4.1.2 Level of service and risk

We provide these methodologies and tools to help you in forecasting benefits measures from the Land Transport Benefits Framework. We are developing and refining them over time, and you can provide feedback by emailing us at investment.benefits@nzta.govt.nz.

Before using this forecasting methodology, read the information about this benefit measure in the Land Transport Benefits Framework measures manual.

Model assumptions

This forecasting method utilises the methodology outlined in the National Resilience Programme Business Case (appendix G). The approach uses combined likelihood and consequence parameters that influence the level of risk as follows:

The **likelihood** is addressed by combining the hazard frequency and the duration of outage, which is indicative of the level of potential damage to the asset from its exposure to the hazard (that is – the greater the damage the greater the duration of outage).

The **consequence** is addressed by combining the criticality of the road and the availability of a viable detour.

The methodology is currently being reviewed and it is expected that an update to this guidance will be issued when that has been finalised.

Rating criteria

The combined likelihood and combined consequences are each distilled to a rating matrix. The combined consequence/criticality is combined with the combined likelihood to assess the overall risk to establish the risk category (minor, moderate, major or extreme).

Combined likelihood

In order to manage the key parameters within a 'likelihood and consequence' approach, a combined likelihood parameter has been developed as a combination of the hazard likelihood and the likelihood of damage expressed as the duration of outage. Table 3.1 of appendix G of the National Resilience Programme Business Case, reproduced below, details the criteria used to rate the hazard likelihood and the duration of outage in terms of low (1), medium (2) and high (3) combined likelihood. Table 3.2 details the matrix used to combine the hazard frequency and duration of outage ratings into a combined likelihood of damage rating of unlikely (UL), likely (L) or very likely (VL).

Table 3.1: Combined likelihood rating criteria

Descriptor	Hazard likelihood/frequency
Low (1)	Occurs approximately every 50 years or more
Medium (2)	Occurs approximately every 5–50 years
High (3)	Occurs approximately every 5 years or less

Descriptor	Duration of outage
Low (1)	Less than 12 hours
Medium (2)	12–48 hours
High (3)	> 48 hour

Table 3.2: Combined likelihood matrix:

		Hazard likelihood/frequency		
		Low (1)	Medium (2)	High (3)
Duration of outage	Low (1)	1	2	3
	Medium (2)	2	4	6
	High (3)	3	6	9

Rating key
Unlikely (UL)
Likely (L)
Very likely (VL)

Combined consequence

The combined consequence parameter is assessed by combining the criticality of the road network, which has been based on the One Network Road Classification (ONRC) and the availability of viable detours.

Criticality

The ONRC is a classification system that divides New Zealand's roads into six categories based on: how busy they are; whether they connect to important destinations; and if they are the only route available. Criticality should also consider the road interdependencies with essential services and lifeline utilities. The ONRC does not always reflect the actual use of the road and its importance to the region/nation, and to enable stakeholders to adjust for this, criteria has been included to enable the ONRC rating to be increased to reflect the appropriate risk to the network.

Where increases to the ONRC rating are made, this needs to be documented. This may be due to the road being a key route for vulnerable/isolated communities or the region, but only has a low rating of primary or secondary collector. It therefore becomes hard or near impossible to obtain appropriate funding for upgrades to these roads even though they have significant resilience, safety and/or capacity issues. An example of this is State Highway 7 through Lewis Pass in north Canterbury/West Coast. The route is one of three routes that provide access between the east and west coasts of the South Island; however, it has a lower ONRC rating than the other two. It represents a key and high-risk area which impacts Canterbury, Top of the South and the West Coast, but is not prioritised due to its low criticality. This was emphasised after the Kaikoura earthquake when it became the primary route north from Canterbury.

Detour availability

It was also clear that the availability of viable detour routes plays a key factor in the consequence of hazards impacting the land transport network. For example, a national road has a high criticality rating; however, if there is a short detour for all vehicle types, the disruption to the network is limited compared to that of a regional road with a significant or no detour for the same combined likelihood.

The criteria used to rate the combined likelihood in terms of the ONRC (from 1–6) and the detour issues as low (1), medium (2) or high (3) are shown below, along with the matrix used to combine the ONRC rating and detour issues into a combined consequence rating of 1–5.

Table 3.3: Combined consequence rating criteria

Descriptor	ONRC banding
1	Access/Low Volume
2	Primary/Secondary Collector
3	Regional/Arterial
4	National
5	High Volume
6	High Volume increase

Descriptor	Detour issues
Low (1)	Short (<1hr) and easy to manage detour for all vehicles
Medium (2)	Moderate detour (3hr), hard to manage and no HPMV[1] option
High (3)	Long detour (>3hr), hard to manage and no HPMV option

Table 3.4: Combined consequence matrix

ONRC banding	Detour issues				Rating key
		Low (1)	Medium (2)	High (3)	
	1	1	2	3	1
	2	2	4	6	2
	3	3	6	9	3
	4	4	8	12	4
	5	5	10	15	5
	6	6	12	18	

Risk rating

The combined consequence/criticality is combined with the combined likelihood to assess the overall risk to the asset or section of network as minor, moderate, major or extreme as shown in table 3.5.

Table 3.5: Risk matrix

Combined consequence		Combined likelihood			Rating key
		Unlikely (UL)	Likely (L)	Very likely (VL)	
	1	1UL	1L	1VL	Minor
	2	2UL	2L	2VL	Moderate
	3	3UL	3L	3VL	Major
	4	4UL	4L	4VL	Extreme
	5	5UL	5L	5VL	

For further detail, see appendix G of the National Resilience Programme Business Case.

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[1] High performance motor vehicle (typically heavy vehicles longer or heavier than Class 1).