, and indicated that the next step for them will be to integrate their risk planning with the NZTA’s risk planning for their district.

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