8.0 RISK MANAGEMENT

This section looks at the Risk Management Processes utilised by Selwyn for assessing and managing risk within the Transportation Activity. Risk is used as a strategic decision-making tool assisting with developing and prioritising district strategies and work programmes.

Contents

8.1 Risk Management Strategy

Risk can be defined as the likelihood of something adverse happening. Risks can be seen to arise from many areas of Transportation management, both in the physical assets, service delivery to road users and organisational management of the services provided. Therefore the Transportation risks include:

- risk items that could impact directly on the assets (e.g. weather events damaging road or bridge);
- risks that impact on the council's ability to operate or manage the transportation services and/or required level of service; and,
- Risk related to the road users and the way they interact with the assets. Road safety is often an important risk consideration in the planning and management of the network.

Section 8.2 details the risk assessment process that identifies risks into the four categories illustrated in the figure. Other sections within the asset management plan mostly cover the planning risks, whereas this section has a holistic approach of all risks related to the Transportation services and assets.

Figure 8-1: *Risk classification hierarchy*

The strategies used to manage risks include the following strategies:

- Risk management, mitigation or control – Council uses active measures to manage the risk to acceptable levels;
- Risk avoidance – Council may have certain by-law, policies or procedures in place that avoid the occurrence of certain risk events.
- Risk acceptance – Council may choose to except certain risks when they are minor or out of the council's control to manage; and,
- Risk transfer – some risk are transferred to another party who is better positioned to manage the risks. Examples include performance risks being transferred to contractors or the large financial loss being transferred to an external insurer.

Risk management is the systematic application of management policies, procedures and practices to the tasks of Identifying, Analysing, Evaluating, Treating and Monitoring of risks. Most asset management planning processes already address risks by targeting a given level of service. In other words, if the levels of service as designed are achieved, then legislative compliance, prudent investment & financial management, minimisation of exposure to the public and general liability and minimisation of asset risks will also occur. A good example is Council adopting and following Level of Service recommendations as set out in the Road Efficiency Group's ONRC performance framework. Some of the measures include expectations on road safety standards appropriate for respective road classes. However, there are a number of risks that are highlighted and addressed in this section.

8.1.1 Risk Assessment Outcomes

The table provides a summary of the highest-ranking risks, current mitigation measures and indication of risks that would require further management to reduce the risk envelope to desired levels.

Table 8-1: *High-level risks and mitigations*

Risk	Current Controls or Further Management Required	Linkage to other AMP Section (where financial allowance was made)
Planning Risk		
Natural Hazards – Major and Minor Events	Natural hazards are well defined, and emergency response processes are in place for minor and major events is adequate. More proactive risk management/resilience should be considered.	Operations and maintenance contracts are covered directly in Financial Management Section 11 and Life-cycle Management Section 9.
Traffic Demand Increases Causes Traffic Control to be inefficient	Traffic growth puts pressure on control systems. Regular traffic modelling will maintain optimal setting for traffic control. The current process of problem identification and new settings based on traffic modelling is sufficient mitigation of this risk.	This risk is managed under current traffic services budgets accounted for in the Level of Service Section 6.
Councils' Roading Asset on Private Land	Private land-owners may make access to the council's assets difficult, thus limiting the ability to maintain or inspect. The current approach to relationship management deems effective.	No financial implication or allowance in AMP required.
Management Risk		
External Economic Influences	External economic influence may cause significant cost fluctuations that will impact the available funding and the ability for programme delivery. Managing this risk is difficult to manage.	Some understanding of this risk and its impact is accounted for in the Life-cycle Management Section 9.
Inability to Fully Utilise Funding Options	Transport has a two-way relationship to maintain with both funding arms, Waka Kotahi and Council elective members. There is a prevailing risk of not obtaining and delivering the required funding. This risk is managed through active management of the relationship and provided sufficient evidence of investment needs to both parties.	The risk management for this task is mostly related to robust asset management processes that are evident through the AMP.
Business Continuity: Loss of System Knowledge	Loosing of skilled people and their tools to deliver robust network management remains a risk for council. It is mostly managed through succession planning and following securing protocols on systems.	No financial implication or allowance in AMP required.
Lack of Political Alignment	The risk of political misalignment may originate from political agendas and technical objectives not being aligned. This risk is managed through	No financial implication or allowance in AMP required.

Risk	Current Controls or Further Management Required	Linkage to other AMP Section (where financial allowance was made)
	sufficient information sharing and management of relationships.	
	Delivery Risk	
Inadequate Portfolio and Capital Works Contract Management	Due to regional growth, there is a growth in the number and complexity of programme management. If not executed adequately, this risk could impact the effectiveness in delivering the works programme. It has been identified that some additional tools are required to manage this risk effectively. A review of the current procurement processes and models may also be required.	Getting the right tools and skills to manage this risk could be dealt with under current operational budgets. The process to be included in Section 10 Asset Management Processes and Practices
Inadequate Project Management	Failure in project management is an ongoing risk due to the complex nature of roading projects. This risk is sufficiently being managed through a series of controls, including procurement and contract management processes.	Section 10 Asset Management Processes and Practices includes consideration to effective project management.
Non-compliance with Legislation and Legal Requirements	Fast-changing legislation on occupational health and safety causes a risk of councils not being aware or lacking behind with complying with requirements. This risk is currently sufficiently managed through processes of validating current practises to new requirements.	Section 10 Asset Management Processes and Practices includes consideration of legislative and legal requirements.
	Physical Risk	
Minor to Major Natural Hazards roads and bridges	Natural hazards were identified as the top risk to the physical assets ranging from the likely event of ice and snow on roads to the likely flooding events. As highlighted earlier, the current approach to resilience should be expanded into wider pro-active resilience programmes. For example, due to climate change, there are some 'slow-burning' changes that are starting to impact on assets e.g. higher temperatures affecting surfacing performance and wet/drying subgrade impacting on pavement performance.	Most resilience improvements (e.g. work on bridges) is included in the Life Cycle Costing Section 9.
Road User Types Conflicts	Significant update of more active modes of travel (e.g. cycling) has a potential risk of conflict between the travel modes, where adequate separation has not been provided. Council is undertaking a programme of addressing this issue, and it is believed that the risk is managed appropriately.	Cycleway improvement is included in the Life Cycle Costing Section 9.

Risk	Current Controls or Further Management Required	Linkage to other AMP Section (where financial allowance was made)
Inadequate Road Marking and Signing	Insufficient marking and signage is an ongoing risk that has serious safety implications on road users. Signage maintenance is also included in maintenance contracts, thus ensuring this risk is sufficiently managed.	Road signage is included to the Life-cycle Section 9 and Level of Service Section 6.
Traffic Signal/Controls Failures	Traffic signal/control failures risk would mostly originate from power outages. With sufficient back-up power provided, it is believed that these risks are appropriately managed.	Operations and maintenance contracts are covered directly in Financial Management Section 11.
Non-Hazard related Bridge Failures	Given the critical nature of bridges, the condition and capacity to carry the required loading is a significant risk factor. This risk is being managed according to Life-cycle cost principles, and no further or additional controls are required.	Most resilience improvements (e.g. work on bridges) is included in the Life Cycle Costing Section 9.

8.1.2 Recommendations for Improving Risk Management and Planning

Section **Error! Reference source not found.** provides recommendations regarding the improvement of the risk section of the AMP and the risk register feeding into it. The actual risks that require more attention and analysis for further development are:

1. Establishing a corporate risk policy;
2. A more proactive approach to resilience improvements. For example, incorporating a holistic resilience responsive asset management process would see the over-all resilience of the infrastructure improvements with time;
3. Updating the risk register as part of the asset management cycle with more focus on specific risks associated with each section within the AMP;
4. Establishing a more robust programme management system for capital and maintenance works; and,
5. Developing a strategy for climate response that includes both climate mitigation (reducing carbon footprint) and adaption climate-responsive maintenance and renewals (e.g. more resilience from day-to-day maintenance activities).

8.2 Risk Assessment

8.2.1 Identification

An important component of effective Asset Management is to identify risks in the context of the Council's obligations for the Transportation activity. The identification of risks results in the identification of improvements to mitigate these risks. Improvements have been recorded throughout this AMP.

Risks have been reassessed as part of the development of this AMP. The process used has drawn from NZTA Research Report 415 Case studies and best-practice guidelines for risk management on road networks along with SNZ HB 4360:2004.

This involves classifying risks into areas which focusses the analysis and management approach.

The following risk register illustrates this approach.

Figure 8-2: *Risk classification hierarchy (RIMS – Risk Guideline)*

8.2.2 Risk Assessment Criteria

The establishment of risk management criteria is one of the most important steps in the risk management process, because it sets the boundaries for consistent risk decision making across the organisation. The 'acceptable' level of risk for the Council has yet to be determined.

The likelihoods and consequences of events occurring, or risks arising, will be measured as described in the Risk Register.

The level of risk to the Council is indicated by the product of the respective probability and consequence scores shown in the Likelihood and Consequence tables and summarised into the following categories by the total scores indicated.

Risks are assessed based on the following criteria:

Table 8-2: *Risk Assessment Matrix*

	Consequence				
Likelihood	Insignificant	Minor	Significant	Major	Catastrophic
Rare	Low	Low	Moderate	Moderate	Significant
Unlikely	Low	Low	Moderate	Significant	High
Possible	Low	Low	Moderate	Significant	High
Moderate	Low	Moderate	Significant	High	High
Likely	Moderate	Moderate	High	High	High

8.2.3 Transportation Network Risk

Council is exposed to a number of risks arising from the operation of the road network. These risks arise from any number of sources, but can generally be grouped into two main areas:

- Management — those risks that are largely concerned with the way the roading network is managed. These include funding, resourcing, programming of work and interaction with the public
- Environmental — those risks that are concerned with the impact of the environment on the physical assets, including natural and man-made disasters

When managing risk of a network asset such as this it is necessary to establish the goals, objectives, strategies, and the scope of the assessment and management process. If this is not done then the acceptability of risks cannot be evaluated. The corporate level policy towards risk also needs to be stated, defined or interpreted.

Establishing the context for the Council's risk management process, as suggested by SAA/SNZ HB 4360:2004, involves:

- Defining the relationship between the Council and the environment through SWOT analysis (Strength, Weakness, Opportunity, and Threat). Threats and weaknesses may highlight priority risk areas,
- Identifying the stakeholders who should be consulted during the risk management process,
- Defining roles and responsibilities for risk management,
- Establishing the criteria for how risk will be evaluated, including ratings for risk probabilities and consequences, and a risk treatment matrix. This latter is of particular importance in that it effectively sets a level for 'acceptable risks', and
- Separating the risk management activity into a set of elements, which provide a logical framework for risk identification and analysis.

8.2.4 Treatment and Monitoring

If all possible work that impacts level of service was completed, then the probability of failing to deliver the level of service would be zero. If none of this work was done, the probability of failure would be almost certain.

In reality, not all risk items identified can be mitigated either immediately or in the long term; but numerous items are being mitigated. The successful implementation of each identified work item will help to reduce the probability of failure.

For a particular project or work item, the probability of failure to deliver its desired contribution to achieving levels of service is affected by a number of factors:

- Planning and design,
- Human resourcing,
- Climatic influences,
- Construction,
- Maintenance,
- Operation,
- Monitoring, and

- Renewals.

All of these factors can impact on a successful outcome and will affect the lifecycle cost of the asset involved.

8.2.5 Prioritising Expenditure

The successful management of the Transportation activity is dependent on the coordination of a multitude of activities. A work programme is produced that consists of planning, design, construction, operation, maintenance, and monitoring of the assets. There are competing demands placed on the operation & maintenance and capital expenditure budgets that are available for the Transportation Activity. Decision making processes must ensure that expenditure is allocated fairly and wisely according to the needs of existing and future generations and in a way that is affordable. Regional and national planning and prioritisation processes also affect decision making.

Typically, assets are replaced when there is unacceptable risk to levels of service because of asset condition, operability, or vulnerability to external influences. Subject to the availability of resources, it is intended that selection and prioritisation criteria for asset renewals will put a greater emphasis on condition, performance, risk and failure history assessment. This is typically done through a Failure Mode Effects and Criticality Analysis.

Currently there are sufficient processes in place to monitor road pavements and bridges to ascertain the renewal programme required.

8.3 Risk Assessment Outcomes

8.3.1 Risk Register

This section outlines the risks to the Council's roading network and the approach to their management that will be used by Council to:

- Ensure that asset failure modes are identified.
- Determine the level of acceptable risk for different situations.
- Identify critical assets.
- Identify and quantify the consequences of failure.
- Avoid or mitigate risks.

The Risk Register follows. It will be continually revised as part of the Council's process of continual asset management improvement.

Risk register follows (these pages have been formatted so two A3 pages can be viewed together)

1. Planning Risks
2. Management Risks
3. Delivery Risks
4. Physical Asset Risks

Table 8-3: Planning Risk

Planning Risk				Gross Risk						
									Green - acceptable Orange - Monitor Red - Manage (see further analysis)	
Ref #	**The Risk**	**Likelihood**	**Consequence**	**Total**	**What can happen (event)**	**How can it happen**	**What can happen (Consequences)**	**Identify existing controls**	**Effectiveness and implementation of existing controls (Red/Orange/Green)**	**Who is responsible?**
10	**Insufficient management of traffic demand – e.g. increased congestion leads to higher loading time and reduced life of roads; inability to provide balance between the needs of commuters and local short-trip users**	5	4	20	Demand beyond road capacity	Inadequate intersection controls	Delays and crashes	Model demonstrating demand and interventions		Senior Management
15	**Extreme natural hazards – e.g. earthquake/volcano/tsunami causing damage to assets and/or hindering community growth**	4	5	20	Loss of access and connectivity on District Roads	Natural disasters i.e. earthquake can make roads unsafe to travel on.	Traffic comes to a standstill	Building resilience into roading network		Senior Management
7	**Risks associated with council-owned roads and bridges on private land – e.g. council-owned bridges and walls on private property/privately owned bridges and walls on council property; unknown ownership; reliance on private structures**	4	4	16	Ability to assess the condition and performance of Council asset may be compromised because asset is on private property	Breakdown in relationship with private land owners	Inability to access Council assets	Good working relationship with private land owners		Senior Management
16	**Moderate natural hazards – e.g. landslip/major storm event/heat wave causing damage to assets and/or hindering community growth**	4	4	16	Natural hazards can stop "business as usual"	Global warming	Loss of access to key infrastructure	Having a disaster management plan		Senior Management
17	**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**	5	2	10	Use of unsealed roads by heavy vehicles can cause dust on properties	Increase traffic volumes	Health hazard, lost of amenity	Having a process that looks to seal roads that may cause a nuisance to the public		Mark Chamberlain
4	**Insufficient business continuity planning for disruptive events**	3	4	12	Council is unable to provide leadership in these situations	Loss of communications, ICT failure	Inefficient response	Process and procedures that consider these eventualities		Senior Management
13	**Lack of transport alternatives – e.g. cycleways and walkways**	3	3	9	Overreliance on vehicles as primary transport mode	Insufficient funding for walking and cycling	Active modes are discouraged	Requirement in Annual Report for delivery of walking and cycling facilities		Transportation Asset Planner
1	**Inadequate asset management/infrastructure strategy planning – e.g. not up to date; process and output are of insufficient quality**	2	4	8	Council is not keeping up to date with strategic planning - relying on reactive responses instead	Too much going on	Increased risk associated with transportation	Having consultants look through Council processes		Senior Management
2	**Non-compliance with legislation and legal requirements – inability or failure to comply with consents, statutes and national standards e.g. OSH requirements; inadequate signage**	2	4	8	Council is unable to ensure that the roads under its stewardship are up to standard	Mistakes occur due to inadequate resourcing	Council is liable for damages	Skilled staff are responsible for ensuring all regulatory requirements are met		Senior Management
5	**Ineffective strategic planning (internal council) – e.g. 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**	2	4	8	Unsynch planning can result in unnecessary work being done by different groups in Council	Lack of communication between different groups/departments in Council	Project delivery does not occur on time, at cost	Meetings involving different stakeholders occur regularly to ensure that everyone receives information they need to know		Senior Management
6	**Ineffective input into regional strategic planning – results in reduced funding available to council, extra requirements, clashing objectives**	2	4	8	Strategic input provided by SDC to the RLTP is ineffective	Poor evidence to support SDC's perspectives c	Projects requested by Council are not approved	Trained staff are responsible for input into the RLTP process		Senior Management
8	**Underestimating the effects of climate change – inadequate council readiness, resulting in e.g. encroachment of the sea onto roads; consecutive droughts causing subsidence; under capacity of network**	2	4	8	Underestimating climate change may mean that Council is unprepared for potential consequences arising from droughts and rising sea levels	Council inaction may mean that strategies like finding alternatives to coastal routes and dealing with potential subsidence of the roads may not occur.	In both situations, flooding can occur across key routes in Selwyn District	Having a plan that deals with the potential implications of climate change		Senior Management
18	**Hazardous materials – e.g. leakage from a vehicle damaged in an accident or with a slow leak; bitumen spills – effects on stormwater**	2	3	6						
19	**Surface water contamination during normal operation of the network; lack of controls causing environmental impacts**	2	3	6						
9	**Overestimating the effects of climate change – resulting in conservative design and excessive use of funds**	1	4	4	Overestimating climate change may mean that Council is over prepared for potential consequences arising from droughts and rising sea levels	Council action may mean that strategies like finding alternatives to coastal routes and dealing with potential subsidence of the roads may be gold plated	Financial over-commitment may mean that Council is unable to progress other important projects	Having a plan that deals with the potential implications of climate change		Senior Management
11	**Inappropriate number of car-parking facilities on the street – under-provision, or over-provision**	2	2	4						
12	**Inappropriate number of car-parking facilities off the street – including car parks for the disabled**	2	2	4						
3	**Inability to comply with council's own standards – e.g. not meeting benchmarks or milestones set by council**	1	3	3						
14	**Poorly defined levels of service – affecting community expectations; increased costs; inferior assets and services**	1	2	2						

Net Risk									
Analysis 1	Analysis 2	Analysis 3							
Likelihood	**Consequences**	**Level of risk**	**Risk Priority**	**Treat Risk (Y/N)**	**Treatment option**	**Who is responsible for treatment?**	**Residual risk**	**Monitoring**	**Who is responsible for monitoring?**
2	4	8	2	N					
2	5	10	1	Y	Prepare Resilience/Emergency Preparedness Plan	Asset Manager Transportation	5	Y	Senior Management
2	4	8	2	N					
2	4	8	2	N					
2	2	4							
2	4	8	2	N					
1	3	3							
2	4	8	2	N					
2	4	8	2	N					
1	4	4	3	N					
2	4	8	2	N					
2	4	8	2	N					
1	4	4							

Table 8-4: Management Risk

Management Risk										
									Green - acceptable Orange - Monitor Red - Manage (see further analysis)	
Ref #		**Likelihood**	**Consequence**	**Total**	**What can happen (event)**	**How can it happen**	**What can happen (Consequences)**	**Identify existing controls**	**Effectiveness and implementation of existing controls (Red/Orange/Green)**	**Who is responsible?**
7	**Insufficient technology – inability to track technology, engineering developments/techniques, local and national trends, and to utilise these where relevant**									
4	**External economic influences – eg cost escalation of oil/road materials/ quality aggregate – economic viability and sustainability**	4	4	16	New roads will not be built and existing roads may not be able to be maintained	Cost of materials become too high for Council to be able to afford building and maintaning roads in the District	Only strategic roads will be maintained. Safety and access issues will happen	Central Government will provide extraordinary funding		Senior Management
5	**Inability to utilise funding options – both internal and external, eg 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**	4	4	16	As above	As above	LOS experienced by road users drop	Ensuring that SDC has an enduring working partnership with NZTA		Senior Management
2	**Loss of system knowledge – eg inability to retain knowledge, loss of institutional knowledge; insufficient systems in place to manage data/information, especially regarding asset performance and condition; IT failure, or inability to scope IT priorities**	3	4	12	Key personnel change	Change in life circumstance of key personnel	Loss of experience may mean lost opportunities and time as replacement catches up.	Having an up to date Activity Management Plan that documents processes and procedures that could be referred to were this situation to occur		Senior Management
6	**Diminishing funding allocation – eg reduced contribution from subsidies/property rates/taxes/development charges, or a change of roading status, resulting in an inability to maintain levels of service**	4	3	12	Insufficient finances to finance LTP projects	Lack of growth, economic decline etc.	Projects in the LTP may not be completed	Risk analysis is underatken to ensure LTP is achievable and affordable		Management
8	**Lack of political alignment – eg inability of elected members to fulfil roles and responsibilities, or a disregard for community/staff views**	3	4	12	Elected representatives may not fulfil their roles and responsibilities.	Different visions of where the district should be heading and inadequate opportunities for residents to input into Council processes.	Council decision making comes to a standstill	Good communication between elected representatives. Consensus seeking attitude		Senior Management
1	**Lack of staff resources – eg inability to attract key staff and/or retain skilled staff**	3	3	9	Skills shortage may cause skilled staff to leave Council	Skilled staff may want a change in workplace	Loss of institutional knowledge	HR has strategies to retain skilled staff		Senior Management
9	**Handover of low-quality assets from property developers or council**	3	3	9	Property developers may hand over assets that are not up to standard	Rushed jobs may occur in order to satisfy tight timeframes	Assets may degrade after coming into Council ownership. Council will have to pick up the cost.	Having checks on adequacy of assets before handover		Development Engineer
10	**Shortage of local contractors and consultants**	3	3	9	Council may not have access to consultants and contractors to assist with Council workstreams	Economic boom or Council is seen as not being a suitable client	Projects do not get delivered	Maintain good relationship with consultants and contractors. Review procurement strategy regularly		Management
3	**Insufficient technology – inability to track technology, engineering developments/techniques and local and national trends, and to utilise these where relevant**	2	2	4						
11	**Inadequate event management**	2	2	4						

Analysis 1	Analysis 2	Analysis 3							
Likelihood	**Consequences**	**Level of risk**	**Risk Priority**	**Treat Risk (Y/N)**	**Treatment option**	**Who is responsible for treatment?**	**Residual risk**	**Monitoring**	**Who is responsible for monitoring?**
3	4	12	1	N					
3	4	12	1	Y	1. Prepare Capital Programme Management Process 2. Manage relationship with funding partners	Asset Manager Transportation	8	Y	Senior Management
2	4	8	3	N					
1	3	3							
2	4	8	3	N					
3	3	9	2	Y	Ensure corporate processes are appropriate	Human Resources	6	Y	Senior Management
1	3	3							
2	3	6							

Table 8-5: Delivery Risk

Delivery Risk										
									Green - acceptable Orange - Monitor Red - Manage (see further analysis)	
Ref #		**Likelihood**	**Consequence**	**Total**	**What can happen (event)**	**How can it happen**	**What can happen (Consequences)**	**Identify existing controls**	**Effectiveness and implementation of existing controls (Red/Orange/Green)**	**Who is responsible?**
2	**Inadequate portfolio management – failure to deliver on commitments because of over-/under-spending of budgets, or deferring transport/roading projects**	3	5	15	Inadequate management (including financial) leads to non-delivery of projects	Insufficient resource to deal with growth.	Project delivery will be delayed and possible escalation in project cost. Unhappy ratepayers.	Identifying areas of risk and mitigating risk		Senior Management
1	**Inadequate project management – e.g. 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**	3	4	12	As above	As above	As above	As above		Senior Management
4	**Inadequate capital works contract management – poor contractor performance resulting in unnecessary or excessive costs and/or insufficient output or quality**	3	4	12	As above	As above	As above	As above		Senior Management
5	**Non-compliance with legislation and legal requirements – inability or failure to comply with consents, statute and national standards e.g. increased OSH requirements, inadequate signage**	2	5	10	Legislative and regulatory requirements change over time. SDC may not be up to date with requirements.	Not keeping updated with new requirements	Legal action could be actioned against SDC for non-compliance	Provision of personnel to ensure that these requirements are met		Senior Management
6	**Inability to comply with council's own standards – not meeting benchmarks or milestones set by council**	3	3	9	Council is unable to meet the requirements it sets	Poor work quality and/or lack of resource	Danger to public	Ensuring that Council can deliver on its obligations prior to agreeing to "things"		Senior Management
9	**Handover of low-quality assets – from property developers or council**	3	3	9	Council receives assets that have lower than expected lifecycles	Inadequate assessment of asset prior to "vesting"	Council is responsible for bringing asset up to standard	Skilled staff signing off on vested assets		Development Engineer
10	**Shortage of local contractors and consultants**	3	3	9	Loss of resource to assist with Council projects	Economic boom	Project delivery will be delayed	Building good relationship with consultants and contractors		Senior Management
3	**Inadequate maintenance contract management – poor contractor performance resulting in unnecessary or excessive costs and/or insufficient output or quality**	2	3	6						
7	**Service level agreements between transport/roading and other parties (internal or external) not met, or non-existent – inadequate service provided to, or by, other activities (e.g. internal business units, regulatory departments)**	2	3	6						
8	**Unsatisfactory working relationships with utilities (e.g. power, telecommunications, council water and waste) – causing delays to projects and negative impacts on service levels/coordinating work programmes**	2	3	6						
14	**Inadequate procurement practices – not using optimal procurement options, resulting in e.g. cost increases/lost staff time/delays**	2	3	6						
11	**Inadequate event management**	2	2	4						
12	**Ineffective enforcement measures – e.g. of car parking, unauthorised vehicles using restricted lanes**	2	2	4						
13	**Inadequate public relations management – resulting in public misunderstanding of infrastructure problems, projects and programmes**	2	2	4						

Analysis 1	Analysis 2	Analysis 3							
Likelihood	**Consequences**	**Level of risk**	**Risk Priority**	**Treat Risk (Y/N)**	**Treatment option**	**Who is responsible for treatment?**	**Residual risk**	**Monitoring**	**Who is responsible for monitoring?**
2	5	10	2	Y	Prepare Capital Programme Management Process	Asset Manager Transportation	8	Y	Senior Management
1	4	4	5	N					
3	4	12	1	Y	Prepare Capital Programme Management Process	Asset Manager Transportation	8	Y	Senior Management
1	5	5	4	N					
2	3	6	**3**	N					
1	3	3							
1	3	3							

Table 8-6: Physical Asset Risk

Physical Asset Risk										
									Green - acceptable Orange - Monitor Red - Manage (see further analysis)	
Ref #		**Likelihood**	**Consequence**	**Total**	**What can happen (event)**	**How can it happen**	**What can happen (Consequences)**	**Identify existing controls**	**Effectiveness and implementation of existing controls (Red/Orange/Green)**	**Who is responsible?**
21	**Car parks: Inappropriate number of car-parking facilities on the street**									
22	**Car parks: Inappropriate number of car-parking facilities off the street – including car parks for the disabled**									
7	**Roads/pavements: Ice/snow on roads – resulting in unsafe operating conditions (loss-of-control accidents)**	5	4	20	Traffic accidents can occur due to slippery road	Drivers may misjudge conditions and assume that no danger exist in driving "normally"	Injuries and fatalities at intersections and blind spots	Contractors have an action plan to plow etc. road. Adequate signage exist to warn motorist about road condition		Senior Management
8	**Roads/pavements: Road-user conflicts – impacts due to conflict between different user types e.g. cyclists in busways/pedestrians on roads**	3	5	15	Collisions could occur from drivers not being attentive to the road environment	Road users may not anticipate other road users in proximity and travel in a way that causes a collision.	Injuries and fatalities.	Use of cycle lane, road safety campaigns and engineering design to minimise this risk		Senior Management
13	**Signage: Inadequate signage/markings causing accident/damage – noncompliant to standards or missing because of e.g.. vandalism, deterioration (includes sight rails, chevrons, edge-marker posts, bridge-end markers, culvert markers)**	3	4	12	Non compliant signage can confuse drivers. Lack of warning signage can mean that drivers drive in a way that they wouldn't if warned.	Lack of skilled staff, insufficient audits to determine whether signage is up to standard, vandalism.	Injuries and fatalities	HR and Managers monitoring the well-being of employees		Senior Management
27	**Traffic signals/controls: Power outage causing delays and potential accidents**	3	4	12	Traffic lights that do not work can lead to vehicles making the wrong decision at intersections.	Drivers may misunderstand the right hand rule at the intersection and assume they have the right of way. Indecision can also lead to collisions	Injuries and fatalities	Backup generators to provide electricity to key traffic signals. There are not many signalised intersections in Selwyn		Senior Management
16	**Bridges and structures: Wall failure resulting from a natural hazard (e.g. landslide/undermining) or vehicle impact, affecting accessibility**	2	5	10	Bridge cannot be used by general traffic. Possible entrapment.	Structure failure can block entrance/exit of bridge	Injuries and fatalities	Having audits on the state of the bridge. Ensuring that there is resilience built in the system i.e. another bridge in the vicinity		Senior Management
17	**Bridges and structures: Bridge collapse/damage/deterioration/erosion/blockage – affecting accessibility, safety (but excluding catastrophic events)**	2	5	10	Bridge maybe closed to allow for detailed examination of its structural integrity	Lack of ongoing inspection and maintenance of the bridge, poor design and construction of the bridge could contribute to this event	Traffic delay as vehicles are unable to take the most direct route to their destinations	Having maintenance contract that specify bridge will be inspected and maintained according to best practice		Senior Management
5	**Roads/pavements: Low-lying road inundated by floods during heavy-rainfall events**	3	3	9	Rainfall can cause the water level to be higher than the road.	Traffic, especially cyclist, pedestrians and some cars may be unable to use the roads. Traffic may be stuck in the flooded areas.	Injuries, fatalities and disruption of journey	Building resilience into the roading system so that an alternative exist to the low lying road		Mark Chamberlain
15	**Drainage: Flooding affecting roads – e.g. inadequate drainage/poor location/blocked drainage assets, causing inaccessibility or unsafe driving conditions**	3	3	9	Lack of drainage can mean that water is not drained properly. Roads can become flooded with the excess water.	It can happen when drains are blocked due to sediment or because roads are incorrectly designed/built	Disruption to journey	Appropriate drainage systems needs to be included in the road carriageway. Audits need to occur to ensure any issue with drainage is picked up		Mark Chamberlain
23	**Car parks: Inadequate quality of car parks – e.g. signposting/design in regards to national standards (with reference to the national standard – Manual of traffic signs and markings (MOTSAM) (NZTA 2009)**	3	3	9	Carparks can be marked incorrectly i.e. too small or too big. They can be designed incorrectly so that if carpark is full, no cars are able to get in or out	Carparks that do not meet the District Plan requirements	Vehicles may not have enough room to manoeuvre within the car park. Vehicles door may not be able to be open	Where applicable, ensuring parking meets district plan requirements is part of the resource consent requirement		Mark Chamberlain
24	**Public transport: Lack of bus shelters – resulting in reduced patronage, people exposed to the weather**	3	3	9	Well frequented bus stops may not have the infrastructure i.e. bus shelters to protect commuters from weather elements.	Insufficient PT infrastructure funds and/or slow service delivery may hold up needed infrastructure	Public transport may lose it's appeal	Close collaboration with ECAN and PT users to determine what infrastructure can be provided to encourage PT use		Transportation Asset Planner
25	**Public transport: Lack of quality bus shelters – resulting in reduced patronage, people exposed to the weather**	3	3	9	As above	As above	As above	As above		Transportation Asset Planner
1	**All assets: Inadequate condition/performance assessments – lack of reliable data for renewals/replacements and valuations**	2	4	8	Information on assets may be inaccurate	Incorrect data entry, wrong assessment methodology used by engineers	Corporate may be using incorrect valuation numbers.	Using respected consultants i.e. BECA, Waugh and employing skilled staff in Council to ensure the integrity of data and assessment process		Senior Management
19	**Bridges and structures: Structure damage from overloading – causing faster deterioration of bridges/culverts/structures**	2	4	8	Heavy vehicles on structures can result in more rapid structure deterioration	Heavier weights can accelerate cracking/breakdown of structure	Catastrophic failure can occur to the structure as cracking may result in it being unable to carry normal vehicle loads	Proper modelling of bridge and on-going inspections to ensure the integrity of the structure		Senior Management
2	**All assets: Damage to Infrastructure through vandalism**	3	2	6						
4	**Roads/pavements: Inadequate road maintenance – e.g. substandard surfaces resulting in higher long-term costs and inefficient/unsafe operating conditions (loss-of-control accidents, potholing, stone loss etc.).**	2	3	6						
9	**Streetlights: Inadequate street lighting – resulting in crime, safety considerations**	3	2	6						
12	**Footpaths/accessways: Inadequate accessibility – for physically and visually challenged persons, wheelchairs, strollers, walkers, prams, mobility scooters (including lack of footpaths, thus limiting accessibility)**	3	2	6						

Analysis 1	Analysis 2	Analysis 3							
Likelihood	**Consequences**	**Level of risk**	**Risk Priority**	**Treat Risk (Y/N)**	**Treatment option**	**Who is responsible for treatment?**	**Residual risk**	**Monitoring**	**Who is responsible for monitoring?**
2	4	8	1	Y	Prepare Resilience/Emergency Preparedness Plan	Asset Manager Transportation	4	Y	Senior Management
1	5	5	3	N					
1	4	4	4	N					
1	4	4	4	N					
1	5	5	3	N					
1	5	5	3	N					
1	3	3							
1	3	3							
2	3	6	2	N					
2	3	6	2	N					
2	4	8	1	Y	Review programme as part of RAMM/dTIMS Contract	Asset Manager Transportation	4	Y	Senior Management
2	4	8	1	Y	Include in Capital Programme Management Process	Asset Manager Transportation	8	Y	Senior Management

Table 8.5: Physical Asset Risk (continued)

Physical Asset Risk										
									Green - acceptable Orange - Monitor Red - Manage (see further analysis)	
Ref #		**Likelihood**	**Consequence**	**Total**	**What can happen (event)**	**How can it happen**	**What can happen (Consequences)**	**Identify existing controls**	**Effectiveness and implementation of existing controls (Red/Orange/Green)**	**Who is responsible?**
3	**Roads/pavements: Inadequate road design – e.g. substandard geometry/surfaces/marking resulting in inefficient or unsafe operating conditions (loss-of-control accidents); road pavement not inadequately designed for ADT**	1	4	4	Accidents may occur on these roads from vehicles assuming road environment is "standard" instead of "poor"	Absence of appropriate warning signs may cause drivers to assume no extra caution is needed when driving around bends etc.	Vehicles may experience accidents	Capable consultants/internal staff responsible for designing roads. Roads are checked to ensure they are up to standard.		Senior Management
6	**Roads/pavements: Loss of amenity and visibility caused by roadside vegetation – e.g. spread of noxious weeds and debris within the road reserve; debris blocking stormwater drains**	2	2	4						
14	**Guard rails/medians: Guard rails/medians damaged and/or missing**	1	3	3						
18	**Bridges and structures: Damage to services on structures – causing e.g. loss of water supply/electricity/telecommunications**	1	4	4	Services on structures can be damaged	Vandalism or accidents can sever services no structures	Loss of services	Having the services protected or embedded		Senior Management
20	**Bridges and structures: Vehicle, pedestrians or objects fall (or objects are thrown) from bridge**	1	3	3						
28	**Traffic signals/controls: Inadequate phasing of signals**	1	4	4	Intersection may not be operating at the maximum efficiency possible	Signals are not integrated within the overall network	Unnecessary delays occur on the roading network	The two traffic signals in Rolleston allow traffic on and off the State Highway. From NZTA's perspective, these two signals are very important and provides an impetus to guarantee that these signals operate efficiently		Senior Management
10	**Streetlights: Damage to streetlights – due to vandalism and/or vehicle damage, resulting in crime, replacement costs and safety considerations**	1	3	3						
11	**Footpaths/accessways: Inadequate footpath quality – because of e.g. poor design/construction/materials/funding/utilities reinstatements, resulting in pedestrian slips/falls, and inaccessibility**	1	3	3						
26	**Cycleways: Inadequate cycleway quality – e.g. poor design/construction/materials/ funding/utilities reinstatement, resulting in accidents and inaccessibility**	1	3	3						

Table Caption: Physical Asset Risk (continued)

Analysis 1	Analysis 2	Analysis 3							
Likelihood	**Consequences**	**Level of risk**	**Risk Priority**	**Treat Risk (Y/N)**	**Treatment option**	**Who is responsible for treatment?**	**Residual risk**	**Monitoring**	**Who is responsible for monitoring?**
1	4	4							
1	4	4							
1	4	4							

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8.3.2 Planning Risk

The top planning risk factors identified as include:

- ***Insufficient Management of Traffic Demand:***

The significant population growth impact on the road network is discussed in the Growth and Demand section of this plan. A particular risk that results from this growth is the congestions at the intersections that in turn causes the likely consequences of time delays to road users and additional loading time on pavements and surfaces, causing accelerated deterioration. This risk is currently being managed through the use of traffic and intersection modelling to optimise the setting of traffic controls and signals. In extreme cases, there is a process of identifying intersection upgrades and securing funding for those upgrades. No further risk mitigation measures are required for this risk.

An additional risk that is mentioned in Section 9 Life Cycle Cost is the significant increase of heavy vehicles and the impact on the deterioration of pavements. This risk should be investigated further as part of the Risk Register review.

Additional Risk Treatments Required: No

- ***Planning Risk Dealing with Major Natural Hazards:***

Given its geographic location, Selwyn DC has significant exposure to most natural hazard events. Given the significance of this risk and the complexities in dealing with, it warrants a focus on councils' approach. Section 8.4 discusses the council's approach to resilience.

Additional Risk Treatments Required: Yes

- ***Risks Related to Moderate Natural Events:***

Some minor natural events may cause minor or isolated damage to parts of the road network. Examples include minor slips blocking parts of the network, or washouts of a road in isolated locations. Minor event remedial work is included in maintenance contracts, and these risks are therefore adequately managed through current controls.

Additional Risk Treatments Required: No

- ***Risks Associated with Councils' Roading Asset on Private Land:***

The need to regularly inspect and assess the conditions of the council's asset free access to these structures are needed. With a potential breakdown in relationships with land-owners, access may become an issue. The potential risk is currently managed well through ensuring positive relationships with land-owners are maintained.

Additional Risk Treatments Required: No

8.3.3 Management Risk

- ***External Economic Influences:***

The experience during COVID-19 has shown how quickly the global economy can change and how that impacts on the local economy. There are a number of risks associated with the economy that are well beyond the means for Council to deal with; the Transportation sector's exposure to high-cost fluctuations of bitumen is a particular risk factor. With extreme cost increases of material, the length

of roads being constructed or re-sealed could be significantly affected, thus having a roll-on effect on the level of service provided to the road users. Given Councils limited means of mitigating this risk, no further controls are considered and the current status of depending on the central government to cover these types of threats is maintained.

Additional Risk Treatments Required: No

- ***Inability to Fully Utilise Funding Options:***

Given the mixed investment into Transportation from Waka Kotahi and internal allocation, there is always a risk of not fully obtaining the required or requested funding. These risks could be further broken down into the following categories:

1) Knowing the appropriate investment needs to maintain the target level of service,
2) Developing a compelling business case to motivate the investment need, and
3) Maintaining the trusting partnering relationship with the investors.

The asset management planning tools and processes Council uses are aimed at minimising associated risk and knowing the right level of investment. Council uses the analysis as evidence for investment requests. The asset management improvement programme also includes using new technology and knowledge to better estimate and demonstrate investment needs. Council should also invest time in maintaining and improve the relationship with the funder's officials, keeping them close to the needs of the region for maintaining the road network to an appropriate level of service.

Additional Risk Treatments Required: Yes

- ***Business Continuity & Loss of System Knowledge:***

All councils face a significant risk of losing systems knowledge that result from staff turnover and having insufficient systems to manage information regarding assets and asset performance. Business continuity is directly threatened by the risk of valuable lessons from the past being lost. The efficiency of the organisation is hampered by new staff or system lag time to restore lost knowledge. Existing mitigation measures for this risk include documenting the procedures in practice documentation. The Council also have a practice of supplementing internal staff with external resources to assist with producing documentation. Furthermore, most database and management systems now function in the cloud providing additional security and on-going access to the information despite potential council facilities being impacted through staff turnover.

Additional Risk Treatments Required: No

- ***Lack of Political Alignment:***

There is a risk that the technical strategy and vision for the road network and investment strategy may differ between elected members. Elected members often have 3 to 6 year vision that corresponds with election cycles. Local initiatives may not always receive national subsidy leading to high levels of unsubsidised work being undertaken. The road asset management planning horizon ranges between 3 years for the Waka Kotahi funding applications, to 10 years for the activity management plan, and up to 30 years for the strategic asset management plan. Should council members make short-term decisions, it may compromise the long-term outcomes expected of the road network. The mitigation for this risk is through having robust evidence that is presented to Councillors to get support for the technical asset management strategy for the road network.

Additional Risk Treatments Required: No

8.3.4 Delivery Risk

- ***Inadequate Portfolio and Capital Works Contract Management:***

Successful portfolio management depends on several factors that significantly impact the delivery of the works programme within planning horizons. There are also external factors such as contractor's capabilities to mobilise their teams on time and progress the work according to scheduling. The likelihood of any of these factors impacting the portfolio programme is almost a certainty, and sufficient mitigation measures should therefore be in place. It has been identified that current processes do not manage this risk adequately, and a more formal capital programme management system should be adopted.

With the increasing complexity of the programme and size, there is more required to understand the needs from a programme management perspective.

Additional Risk Treatments Required: Yes

- ***Inadequate Project Management:***

Each individual project also has a significant risk of not being able to deliver on the intended outcome, or run overtime or over budget. Project delivery risk management relies on the ability of the contract to cover the likelihood and consequences of delivery issues. Best practice in contract specification is therefore essential to manage project risk. The appropriate contract management relationships focus on identifying issues early and address these through appropriate mechanisms.

Additional Risk Treatments Required: No

- ***Non-compliance with Legislation and Legal Requirements:***

The Occupation Safety and Health (OSH) legal requirements are ever-changing, and there is a risk for the council not being a) are not are of new requirements; and, b) not being agile to adjust processes quick enough to new requirements. Current arrangements are for updating councils procedures and staying abreast to developing requirements are deemed sufficient to manage this risk to satisfaction.

Additional Risk Treatments Required: No

8.3.5 Physical Asset Risk

- ***Minor to Major Natural Hazards roads and bridges:***

Natural Hazards have been identified as the most significant physical infrastructure risk. Minor climatic events such as ice or snow could create unsafe operating environments for motorists. This issue is of high significance and it is anticipated that new processes will be developed to deal with resilience in a more holistic manner.

Additional Risk Treatments Required: Yes

- ***Road User Type Conflicts:***

The government policy statement encourages all road controlling authorities to invest in promoting choices of active and sustainable transport modes in communities. There is a risk that the uptake of alternative travel modes happens faster than the works to facilitate these modes, increasing the likelihood of conflict between travel modes having to share roadways. These conflicts could result in reduced user satisfaction, or in crashes and injuries.

Additional Risk Treatments Required: No

- ***Inadequate Road Marking and Signing:***

Insufficient marking and signage is an ongoing risk that has serious safety implications on road users. Typical causes for insufficient signage are vandalism, insufficient audits, and changing road layouts and conditions. The state of signage is a standard performance reporting measure from the Road Efficiency Group (REG) and the council regularly reports on this measure. Signage maintenance is also included in maintenance contracts, thus ensuring this risk is sufficiently managed.

Additional Risk Treatments Required: No

- ***Traffic Signal/Controls Failures:***

The failing of traffic signals and controls will result in potential crashes and injuries of road users. The most likely cause of traffic signal failures are power failure or vehicles hitting the signals. Council has back-up power generation options in place for signals that could adequately mitigate the risk for power failures, and protocols are in place with traffic signals being knocked over to restore the services within a prescribed time-frame.

Additional Risk Treatments Required: No

- ***Non-Natural Bridge Failures:***

Bridges provide critical linkages across rivers and river valleys that will become inaccessible if the bridges fail due to poor condition or over-loading. These failures will occur with a lack of investment or lack of robust asset management processes.

Additional Risk Treatments Required: No

8.4 Natural Hazards

8.4.1 Context

The District Plan discusses Lifeline Risks under the heading B 3.1 Natural Hazards Issues. Relevant extracts follow:

Natural Hazards: NH-Overview

A natural hazard is defined in the RMA as "any atmospheric or earth or water related occurrence (including earthquake, tsunami, erosion, volcanic and geothermal activity, landslip, subsidence, sedimentation, wind, drought, fire, or flooding) the action of which adversely affects or may adversely affect human life, property, or other aspects of the environment". Both the Canterbury Regional Policy Statement 2013 (CRPS) and the New Zealand Coastal Policy Statement 2010 (NZCPS) promote a risk-based approach to natural hazard and coastal hazard management.

Council has defined a risk-based approach as:

- *managing risk when there is uncertain or insufficient natural hazard risk information*
- *Managing risk based on the scale of a particular natural hazard event, together with the likelihood of that event occurring and the effects on people and property.*

Council has defined a risk-based approach in this way due to the large geographical spread of the District, with its sparse population and low level of development in some areas, compared with discrete areas of larger populations in its townships. In the larger populated and developed areas the consequences from natural hazards and therefore the risk could be considerably greater. A risk-based approach will enables the focus of the District Plan natural hazard provisions to gravitate towards the areas where there is greatest risk.

The natural hazards managed by this District Plan are:

- *coastal hazards*
- *flood hazards*
- *geotechnical hazards*
- *Wildfire hazards.*

General

NH-P1 Avoid new subdivision, use, or development of land in high hazard areas (except for important infrastructure and land transport infrastructure)

NH-P2 Avoid the development or use of land, buildings or structures in high hazard areas for any important infrastructure or land transport infrastructure

NH-P3 Restrict new subdivision, use or development of land in areas outside high hazard areas but known to be vulnerable to a natural hazard, unless any potential risk of loss of life or damage to property is adequately mitigated.

NH-P4 Natural hazard mitigation works shall consider:

1. *approaches to risk management that reduce the need for physical works and similar engineering interventions;*
2. *The nature of the natural hazard risk and how it might change over at least a 100-year timeframe, including the expected effects of climate change;*
3. *The potential for adverse effects on indigenous biodiversity, Ngāi Tahu cultural values, or sites of historic heritage or geological value;*
4. *Identification of and a plan for transition mechanisms and timeframes for moving to more sustainable approaches; and*
5. *The physical works necessary to ensure that the form and location of any structure is designed to minimise adverse effects on the environment.*

NH-P5 When determining if new subdivision, use, or development is appropriate and sustainable in relation to the potential risks from natural hazard events, have particular regard to the effects of climate change.

Coastal Hazards*NH-P7 Recognise that hard protection structures may be the only practical means to protect existing important infrastructure and land transport infrastructure against coastal hazards.*

NH-P8 Where hard protection structures are considered necessary to protect private assets, avoid their location on public land unless there is significant public or environmental benefit in doing so.

8.4.2 Climate Change

Climate change affects patterns or regular weather and intensifies the events and the frequency of events at the extreme ends of the spectrum of climate events.

Significant rainfall events will occur more frequently, and higher downpours are expected. Hotter and dryer spells in summer will also increase, and occur more frequently.

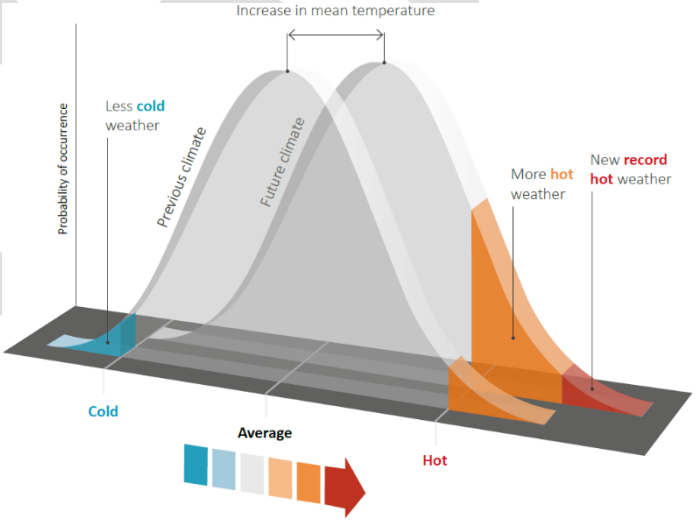

Figure 8-3: *Climate Shift (Royal Society of New Zealand)*

The mean is also changing, often referred to as "slow-burning" climate change. Coastal erosion is an example of slow burning change, taking a bit longer to manifest problematic issues. Slow-burning climate change is a risk that the council has to consider and manage. Transportation issues include increased subgrade moisture conditions, and high-temperature impacts on surfaces. The impact on bituminous surfaces is of particular concern as increased use of bitumen products will contribute to increasing Council's carbon footprint.

Significant work has been completed in the understanding of climate change in the region. Studies completed by Council and Environment Canterbury have shown potential climatic changes that will pose risks to infrastructure and services in the short, medium, and long term. This section mostly deals with risks related to disaster events such as floods. Council-wide approach to climate change is documented in the Council Climate Change Policy.

8.4.3 Resilience to Natural Hazards

The likelihood of some events is relatively low, there are others that are almost certain to happen but the timeframes are unknown. Council is following a holistic approach to resilience.

Figure 8-4: *Cycle of Resilience to Natural Hazards (Source: Theuns Henning)*

Following any natural hazard event that affects infrastructure or utilities, an assessment is undertaken to ascertain the extent of damage, intervention required, priority of reinstatement, and the resource requirements. The effects and intervention lists contained in this plan can be used to ensure all contingencies are considered. The interconnectivity and interdependence between the Transportation activity and other utilities during and after an event is very important and has been identified in the Plan.

Table 8-7: *Risk Reduction, Readiness, Response and Recovery Status*

Activities Required	Description	Status
Risk Reduction	Identifying hazards, describing risks, and taking actions to reduce the probability or consequences of potential events	Risk assessment and control processes in place for future use
Readiness	Planning and preparation required to equip agencies and communities to respond and recover	Emergency Management Plans and Emergency procedures manual prepared for future use. Exercises undertaken to test readiness.
Response	Addressing immediate problems after an emergency	Emergency Management Plans prepared for future use.
Recovery	Addressing the long-term rehabilitation of the community	Managed by the Civil Defence Emergency Management Group

8.4.4 Lifelines and Critical Infrastructure

Investment prioritised for roads and bridges that are classified as critical links. The criticality of an asset reflects only the consequence of the asset failing. High criticality assets are best defined as assets which have a high consequence of failure, but may not necessarily have a high probability of failure. Detailed criticality of assets has not been undertaken across the Transportation activity at this stage.

In general the asset hierarchy and bridge network provide a proxy for criticality. The bridges on the state highway network have been considered as the network is treated as an integrated system.

A desktop study of the critical roading infrastructure was undertaken in 2015. The study included the likely impact of the natural hazards that the District faces along with the current level of bridge performance.

This study revealed:

1. There is generally sufficient redundancy in the network to provide alternative routes when any routes are affected by a specific issue,
2. Alternatives become less convenient where widespread events such as floods occur, and the State Highway network becomes the 'spine' of the network when other 'limbs' are impassable,
3. Fords are typically used as a convenient shortcut, there are alternative routes using bridges available when rivers are high,
4. Snow affects State Highway 73 as well as local roads which are located off the highway. Arrangements to work in combination with the State Highway managers to undertake combined snow clearing are appropriate. The key local roads requiring attention are Coleridge Road and part of Homestead Road (to avoid risk to isolated residences at Lake Coleridge, and the hydro station), and
5. The bridge programme has been refined to ensure there is adequate property access for heavy traffic (50MAX/HPMV).

A more thorough assessment is proposed to allow the assets to be clearly identified and managed more proactively to mitigate the risk associated with their failure. This proactive management includes:

- Priorities for undertaking condition assessments,
- Adjusting economic lives with respect to renewal profiles,
- Prioritising/Deferring renewals,
- Prioritising expenditure,
- Operation and maintenance planning, and
- Setting priority for collecting asset information within the required levels of confidence.

8.4.5 Emergency Planning and Procedures

The District is at the mercy of a wide range of potential natural hazards. Several significant natural events have been recorded which have caused damage to property and the environment with no one hazard being the "standard" event.

The District has suffered four main events over the last 25 years:

- Snowstorm in 1992.
- Selwyn River flooding in 2003.
- Fires in the High Country.
- 2010 and 2011 Earthquakes.

Through responses to and rebuilding after these events Council has gained considerable experience. It is important that the knowledge gained is captured and integrated into future operations and planning exercises. Lifelines exercises provide an opportunity for such experience to be shared.

The Civil Defence Emergency Management (CDEM) Act 2002 requires Local Authorities to coordinate Plans, Programmes and Activities related to CDEM across the areas of Risk Reduction, Readiness, Response and Recovery. It also encourages cooperation and joint action within regional groups. Management systems for civil defence emergencies are detailed in the Council's CDEM plan.

A Lifelines Response Plan has been prepared for key Council services including Transportation. The Plan considers natural hazard events including earthquake, flooding, meteorological (snow/wind) and mass movement (land slip), and also takes account of fire and civil disruption events. The principle objectives of the Plan are to:

- Possess a management tool that identifies natural hazards for the transportation activity,
- Identify the consequences of the natural hazards,
- Identify immediate remedial actions,
- Define restoration levels, priorities and issues,
- Identify long term risk management issues, and
- Ensure Emergency Management knowledge is retained within Council.

The Utilities Lifelines Response Plan details the hazards, possible cascading effects and the interventions that may be applicable. It does not consider the effect on any individual community as these will change with the extent of the hazard i.e. the depth and extent of snow and the extent and makeup of that utility i.e. if the water supply has a standby generator.

The Township Volume of the District Plan contains a basic strategy to address Natural Hazard issues, and is applicable to all works

The significance of the various hazards to lifelines are ranked in the order of the study with earthquake the greatest threat. Flooding is limited in extent within the District. Meteorological hazards also tend to significantly affect only limited areas. Snowstorms are historically more significant, and high winds have also caused disruption to infrastructure. Mass movement and coastal hazards may be very significant for the immediately affected area but are limited geographically.
Other factors affecting the assessment of natural-event risk include:

- The total population of the District is centred in particular communities,
- The Arthur's Pass alpine resort is a very popular tourist attraction and its population can increase dramatically during holiday periods. There are appreciable seismic rock-fall risks at Arthur's Pass, and
- The Rakaia Huts and Selwyn Huts are popular fishing and recreational areas with a permanent population of approximately 200. This number can also increase rapidly during holiday periods

8.4.6 Business Continuity

Business Continuity is a progression of disaster recovery, aimed at allowing an organisation to continue functioning during a disaster, rather than simply being able to recover after the fact. The following plans have been developed to ensure business continuity.

Response Plan - Effects and Intervention for Transportation:

The principal objectives for the Utilities Lifelines Response Plan associated with Selwyn District Council (Council's) Transportation are:

- Possess a management tool that identifies natural hazards for the individual utilities,
- Identify the consequences of the natural hazards,
- Identify immediate remedial actions,
- Define restoration levels, priorities and issues,
- Identify long term risk management issues, and
- Ensure that Emergency Management knowledge is retained within Council.

This document is in the process of being revised and updated.

While roads in the District are affected by snow, there are seldom long delays before they are opened. The high country roads have heavier and more regular snowfalls with subsequent longer delays but they serve fewer people who generally have a lesser expectation. The portions of the roading network above the 300m contour line are those usually the worse affected.

Washouts occur infrequently on high country roads. They seldom close the road for long periods and are simply removed or repaired in a short time. There are sites that have washouts occur because of runoff during heavy rain.

There are approximately 49 fords that are maintained on rural roads. The majority are dry, except after heavy rainfall when they usually close the road until the water level recedes and any repairs to the fords are completed. While these cause delays, they are on low traffic volume roads and there usually alternative routes.

8.5 Network Events

The operation of the transportation network includes a number of risks that may impact the safe and efficient operation of the network. These risks may also impact the performance targets of the road network.

The detailed network knowledge gained from continual observation and monitoring of the network is the appropriate means of managing most of the events described in this sub-section. The associated risks are further reduced by the management measures described under each heading.

8.5.1 Condition and Performance Risks

There are a number of factors contributing to the condition and performance-related risks on the roading network including traffic volumes, failures of structures, and pavement failure.

The number and size of vehicles using a road are the major influences on condition, and on the cost of maintaining the desired condition and level of service. Council has a traffic-counting programme that keeps this matter under review. The traffic-counting programme also monitors the proportion of heavy vehicles on representative roads. This monitoring supplements the detailed network knowledge gained from in-situ monitoring and observation of the network. Significant land-use changes that affect traffic loadings are also monitored, and upgrading can be funded.

Bridges are protected through regular inspection by appropriately trained and experienced external consultants. Any bridges with reduced capacity must have legally enforceable load or speed (or both) restrictions placed on them under Land Transport Rule 41001 - Vehicle Dimensions and Mass 2002, and its subsequent amendments (HPMV and 50 MAX). These limits are displayed at each bridge, and where appropriate in advance of the bridge at a location where heavy-vehicles have the opportunity to use an alternative route.

Permits for over mass vehicles to use Selwyn District Bridges are issued by the Council, where appropriate, after consideration of the effects of the load on each bridge it will cross. A record is kept of each permit issued. There are appreciable risks associated with over mass and over-width vehicles using low-capacity bridges in remote rural areas. Large agricultural machinery is a particular source of this risk, with logging and waste management equipment also being significant.

Material failures include deterioration through normal wear and tear, and unexpected failures. Council carries out regular condition-ratings of all its sealed and unsealed roads using industry-standard procedures, and at intervals accepted as appropriate by Council and Waka Kotahi. Deterioration modelling is used to assist in forecasting the quantum of pavement and sealed-surfacing renewals works.

The bridge inspections outlined in the Lifecycle Management Plans monitor the condition of the overall bridge structure, and the individual components and materials. Core samples are taken from the structural members of timber bridges as appropriate on the recommendation of the experienced bridge inspector.

8.5.2 State Highway Detours

Road crashes and other disruptive events on the State Highways in the District can precipitate the need for traffic diversions onto local roads, subjecting them to volumes and axle loads for which they are not necessarily designed to withstand, and drivers to unexpected conditions. These circumstances can lead to premature failure of sections of the road, and to crashes on the detour route. These risks

are managed through a State Highway Detour Policy, which is proposed as a combined project with NZTA.

8.5.3 Network Operations

- ***Mechanical Failure***

The only mechanical equipment on the road network relevant to this plan are railway crossing signals and barrier arms. These are the property of the NZ Railways Corporation and are operated, maintained, and inspected by KiwiRail. Any failures noticed by or reported to the Council are relayed to KiwiRail staff urgently.

- ***Electrical failure***

On-road electrical failures may affect urban street lighting or traffic signals, as these are dependent on grid supplied electric power. Failure of individual lights is managed through the Street Light Maintenance Contract that specifies response times for individual street light failures, or localised groups of failed lights. It also requires periodic electrical inspections of each light fitting. Specific back-up systems are in place for traffic signal power supply. Council contracts for the supply of energy for lighting its urban streets. The disperse nature of the street-lighting network means that stand-by generation is not practical.

- ***Vandalism***

The most significant risk posed by vandalism is obliteration of warning or regulatory signs to the extent that their messages are lost, or the removal entirely of these signs. Council's maintenance contracts cover reinstatement of signs damaged by vandals but discovery of removed signs is often.

- ***Failure of Other Utilities***

The extent of, and regular reoccurrence of damage to some bridges by farm tractors could warrant this behaviour being included in the vandalism category.

The installation or maintenance of utilities such as power, telecommunications, water supplies or sewerage in the roadway or road reserve can have significant adverse effects on both the roadway and its users. This is an area covered by a number of different and sometimes contradictory acts of Parliament.

The applicable acts depend on the utility in question. The acts are the:

- Telecommunications Act 2001.
- Gas Act 1992.
- Electricity Act 1992.
- The Local Government Act 1974.
- The Utilities Access Act 2010.

8.6 Health and Safety

Council is responsible for providing a safe work environment for its staff, contractors, and the public. A Health and Safety committee is currently being formed and is representative of different departments in Council. Council's Health and Safety procedures are detailed in its Health and Safety Policy. The Policy is a reflection of the Health and Safety at work Act 2015. Council staff are exposed to risks associated with the Transportation activity. Council provides training in general and specific safety areas as required.

Council' contractors have Health and Safety Officers, who undertake and maintain workplace risk registers. Contractors' staff have monthly Health and Safety meetings, with documentation of meetings included in the monthly contract performance meetings.

8.6.1 Temporary Traffic Management

The Council has adopted a standard for Temporary Traffic Management at worksites on roads. The Standard consists of:

- The NZTA Code of Practice for Temporary Traffic Management (COPTTM).
- The RCA Forum Local Roads Supplement to COPTTM.

All worksites are required to be controlled by appropriately qualified site traffic management supervisors (STMS). Warrants for temporary speed limits at work sites approved as required under the Council's delegated authority.

Council requires that all contractors engaged to work on behalf of Council have in place effective health and safety systems. During works checks are made to ensure that the submitted plans are being adhered to. TTM site audits will be performed by Council staff as part of the ONRC performance measure suite.

All work within the road reserve requires the contractor or property owner to inform the Council of the proposed work. A standard service plan request form is used to obtain the details of the work and to inform the contractor/property owner of the requirements for traffic management and reinstatement.

All requests are entered into a database which keeps information on traffic management plans. Having the information in a database allows the contractor or property owner to be contacted if there are problems with the worksite or reinstatement of surface. The database:

- Records all relevant details of each Traffic Management Plan (TMP), and
- Includes information on requests for service plans, as these requests usually culminate in work that requires an approved TMP.

The majority of the contractors that carry out work for the utility companies have generic sign layouts submitted but applications are submitted for each project. There is no fee for processing the request but the contractor/property owner is responsible for all costs involved with the work, including the reinstatement. The majority of the contractors that carry out work for the utility companies have

submitted generic temporary traffic management plans but these must be activated for each project by submitting a simplified 'activation form' before work commences.

The NZTA and Council have established a protocol that provides for traffic to be diverted on to The Councils local roads for that time it takes to resolve the situation if a serious crash occurs on a state highway. Under the protocol:

- The NZTA is required to inform either the Council's staff or the Council's road maintenance contractor of this need.
- The NZTA invokes its own TMP procedures and provides the necessary signage and other control measures on the Council's local roads to establish a detour safely and efficiently.
- The NZTA is responsible for meeting the cost of any damage that may result to Council roads from the use of the detour, e.g. by grading an unsealed road or the repair of edge break on a sealed road caused by the vehicles detoured from the state highway.

8.7 Service Delivery Risks

8.7.1 External Provider Risks

There are inherent risks associated with any work undertaken under contract. Contractual difficulties, or the failure of contract entirely, and skill deficiencies within contracting organisations both pose risk at contractual levels.

Major contractual difficulties can have significant adverse effects on the Council's ability to deliver its agreed levels of service. These risks are managed by:

- Using industry-standard forms of contract wherever practical,
- Appropriately qualified and experienced senior staff reviewing draft contract documents before tenders are advertised,
- Close liaison with contractors,
- Management of long-term period contracts in a partnering environment,
- Holding regular meetings with individual contractors at which difficulties can be resolved before they become problems,
- Checking contract claims quickly and paying authorised claims quickly, and
- Attempting to understand the contractors' businesses and the pressures on them.

Council's contract evaluation procedures include assessment of the contractors' ability to perform the required works or services to the required standards. On long-term contracts, the depth of key skills in contracting organisations is also considered.

8.7.2 Internal Risk

Staff turnover and loss of skill-sets is a key internal risk area. The effects of the loss of key staff, with key knowledge, requires constant management. Council recognises that staff turnover is inevitable and the importance of continuous capture and transmission of knowledge. This Activity Management Plan is a small part of that process.

Succession planning within any business is considered necessary to reduce the risk associated with staff leaving the organisation and forms part of the business continuity process. Succession planning allows institutional knowledge to be passed on, and assists in ensuring continuity of organisational culture. To this end the Transportation AMP is quite detailed to ensure all relevant documents and information required for appropriate decision making are recorded and knowledge transfer can occur even in the absence of key staff.

A methodology for managing this risk has yet to be resolved formally but the following steps have been implemented in the interim:

- Regular reviews of pay parity.
- Management of individual professional development.
- Work enjoyment and flexibility.
- Management of individual workloads.

In June 2014 an additional Transportation Asset Planner was employed to assist with strategic management of the network. In addition, long term relationship with Consultants means there is some broadening of their knowledge and capability base within Transportation Planning.

Council recognises that its staff cannot be expert in all the skills and competencies required to manage, maintain and develop all facets of its road network, and it acknowledges the importance the "smart purchaser" principle plays in reducing its risks in this area.

Workplace health and safety risks are managed through training of staff and providing them with knowledge of their working environments and the Council's requirements. Council has established procedures for managing workplace health and safety and Council's Health and Safety committees meet regularly. Reliance on inadequate or poor inspections can have significant adverse effects. Council endeavours to have all such critical inspections carried out by appropriately trained and experienced people, or at least under their direct supervision. All such reports are reviewed using the smart purchaser principle, external reviews being commissioned where appropriate and necessary.

Changes in operating and legislative standards, especially when sudden, can be a risk area for Council. Changes to environmental standards can have significant and costly implications for Council. It manages these risks by continually reviewing proposals and actively participating in consultation processes that the regulatory authorities are bound to follow. Staff also note adopted changes, and include the long-term effects of them in budgets at the first available opportunity. Sudden changes to desired levels of service can have significant effects on forecast costs of maintenance, renewals and new works. Council will manage these risks using the processes outlined in the levels of service section of this plan.

Legislative changes can have significant implications for Council. Sometimes these changes can reduce costs but often they, at best, result in short-term cost increases. Council manages these risks by reviewing proposed legislation, participation in the Local Government Association and the Road Controlling Authorities' Forum and participating, where appropriate, in the consultation and review process that legislation follows. Staff also note legislative changes and include the long-term effects of them in budgets at the first available opportunity.

Waka Kotahi's funding assistance rates (FAR) are reviewed a year prior to the start of each NLTP. Council is particularly vulnerable to changes in funding assistance rates, as these represent a significant portion of the affordability of the affordability of Council's operations. Council manages this risk by closely monitoring proposed changes, through its participation in the industry groups mentioned above, by lobbying, and by ensuring that its road maintenance and renewal expenditure remains at relatively constant proportion of the net equalised land value of the District.

8.8 Management and Organisational Risks

8.8.1 General Management Risks

A lack of clear guiding policy documentation, deficiencies in IT and record management systems, exceedance of delegated authorities, and business continuity pose risk to the general management for the organisation. If Council's policies and directions are not clear and not understood well there is potential for inappropriate, unnecessary or unwarranted expenditure and for Council to require works with similar problems. The Council has a Corporate Policy Manual in which all the Council policies are recorded. The roading chapter requires review to update it to current or new practices employed. The risks associated with exceedance of authority, or delegated authority, can be at contractual, financial, and technical levels. A person to whom appropriate authority is not designated may not have the skills or experience required to discharge non-delegated responsibilities.

Council has not yet prepared a business continuity plan for the roading network. It intends to prepare a business continuity plan for the non-CDEM functions of Council that includes:

- Identification of the Council's business continuity risks,
- Management of these risks,
- Readiness in the event of a business continuity risk,
- Recovery from business continuity risk events,
- Training for business continuity, and
- Personnel Policies and Strategies related to business continuity.

Effective and efficient management of the road network is dependent on computerised systems. Council's IT department has procedures ensuring that there are daily backups of the whole IT systems and that weekly backups are stored off-site for at least one month. Monthly backups are stored for longer periods.

8.8.2 Policy and Plan Risks

Major errors or deficiencies in the roading plans and strategies can adversely affect the Council's ability to meet its level of service commitments. These risks are managed through:

- Use of competent people to prepare and modify plans and strategies,
- Observing the smart purchaser principle,
- Regular review of documentation,
- Corporate commitment to following plans and strategies, and
- Having plans adopted by the Council.

Capacity planning is vitally important to setting forward work programmes and securing adequate future funding. Forecast demand is based on corporate growth models, which are in turn based on the best information available from Statistics New Zealand, corporate, and specialist data. As these trends and effects are relatively long term, periodic review and network knowledge are sufficient to ensure adequate risk management.

Design and construction standards are imposed to adequately manage the long-term risks of subdivisions and developments that do not rest with the developer or designer. Council employs a best-practice approach to design of new and renewal works. This considers the location, application and context of the design as part of the process in establishing the standards for it, ensuring that the risks associated with over- and under-design are considered at the appropriate stage. As long-term design-risk for subdivisions and similar developments does not lie with the designer or developer,

Council imposes its own Code of Engineering practice, which it considers limit these risks acceptably. Construction is similarly required to meet statutory and appropriate best practice standards as specified in contract documents. As-built plans are an important means of assisting asset managers in the future to manage the assets built today. They are especially valuable in detailing information that is hidden during construction, because it is buried in the structural layers, concreted in or no longer accessible.

Inadequately or improperly supervised contracts put Council at risk through their potential to either deliver beyond their original scope at a cost to Council, impose unexpected future maintenance costs on Council, or through the Council paying for work that has not been delivered. Council employs a subdivisions engineer to check on the specification and construction of work by developers and their contractors. It also requires the designers of projects, be they staff or consultants, to oversee and manage the construction of works they have designed. These steps, which operate within the "smart purchaser' principle manage these risks to an acceptably low level.

In large organisations there are risks associated with frequent changes in responsibility resulting in loss of "project ownership" and projects floundering. Responsibilities for the various aspects of the management and operation of the network are detailed in job descriptions and are clearly understood by the staff involved and the contractors who work to them. Progress on projects is monitored by senior management through periodic contact with the relevant staff. Processes are in place to ensure that the desired results will be achieved, on time, to the standard required.

Council also holds consents for a number of activities and works associated with the road network. Should Council fail to comply with the conditions of consent for works or activities it undertakes, the consequences could range from embarrassment thorough to significant court costs and fines, and potentially demolition of any offending works.

8.9 Improvement Plan Items

TO BE UPDATED TO REFLECT PROGRESS AND NEW 2021 IMPROVEMENT ITEMS ON COMPLETION