

Risk Management Practice Guide (Minimum Standard Z/44)

1 Introduction

The NZ Transport Agency's strategic objectives are delivered through ongoing operational activities, and capital funded projects to improve service levels to customers. The delivery of these activities or projects is often enabled through supplier contracts, and appropriately applied risk management by the NZTA project manager and within the execution of these contracts plays a vital role in their successful delivery.

The requirements for risk management within the Transport Agency are based on the ISO 31000 standard and are defined within a suite of documents as follows:

- Risk Management Strategy
- Risk Management Policy
- Risk Management Handbook & Reference Guide
- Minimum Standard Z/44 – Risk Management (applicable to Highways infrastructure and operations)

This practice guide (which also serves as a minimum standard for outsourced contracts) has been developed to promote a consistent and uniform approach to risk management services the Transport Agency and our contracts.

Notes:

- a) This minimum standard is mandatory in all outsourced Maintenance and Operations contracts.
- b) This minimum standard is mandatory in all internally managed and/or outsourced Capital Projects with an estimated total project delivery cost of more than \$5 million.
- c) For internally managed and/or outsourced Capital Projects with an estimated total project delivery cost of less than \$5 million, established risk management processes and controls may be considered to be adequate.
- d) For internally managed and/or outsourced Capital Projects which meet the requirements of c) above, aspects of this minimum standard may be applied as deemed appropriate and will be stipulated within any supplier contract.

2 Roles and Responsibilities

2.1 Client

The client is responsible for defining the scope of risk management services associated with the contract to which this minimum standard relates.

Responsibilities of the client include:

- a) ensuring appropriate requirements for risk management are defined within contract documentation
- b) monitoring the performance of suppliers in their provision of risk management services against this minimum standard in addition to any PACE system requirements

- c) escalating M&O and Project risks for management consideration
- d) providing client programme and risk data to the supplier
- e) providing risk data from the preceding project phase(s) or M&O contract, to the supplier

2.2 Supplier

The supplier shall undertake and be responsible for risk management services and deliverables associated with the contract to which this minimum standard relates.

Responsibilities of the supplier include:

- a) supporting the client through the provision of specialist risk management services
- b) conforming to the risk management requirements stipulated in the contract and this minimum standard
- c) demonstrating a commitment to good risk management practice and a culture of continuous improvement
- d) consulting with stakeholders in accordance with the scope of services to obtain their input and contribution to the management of risk

2.3 Risk Owner

Each identified risk is to be assigned a risk owner who shall be a named individual. A risk owner can be defined as:

‘The person best placed to manage the risk, suitably qualified and experienced to do so.’

Responsibilities of the risk owner include:

- a) managing owned risks – definition, analysis and evaluation
- b) managing risk treatment – definition, effectiveness, programme requirements and conduct
- c) ensuring owned risk and treatment data is robust and well maintained
- d) participating in reviews/workshops as appropriate

2.4 Risk Owning Organisation

Each identified risk is to be assigned to an organisation. A risk owner may not necessarily be an employee of the risk owning organisation but in many instances will be. The expectation is that the risk owning organisation will make available the resource required to actively manage those risks that have been assigned to it.

The responsibilities of the risk owning organisation do not take precedence over the contractual obligations as detailed in the supplier’s contract. However, as far as is reasonably practicable there should be alignment between the assigned risk owning organisation and the contractual obligations for each risk.

3 Activity Risk File

The project manager (for internally managed projects) or supplier shall establish an Activity Risk File (ARF) following contract award and/or commencement, maintaining it throughout the contract period. The following documents, where required, shall be held and maintained within the ARF as required:

- a) Risk Management Plan
- b) Risk Register
- c) Risk Adjusted Programme(s)

- d) Risk analysis data
- e) Contract Closeout Risk Report.

3.1 Risk Management Plan

The purpose of the Risk Management Plan (RMP) is:

- a) to describe how the conduct of risk management will meet the needs of this practice guide (minimum standard)
- b) to describe the practices, procedures, controls and reporting processes for the management of risk
- c) to demonstrate to the Client that risks will be effectively managed.

The supplier shall use the Transport Agency provided RMP template downloadable from <http://www.nzta.govt.nz/resources/minimum-standard-z-44-risk-management/index.html>

3.1.1 Capital Projects

For outsourced capital projects, the Supplier shall produce a RMP where the contract includes the delivery of one or more of the following Business Case phases:

- a) Business Case
- b) Pre-Implementation
- c) Implementation.

3.1.2 M&O Contracts

For outsourced M&O contracts, the Supplier shall produce a RMP as part of the Contract Plan.

3.2 Risk Register

The ARF shall contain the supplier maintained risk register. The register shall be used to record project/contract risk data and associated treatment actions.

The supplier may elect to use the Excel Risk Register template available from the NZ Transport Agency's website <http://www.nzta.govt.nz/resources/minimum-standard-z-44-risk-management/index.html>, or may elect to create their own, or use a risk management software package to store the risk data.

As the risk register is updated, superseded versions are to be filed within the ARF to retain historical risk data and provide an auditable trail of risk data development.

Where the supplier elects to not utilise the NZ Transport Agency Risk Register template, the following fields are mandatory:

- a) Risk identifier (unique to the contract/project)
- b) Risk description (utilising the clear expression of risk)
- c) Risk owner
- d) Risk owning organisation
- e) Risk status (refer to Figure 3.1 and Table 3.1)
- f) Date raised
- g) Preventative & mitigating controls
- h) Current Risk Rating
- i) Planned risk treatment actions (with planned treatment implementation dates for each action)
- j) Residual (target) Risk rating

k) Commentary where considered necessary

Notes:

- a) In addition to the requirements above, where the supplier elects to create their own register, it shall meet the 'format for electronic information' requirements specified in the contract.
- b) Analysis shall be clearly separated from the mandatory content of the risk register to maintain viewing clarity, a specific model or template should be considered for the conduct of analysis.
- c) Where the supplier elects to use risk management software as the depository for risk data it shall only be implemented following written approval from the client.

3.2.1 Clear Expression of Risk

Use of the 'clear expression of risk' is intended to promote consistency across Transport Agency projects and contracts ensuring that risks are adequately described and easily understandable, that the causes to be responded to in addressing the risk are identified and that the consequences are clearly defined.

Risks shall be written using the clear expression of risk discipline covering; description, cause and consequence, as follows:-

a. The **Description** shall start:

'There is a threat/opportunity that ...'

(Describe the adverse/positive event or series of events that may happen. This will often be related to a milestone in or at the end of the work activity in which the risk is present.)

b. The **Cause** shall start:

'The cause of the threat/opportunity is...'

(Identify the cause(s) of the risk and highlight the areas of work in which the cause is contained.)

c. The **Consequence** shall start:

'The consequence of the threat/opportunity is...'

(Describe the direct adverse/positive impact on the objectives of the work area in which the risk is present. It is not sufficient to say 'additional spend' or 'programme extension' – indicate which activities require additional spend or require additional programme time).

3.2.2 Risk and Treatment Lifecycles

Risks are categorised as either open (i.e. draft, live – treat, live – parked) or closed (i.e. impacted, closed, rejected). Each risk shall have a risk status against it which reflects its position in the risk lifecycle shown in Figure 3.1 and described in Table 3.1.

Risk treatment actions are categorised as either open (i.e. proposed or live) or closed (i.e. completed – successful, completed – unsuccessful, rejected). Each action shall have a treatment status against it which reflects its position in the treatment lifecycle shown in Figure 3.2 and described in Table 3.1.

Notes:

- a) Impacted, closed or rejected risks are to remain on the register for auditing purposes.
- b) When new or changed risks are identified, they shall be:

- i. notified to the client in accordance with the requirements contained in Table 3.2
- ii. reported in accordance with the client reporting requirements stipulated within section 7.1.

3.2.3 Established Controls

Established controls are standards, plans, processes and practises that exist within a contract, project or organisation that are deemed to be business as usual, and exist independent of specific risk treatment actions. Established controls either pre-exist identified risks, or are risk treatment action that once completed has become an established control.

3.2.4 Phase

The project manager and/or supplier shall identify the phase in which the threat or opportunity may occur. Project phase identification ensures that contingency estimates include the appropriate set of risks relevant to that phase.

For M&O contracts the phase will always be 'Operation'.

Furthermore, understanding the likely timeframe to impact should enable delivery teams to programme their treatment response well in advance of the likely point of impact of the threat or provide sufficient time to pursue identified opportunities.

Where it is proposed that risks may occur during more than one phase of a project lifecycle the phase shall be identified as 'Project' and the supplier analyst shall apportion the consequential financial impact of the threat (realisation of an opportunity) across the phases effected within estimates and provide explanatory information within modelling notes.

3.2.5 Exposure

Current Exposure – is the risk exposure at the time of review, it takes account of established controls and treatment actions completed. When determining current exposure the effectiveness of established controls must be taken into consideration.

Residual (Target) Exposure – is the risk exposure anticipated to exist following successful completion of risk treatment.

Note:

- a) It is reasonable to expect treatment actions proposed to be successful, otherwise why would they form part of a proposed treatment strategy. However, the effectiveness or success of proposed treatment actions cannot be guaranteed and consideration of this is integral to the iterative process that is risk management.

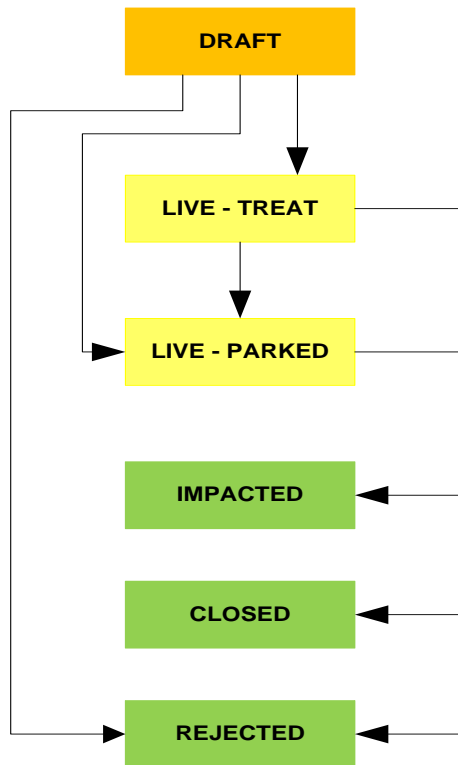


Figure 3.1 Risk lifecycle

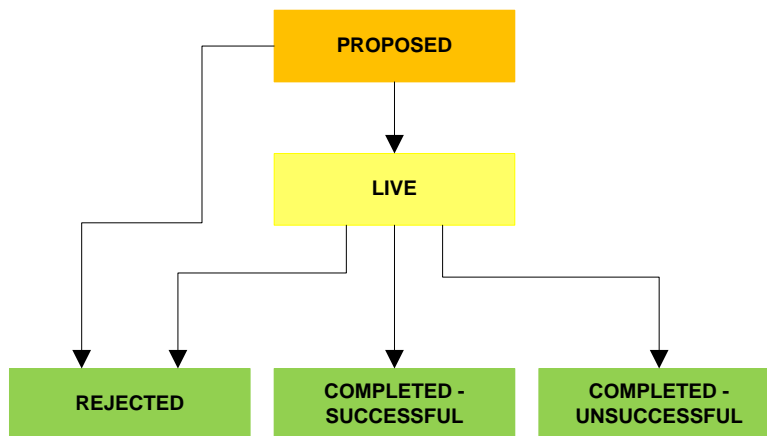


Figure 3.2 Treatment lifecycle

Risk Status			Treatment Status		
A risk is to have a status which reflects its position in the Risk Lifecycle.			A treatment action is to have a status which reflects its position in the Treatment Lifecycle.		
Lifecycle Stage	Status	Description	Lifecycle Stage	Status	Description
Identify	Draft	<p>The initial status of a risk is Draft. This status remains until sufficient data is provided to satisfy progression to a Live status as follows:</p> <p>For an entry to progress to Live the following fields shall be populated, as a minimum:</p> <ul style="list-style-type: none"> • RID • Title • Description • Date Raised • Risk Owner • Risk Bearing Organisation • Phase • Established Controls • Current Exposure • Treatment Strategy • Residual (Target) Exposure <p>The person making the entry is required to inform the nominated Risk Owner of the creation of the new entry. The status should only be changed to Live with the agreement of the Risk Owner.</p>	Identify	Proposed	The treatment action is intended as a future activity.
Manage	Live - Treat	The treatment strategy is to treat, this may consist of; pursuing an opportunity, removing the threat source, changing the likelihood, changing the consequence or a combination thereof.	Manage	Live	The treatment action is in progress.
	Live - Parked	<p>a). The risk level is below the established Risk Tolerance Threshold, or</p> <p>b). The risk treatment is to tolerate the risk, i.e. no treatment (a 'Treat' risk will change status to 'Parked' following successful completion of treatment(s)), or</p> <p>c). The risk treatment is to share (e.g. transfer via insurance). Note: If the shared risk occurs there may still be an impact on objectives, i.e. risk transfer may have been purely financial.</p>			
Outcome	Impacted	<p>The risk has occurred. The consequential impact is to be recorded in the commentary field. Provide data on reactive treatment including relevant cost and time impact data.</p> <p>Note: The impact of a risk may occur on more than one occasion throughout the life of the project/contract/activity to which the risk relates, the consequential impact of each occurrence must be recorded to ensure a full understanding of the overall impact on objectives.</p>	Outcome	Completed - successful	The treatment action is complete and did reduce the current exposure of the threat/increase the current exposure of the opportunity.
	Closed	<p>Management of the risk is no longer required because:</p> <p>a). The risk treatment is to avoid the possibility of occurrence by removing the activity to which the risk relates from the scope of work, or</p> <p>b). The associated activity has been completed and the risk did not impact.</p>		Completed - unsuccessful	The treatment action is complete but did not reduce the current exposure of the threat/increase the current exposure of the opportunity.
	Rejected	<p>The risk register entry has been rejected because:</p> <p>a). It is no longer relevant, or</p> <p>b). It has been raised in error.</p>		Rejected	The action has been rejected because: <p>a). It is no longer relevant, or</p> <p>b). It has been raised in error.</p>

Table 3.1 Risk and treatment action status guide

NZ Transport Agency Risk Level				
Threat Level	Action	Notification of new risk or risk where the Threat/ Opportunity level has increased	Reporting	Opportunity Level
Critical Threat	Maintain record in risk register, determine requirement for treatment, thereafter implement, manage and monitor as appropriate.	Notify NZTA Client within 1 working day or immediately if urgent response is required. NZTA Client to evaluate risk for escalation.	As per reporting requirements of Section 7.1 of Z/44.	Critical Opportunity
High Threat				High Opportunity
Medium Threat		Notify NZTA Client within 5 working days or immediately if urgent response is required. NZTA Client to evaluate risk for escalation.		Medium Opportunity
Low Threat	Maintain record in risk register, risk may be Parked without requirement for treatment, requires ongoing monitoring.	Notify Line Manager within 5 working days.		Low Opportunity

Table 3.2 NZ Transport Agency risk level requirements

3.2.6 Risk Tolerance Threshold

The establishment of a Risk Tolerance Threshold (RTT) encourages focus on those risks identified as posing the greatest threat or offering the greatest opportunity. It is a level of risk exposure deemed to be acceptable to the delivery team – trading effort and expenditure against exposure.

At the commencement of the project/contract the project manager or supplier shall lead a delivery team discussions to consider the appropriateness of establishing an RTT, and if agreed record the RTT established and the agreement by written notification to the client.

Risks with an exposure below the established RTT may be given a ‘Live – Parked’ status. Such risks require ongoing review to monitor change but are deemed to not merit further treatment.

3.2.7 Risk Treatment

Treatment is to be documented with the risk register, typically within a separate but associated action register. Risk treatment actions are to be viewed as packages of work and should be planned, resourced and executed as such. Crucial to a well-documented set of treatment actions are target start and completion dates that drive the delivery of timely risk treatment moving current exposure towards target exposure.

3.2.8 Fallback

Fallback is the reactive response required as a consequence of a threat impacting and is established as part of risk analysis. Establishing an appropriate response should a threat occur is paramount when considering the level of contingency required and the action to be taken.

Furthermore, consideration as to what (reasonable and cost effective) proactive measures can be implemented to facilitate an efficient and effective Fallback response should form part of risk treatment considerations. Where appropriate, proactive Fallback actions should be included as treatment actions within the action register and allowance made within estimates as 'cost of treatment' (See section 5.6).

3.3 Risk Adjusted Programmes (RAPs)

The project manager and/or supplier shall produce a programme that takes into account risks identified within the risk register that have time as a consequential impact. The RAP shall be presented in the form of a Gantt chart.

It is to be expected that the level of detail of the RAP will increase as the maturity of programme and risk data increases.

Software used to produce RAPs under the General Approach shall meet the 'format for electronic information' requirements specified in the contract.

Software used to produce RAPs under the Advanced Approach shall enable the modelling of time related risks and their impact on the programme of work. Approval for its application shall be obtained from the client prior to utilisation.

A programme may, where appropriate, also be the RAP. Where a RAP is maintained independently to a programme it shall at all times align.

3.3.1 Capital Projects

3.3.1.1 Programme Business Case, Single Stage Business Case, Pre-Implementation

The supplier shall produce and maintain a RAP that reflects the timeframe to contract completion including key milestones, taking into account the effect of time related risks as appropriate to the project phase(s) being executed.

Milestone and contract completion dates identified within this RAP shall be as agreed with the client prior to establishing the baseline.

The contract RAP shall only be re-baselined through written agreement with the client.

3.3.1.2 Implementation

The supplier shall produce and maintain a RAP that reflects the timeframe to construction completion including key milestones, taking into account the effect of time related risks.

The supplier shall liaise with the constructor to ensure constructor provision of programme and risk data enables the supplier to produce the RAP.

Milestone and construction completion dates identified within this RAP shall be as agreed with the client prior to establishing the baseline.

The RAP shall only be re-baselined through written agreement with the client.

3.3.2 M&O Contracts

The supplier shall demonstrate consideration of the effect of risks with time impacts in relation to the achievement of programmed maintenance activities.

3.4 Risk Analysis Data

3.4.1 Summary Risk Analysis Report

The ARF shall contain the supplier produced Summary Risk Analysis Report(s) when contingency estimates are required as part of any cost estimates produced as contract deliverables. Minimum requirements are contained in section 7.3.

3.4.2 Suppliers Risk Analysis

The ARF shall contain the results of supplier risk analysis conducted as the data source for the Summary Risk Analysis Report. This may take the form of:

- a) documentation that substantiates the contingency values proposed under the General Approach
- b) computer based modelling outputs where the Advanced Approach to analysis has been applied

3.5 Contract Closeout Risk Report

The ARF shall contain the supplier produced Contract Closeout Risk Report. Minimum requirements are contained in section 7.4.

4 Risk Analysis and Evaluation

4.1 Selecting Risks for Analysis

Only risks with a live status shall be used in risk analysis. Where live risks are to be excluded from modelling the supplier shall document the exclusion within the modelling notes.

Where correlation between risks is identified and modelled this is to be recorded and the modelling approach explained within the modelling notes.

Exclusions, assumptions and constraints associated with the conduct of analysis shall be documented within the modelling notes.

4.2 Cost of Risk

4.2.1 Risk Cost

Risk cost (\$) – This is the cost attributed directly to a project or contract as a result of additional (or reduced) work (including materials) required when threats (or opportunities) impact. It is cost that is independent of costs associated with project or contract longevity which are referred to as time risk cost (\$) (See below).

Risk cost (\$) = cost increase from threats (\$) – cost saving from opportunities (\$).

4.2.2 Time Risk Cost

Time risk cost (\$) – It is only where time related risks affect critical path activities that may result in delay to milestone or programme completion that time risk cost (\$) is generated. Time risks that elongate non-critical path activities are to be defined in terms of cost risk (\$). Time related costs may relate to such items as; management cost, head office overheads, machinery depreciation, accommodation and facilities running costs.

Time risk (t) = programme increase from threats (t) – programme decrease from opportunities (t).

Time risk cost (\$) = time risk (t) x cost of operation (\$/t).*

Notes:

- a) Within projects, time related costs (*cost of operation (\$/t)) may vary over the lifecycle dependent on the particular activities being executed and the modeller should consider this when modelling. Where this variation is not considered to be material it is acceptable for the modeller to calculate an average time dependant cost per day.

- b) When establishing values for the conduct of quantitative analysis, the modeller should demonstrate that the origins of the values attributed to risk cost (\$) and time risk cost (\$) are clearly understood so as to avoid inclusion of time risk cost elements within risk cost (and vice versa), thus preventing double accounting.

4.2.3 Total Cost of Risk

Total cost of risk (\$) – This is the summation of values derived through either specialist interpretation of semi-quantitative data or through statistical analysis of quantitative data.

Total cost of risk (\$) = risk cost (\$) + time risk cost (\$)

4.3 Risk Analysis Approach

Two options for the conduct of risk analysis are defined within this minimum standard:

- a) The General Approach (semi-quantitative).
- b) The Advanced Approach (quantitative).

The approach to risk analysis defines:

- a) How risk data is represented and recorded, and
- b) The method used to conduct analysis (specialist interpretation or statistical analysis).

Note:

- a) Selection of the appropriate approach to risk data representation and recording is intended to facilitate the appropriate approach (General or Advanced) to risk analysis for estimating.

4.3.1 Capital Projects

Risk data representation and recording during project execution shall align with Table 4.1 unless otherwise specified in the contract. Where there is an option, the approach to be applied will be as defined by the client within the contract, otherwise the default is General Approach.

	Estimated Project Cost		
Capital Project Phase	> \$5M - \$20M	> \$20M - \$50M	> \$50M
Programme Business Case	General	General	General
Indicative Business Case	General	General or Advanced	General or Advanced
Detailed Business Case	General	General or Advanced	Advanced
Pre-Implementation	General or Advanced	Advanced	Advanced
Implementation			

Table 4.1 Risk data approach for Capital Project phases

4.3.2 M&O Contracts

Risk data representation and recording during contract execution shall align with Table 4.2 unless otherwise specified in the contract.

Maintenance and Operations Contracts
General Approach

Table 4.2 Risk data approach for M&O contracts

4.4 General approach

The General Approach to risk analysis is based on specialist interpretation of semi-quantitative data.

4.4.1 Risk Rating System

The project manager/supplier shall create a project/contract specific rating system in accordance with the following requirements:

- a) The risk likelihood rating system shown in Table 4.3 shall be applied without exception.
- b) Tables 4.4 and 4.5 contain threat and opportunity consequence criteria to be used as the basis for the risk rating system. Project Manager/Suppliers shall define and gain client agreement on bands for ‘Cost’ (Capital Projects and M&O contracts) and Delivery (Capital Projects only) to suit the risk appetite of the particular project or contract.
- c) The risk rating system within Risk Matrix of Table 4.6 shall be applied without exception.

Notes:

- a) ‘Cost’ banding should endeavour to use an appropriate logarithmic scale. This is intended to aid in the prioritisation of high consequence/low likelihood risks.
- b) ‘Delivery’ within a Capital Project relates to project delivery in accordance with the Project Programme, where the programme consists of a series of consecutive phases (it is to be appreciated that there may be periods between phases where the project is inactive). The number of days required to deliver the programme are to be used when defining delivery bands for consequence criteria. Therefore, where risks (with a time impact) occur within a phase it is the effect on the project completion date, i.e. construction practical completion (as per the client project programme) that is to be used as the reference point.
- c) ‘Cost’ within a Capital Project relates to whole of project delivery cost and includes all phases to project completion.
- d) ‘Cost’ within an M&O contract relates to the annual contract cost as defined by the client and includes all activities required to deliver the contract.
- e) The values used for ‘Delivery’ and ‘Cost’ bands may change through the life of the Project / M&O contract and the possible effect of such change must be taken into account within the risk rating system established by the supplier.

	NZ Transport Agency Threat Likelihood Rating				
	Rare	Unlikely	Possible	Likely	Almost Certain
Likelihood (applicable to Capital Projects)	≤5%	>5% - 30%	>30% - 55%	>55% - 85%	>85%
Frequency (applicable to M&O contracts)	Less than once in 10 years	At least once in a period of >6 - 10 years	At least once in a period of >2 - 6 years	At least once in a period of >1 - 2 years	At least once in a period of 12 months

	NZ Transport Agency Opportunity Likelihood Rating				
	Rare	Unlikely	Possible	Likely	Almost Certain
Likelihood (applicable to Capital Projects)	≤5%	>5% - 15%	>15% - 25%	>25% - 35%	>35%
Frequency (applicable to M&O contracts)	Less than once in 20 years	At least once in a period of >16 - 20 years	At least once in a period of >10 - 16 years	At least once in a period of >5 - 10 years	At least once in a period of 5 years

Table 4.3 NZ Transport Agency Threat and Opportunity Likelihood Rating

NZ Transport Agency Risk Rating Criteria (consequence)							
Rating Scale	Reputation			Performance			
	Stakeholders	Public / Media	Legal/Compliance	Delivery	Cost	Health & Safety	Environmental
Extreme	Disruption to stakeholder relationship slowing progression of nationally strategic activity, and/or... Loss of route availability of a national strategic high volume highway	Sustained national and/or international media coverage Intervention by Minister required, possibly leading to loss of Ministerial confidence. Commission of Inquiry instigated	High profile prosecution(s) with potential for custodial sentence	Programme slippage resulting in late delivery by more than 0 days	Negative financial impact of more than \$0M.	Loss of life, permanent disability or injury, or multiple serious injuries.	Permanent pollution damage or other environmental damage
Severe	Disruption to stakeholder relationship slowing progression of regionally strategic activity, and/or Loss of route availability of a national strategic highway	Sustained media coverage (weeks) Possible Ministerial inquiry leading to loss of Ministerial confidence/formal enquiry by OAG or statutory agency	Individual prosecution	Programme slippage resulting in late delivery by between 0 and 0 days	Negative financial impact between \$0M to \$0M.	Serious injury (injuries) requiring specialist medical treatment or lost time greater than three weeks	Significant and widespread pollution or other environmental damage, with long term effects
Moderate	Disruption to stakeholder relationship slowing progression of regional activity, and/or Loss of route availability of a regional strategic highway	Short term (days) media coverage Parliamentary/Ministerial questions or 3rd party investigation	Breach with legal rebuke/ abatement notice/ restrictions	Programme slippage resulting in late delivery by between 0 and 0 days	Negative financial impact between \$0M to \$0M.	Injury requiring medical treatment or lost time of 1 day to three weeks	Pollution or other environmental damage at a localised level, with medium term effects
Minor	Disruption to stakeholder relationship slowing progression of site specific activity, and/or Loss of route availability of a regional connector highway	Local media coverage for 1-5 days Official information request. Negative feedback from Minister	Breach with letter from authority requesting action	Programme slippage resulting in late delivery by between 0 and 0 days	Negative financial impact between \$0M to \$0M	Injury requiring short term medical treatment and workplace absence less than one day	Minimum pollution or other environmental damage. Short term effects only
Insignificant	Disruption to stakeholder relationship, and/or Loss of route availability of a regional distributor highway	Local media coverage for 1 day	Breach managed at a regional level	Programme slippage resulting in late delivery by less than 0 days	Negative financial impact of less than \$0M	Injury requiring short-term first-aid care and no absence from the workplace	Small scale pollution or other environmental damage is localised with no resultant effects. Contained locally

Table 4.4 NZ TRANSPORT AGENCY Semi-quantitative Threat Criteria

NZ Transport Agency Opportunity Rating Criteria (consequence)						
Rating Scale	Reputation		Performance			
	Stakeholders	Public / Media	Delivery	Cost	Health & Safety	Environmental
Extreme	Enhancement to stakeholder relationship likely to lead to improved implementation of either national or regional strategic activity, and/or... Improvement of route availability of either a national strategic high volume highway or a national strategic highway.	Enhancement to NZTA reputation from positive international or national media coverage likely to lead to recognition from Minister.	Programme advancement resulting in early delivery by more than 0 days.	Positive financial impact of more than \$0M.	Demonstrate Health & Safety innovation likely to lead to changes in international standards.	Demonstrate environmental innovation likely to lead to changes in international standards.
Severe	Enhancement to stakeholder relationship likely to lead to improved implementation of a regional activity, and/or... Potential for improvement of route availability of a regional strategic highway.	Enhancement to NZTA reputation from positive international or national media coverage likely to lead to recognition from NZTA Board.	Programme advancement resulting in early delivery by between 0 and 0 days.	Positive financial benefit between \$0M to \$0M.	Demonstrate Health & Safety innovation likely to lead to changes in national standards.	Demonstrate environmental innovation likely to lead to changes in national standards.
Moderate	Enhancement to NZTA reputation from recorded regional stakeholder feedback, and/or... Potential for improvement of route availability of a regional connector highway.	Enhancement to NZTA reputation from regional media coverage likely to lead to recognition from Senior Leadership Team.	Programme advancement resulting in early delivery by between 0 and 0 days.	Positive financial benefit between \$0M to \$0M.	Demonstrate a number of enhancements to Health & Safety best practice.	Demonstrate a number of enhancements to environmental best practice.
Minor	Perceived enhancement to NZTA reputation from non-recorded regional stakeholder feedback, and/or... Improvement of route availability of a regional distributor highway.	Enhancement to NZTA reputation from positive industry media coverage.	Programme advancement resulting in early delivery by between 0 and 0 days.	Positive financial benefit between \$0M to \$0M.	Demonstrate industry leading application of Health & Safety best practice.	Demonstrate industry leading application of environmental best practice.
Insignificant	Perceived enhancement to NZTA reputation from non-recorded supplier/partner feedback.	Perceived enhancement to NZTA reputation arising from an absence of negative media coverage.	Programme advancement resulting in early delivery by less than 0 days.	Positive financial benefit of less than \$0M.	Demonstrates compliance with Health & Safety practice.	Demonstrates compliance with environmental practice.

Table 4.5 NZ Transport Agency Opportunity Rating Criteria

NZ Transport Agency Threat & Opportunity Risk Matrix												
Threat						Opportunity						
		Insignificant	Minor	Moderate	Severe	Extreme	Extreme	Severe	Moderate	Minor	Insignificant	
Likelihood	Almost Certain	LOW	MEDIUM	HIGH	CRITICAL	CRITICAL	CRITICAL	CRITICAL	HIGH	MEDIUM	LOW	Almost Certain
	Likely	LOW	MEDIUM	HIGH	CRITICAL	CRITICAL	CRITICAL	CRITICAL	HIGH	MEDIUM	LOW	Likely
	Possible	LOW	MEDIUM	MEDIUM	HIGH	CRITICAL	CRITICAL	HIGH	MEDIUM	MEDIUM	LOW	Possible
	Unlikely	LOW	LOW	MEDIUM	MEDIUM	HIGH	HIGH	MEDIUM	MEDIUM	LOW	LOW	Unlikely
	Rare	LOW	LOW	LOW	LOW	HIGH	HIGH	LOW	LOW	LOW	LOW	Rare
		Insignificant	Minor	Moderate	Severe	Extreme	Extreme	Severe	Moderate	Minor	Insignificant	
Consequence												

Table 4.6 NZ Transport Agency Threat and Opportunity Risk Matrix

4.4.2 Semi-quantitative Risk Analysis

Risk analysis of semi-quantitative data by specialist interpretation requires the provision of:

- a) a likelihood of occurrence rating derived from Table 4.3
- b) a consequence rating derived from the client agreed set of consequence criteria (Tables 4.4 and 4.5)
- c) a current and residual (target) risk rating derived from the Risk Matrix in Table 4.6

Notes:

- a) Evaluation and ranking of risks using semi-quantitative data requires careful scrutiny with regard to numerical values such as cost (\$) and delivery (t). The width of bandings used may mean risks that exist within the same band are equally ranked despite their existing at opposing extremities of the band.
- b) The ranking priority for risks is weighted towards consequence rather than likelihood, therefore a very high consequence/very low likelihood risk is considered more important than a very low consequence/very high likelihood risk. This weighting can be considered appropriate since the high consequences are often disproportionately severe in comparison with low consequences and the highest consequence band in the semi-quantitative cost and delivery criteria have no upper limit.

4.4.3 Risk Adjusted Programme

The supplier shall evaluate the effect of risks with time consequences on milestone and contract (or construction) completion dates based on specialist interpretation. Risk Adjusted Programmes (RAPs) produced under the General Approach shall be accompanied by documentation that clearly states:

- a) the risk register used as the source of risk data (include version/date).
- b) the risks used from a) above.
- c) the base, current and target milestone and contract (or construction) completion dates, (most likely and worst case).

4.5 Advanced Approach

The Advanced Approach to risk analysis is based on computer modelling of quantitative data using statistical analysis. The Advanced Approach is used where application of the General Approach is deemed to provide an insufficient level of detail to provide the degree of analysis and evaluation required.

Software used to enable computer modelling shall be approved for use by the client prior to utilisation.

4.5.1 Application of the General Approach within the Advanced Approach

The Advanced Approach utilises both semi-quantitative and quantitative data and analysis. Use of semi-quantitative analysis enables consideration of those risk criteria which cannot easily be defined in numerical terms and enables risk rating.

Note:

- a) Where both quantitative and semi-quantitative data is recorded in a risk register, care should be taken to align quantitative data with the semi-quantitative bands used for delivery and cost criteria.

4.5.2 Quantitative Risk Analysis

The supplier shall undertake statistical analysis of quantitative data, this requires the provision of:

- a) a likelihood of occurrence (>0% and <100%)
- b) an estimate for cost (\$) and/or time (t), (utilising a 3 point estimate as a minimum)
- c) a) and b) above for current and residual (target) exposure

4.5.3 Risk Adjusted Programme

The project manager/supplier shall evaluate the effect of risks with time consequences on milestone and contract (or construction) completion dates based on statistical analysis of quantitative data to produce a risk adjusted programme (RAP). The RAP shall be a logic linked programme with all possible critical paths identified.

The Advanced Approach RAP requires the allocation of time related risks to activities at a level of detail such that their consequence is reflected appropriately when simulation is conducted. The modeller must consider the level of detail required to appropriately reflect the consequence of time related risks on the programme.

RAPs produced under the Advanced Approach shall be accompanied by documentation that clearly states:

- a) the risk register used as the source of risk data (include version/date).

- b) the risks used from a) above.
- c) the base, current and residual milestone and contract (or construction) completion dates, (P5, mean and P95).
- d) graphical representation of the data in c) above

5 Risk Contingency in Cost Estimates

5.1 Contingency Establishment

Contingency values included within cost estimates shall be supported by a Summary Risk Analysis Report (See section 7.3). Data within Summary Risk Analysis Reports is intended to inform the decision making process associated with establishing appropriate contingency values. It is the responsibility of those charged with contract delivery to evaluate the results of analysis and from that evaluation define estimated contingency values in terms of both time and cost.

5.2 General Approach

Risk contingency requirements under the General Approach are established through risk analysis of semi-quantitative data using specialist interpretation, the results of which are to be summarised within the Summary Risk Analysis Report. The supplier shall substantiate the contingency values proposed under the General Approach providing appropriate supporting documentation and evidence.

5.3 Advanced Approach

Risk contingency requirements under the Advanced Approach are established through computer modelling of quantitative risk data using statistical analysis, the results of which are to be summarised within the Summary Risk Analysis Report.

5.4 Contingency in Capital Projects Estimates

Where there is a contract requirement to provide estimates the risk analysis approach to be applied shall align with Table 5.1 unless otherwise specified in the contract. Where there is an option, agreement is to be gained with the client as to which approach is to be applied. Contingency estimates are required for each estimate element.

Note:

- a) The requirement for the consideration of risk within benefit cost ratio (BCR) calculations is provided within the NZTA *Economic evaluation manual* (EEM). This is outside the scope of this document and reference should be made to that manual.

5.5 Contingency in M&O Contract Project Estimates

Where the contract incumbent is contracted to complete projects either through a variation to the contract or through successful tendering, the project shall be treated as a Capital Project and the appropriate approach to risk management, including contingency estimation, applied (See section 1 notes b), c) and d), and section 5.4).

Estimate	Estimated Project Cost		
	> \$5M - \$20M	> \$20M - \$50M	> \$50M
Programme Estimate	General	General	General
Option Estimate	General	General or Advanced	General or Advanced
Scheme Estimate	General	General or Advanced	Advanced
Pre-Design Estimate	General or Advanced	Advanced	Advanced
Design Estimate	General or Advanced	Advanced	Advanced
Construction Estimate	General or Advanced	Advanced	Advanced

Table 5.1 Risk analysis approach for Capital Projects estimates

5.6 Cost of Treatment

Where there are costs associated with the treatment of risks a cost/benefit trade-off is to be conducted. The supplier shall include this cost within the base estimate and substantiate the proposed expenditure with supporting data that:

- a) identifies, where appropriate, the cost of treatment against each threat (or opportunity), and
- b) explains each cost/benefit trade-off conducted and the rationale for proposals made

Cost of treatment data shall be identified within the summary risk analysis report (See section 7.3)

5.7 Risk Contingency Values Within Cost Estimates

Requirements for the provision of estimates are contained within SM014 – *Cost estimation manual*.

5.7.1 General Approach

Risk contingency values to be used within cost estimates where the General Approach to risk analysis has been applied shall be based on:

Contingency = risk contingency = a value derived from specialist interpretation of the ‘most likely’ value of residual ‘target’ exposure, (See note a) below).

Funding risk = funding risk contingency = a value derived from specialist interpretation of the ‘worst case’ residual ‘target’ exposure value minus the ‘most likely’ value of residual ‘target’ exposure, (See note a) below).

5.7.2 Advanced Approach

Risk contingency values to be used within cost estimates where the Advanced Approach to risk analysis has been applied shall be based on:

Contingency = risk contingency = a value derived from the mean residual ‘target’ exposure value, as a result of statistical analysis (See note a) below).

Funding risk = funding risk contingency = a value derived from the P95 residual 'target' exposure value minus the mean residual 'target' exposure value, as a result of statistical analysis (See note a) below).

Note:

- a) Risk contingency values (derived either from specialist interpretation or computer modelling) for use in estimates, should be viewed as a data source to aid in establishing an appropriate value for risk contingency. It should be noted that those responsible for defining the value of contingency should take into consideration a) the robustness of the risk data used in analysis (including the effects of optimism bias, knowledge and capability of data providers, flaws in analysis, etc..), and b) the existence and possible influence of 'unknown – unknowns'

6 Review

6.1 Risk Review

The project manager/supplier shall be responsible for the management and execution of risk reviews. Reviews provide a forum for focused discussion on risk management. The number or frequency of risk reviews shall be as specified in the contract or shall meet the following minimum requirements:

- a) first review within 30 working days of contract commencement
- b) reviews to be held at intervals of no more than 90 working days for Capital Projects
- c) reviews to be held at intervals of no more than 180 calendar days for M&O contracts

It is anticipated that the supplier will provide review invitees with sufficient data well in advance of the review so as to enable maximum benefit to be gained from its conduct. It is suggested that the content of the most recent regular report be provided to attendees as a minimum.

The review format is to be appropriate to the maturity of risk data and/or the contract, e.g. review format may range from an open floor 'brainstorming' approach to one-on-one interview.

The supplier is expected to promote appropriate representative attendance from across the delivery team and stakeholders such as to gain optimal benefit from time expended. The supplier shall not conduct the review in the absence of client representation without prior written agreement from the client.

6.2 Contract Closeout Risk Review

The project manager/supplier shall be responsible for the management and execution of a Contract Closeout Risk Review. The review is intended to provide a forum for discussion on the conduct of risk management through the contract period and the requirements for ongoing risk management either in the successive phases of a Capital Project or a successive M&O contract.

The review need not be a standalone event but may form part of a wider contract completion review.

The project manager/supplier should programme the review as close to contract completion as possible in order to facilitate the provision and review of the optimal quantity and quality of risk management data.

The project manager/supplier is expected to promote appropriate representative attendance from across the delivery team such as to gain optimal benefit from time expended. The supplier shall not conduct the review in the absence of client representation without prior written agreement from the client.

The review is anticipated to inform the content of the Contract Closeout Risk Report (See section 7.4).

7 Reporting

7.1 Regular Client Risk Reporting

The project manager/supplier shall report on risk management as part of regular client reporting as defined in the contract. Risk reporting is intended to provide confidence to the client that risk management processes are being appropriately applied, that risks are being managed and any effect on contract delivery is understood. The supplier shall as a minimum identify:

- a) 'Extreme' and 'High' risks with treatment progress update
- b) new, impacted, closed risks and risks where the exposure level (current or target) has changed [since the preceding regular report] with explanation for changes identified
- c) the contract RAP* [updated from the preceding regular report] with explanation for changes identified
- d) the Risk Register [updated from the preceding regular report].

* Capital Projects only.

7.2 Client Risk Escalation

Escalation is the upward promotion of risks from one management level to another. This promotion is intended to engender consideration of, and where appropriate direction on, significant risks by a higher level of management. The project manager or supplier may identify risks as candidates for escalation. Responsibility for initiation and management of risk escalation is the sole responsibility of the client.

Escalated risks are to remain within the risk register, and dependant on the delegated authority of the client representative may continue to be managed at the project/contract level, or management may transfer to a higher level within the Transport Agency.

7.3 Summary Risk Analysis Report

Supplier cost estimates (See section 5) shall be accompanied by a Summary Risk Analysis Report. The analysis undertaken and content of the report shall reflect the risk analysis approach selected i.e. General or Advanced. Contingency estimates shall be provided for each future project phase as appropriate to the point in the project lifecycle at which the estimate is being undertaken. The report shall include the following as a minimum:

- a) Contract data
 - a. report compilation date
 - b. analyst – name/employing organisation
 - c. analysis method used (General/Advanced)
- b) Source data
 - a. cost of operation (\$/t) (See section 4.2)
 - b. risk register reference (e.g. version/date)
 - c. suppliers risk analysis data reference (See section 3.3)
- c) Results of analysis

- A. General Approach (See section 4.2 and 4.4)
Current and residual risk exposure [most likely and worst case] for:
 - i. risk cost (\$)
 - ii. time risk cost (\$)
 - iii. total cost of risk (\$)
- B. Advanced approach (See sections 4.2 & 4.5)
Current and residual risk exposure (P5, mean and P95) for:
 - i. risk cost (\$)
 - ii. time risk cost (\$)
 - iii. total cost of risk (\$)
- d) Cost of treatment (\$) (with substantiation (See section 5.6)
- e) Risk data
 - a. identify client owned risks
 - b. identify risks used within each project phase contingency estimate
 - c. modelling notes as appropriate

7.4 Contract Closeout Risk Report

The project manager/supplier shall produce a Contract Closeout Risk Report. The report is to summarise risk management activity over the term of the contract.

7.4.1 Capital Projects

The report shall include the following as a minimum:

- a) Contract data, delivery team data
- b) Threats and opportunities impacted/realised throughout the contract period – with supporting information
- c) Risks to be taken into the M&O phase from the construction phase (where appropriate)
- d) Project risk register [up to date]
- e) Contract RAP [up to date].

7.4.2 M&O Contracts

The report shall include the following as a minimum:

- a) Contract data, delivery team data
- b) Threats and opportunities impacted/realised throughout the contract period – with supporting information
- c) Contract risk register [up to date]

8 Risk Management Assurance

8.1 Client Review

The client may elect to conduct reviews or request information as deemed necessary to satisfy expectations regarding the conduct of risk management in accordance with this minimum standard. The supplier shall make all reasonable efforts to facilitate such client requests.

Supplier requirements for the participation in formal client reviews (e.g. Contract Management Review) are as specified in the contract.

8.2 Supplier Quality Assurance

The supplier shall detail (e.g. within their contract quality or management documentation) a methodology that demonstrates an integrated approach to risk management and alignment to this minimum standard.