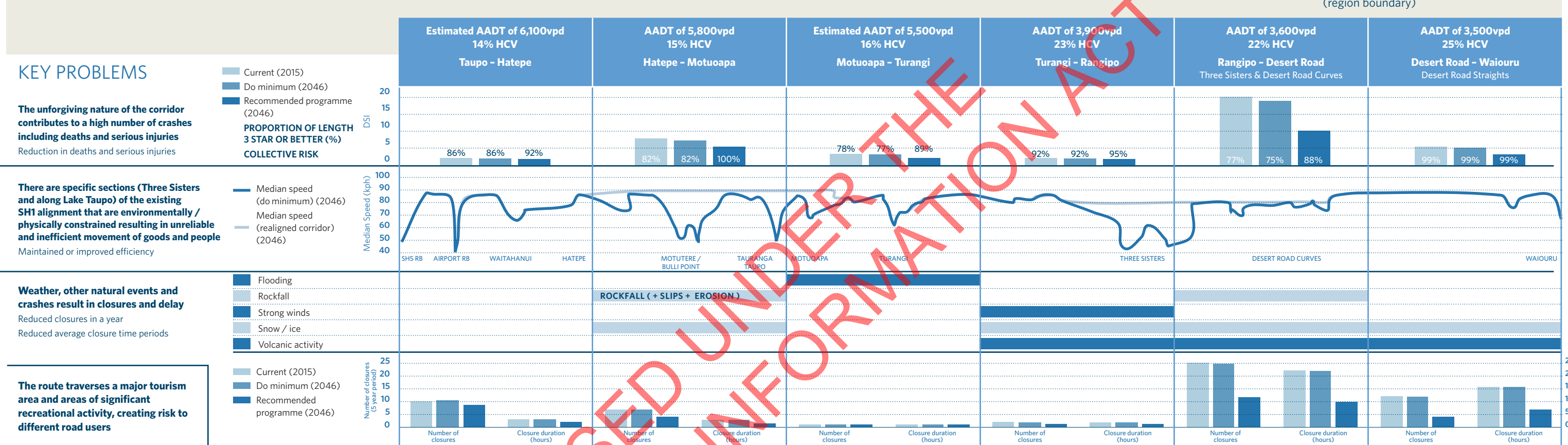
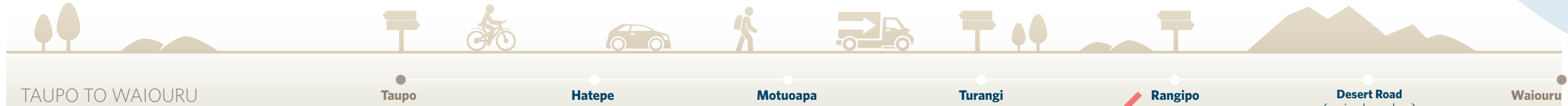


# SH1 TAUPO TO WAIOURU RECOMMENDED PROGRAMME



## RECOMMENDED PROGRAMME

### Outcomes

- 32 DSIs saved (10 yr period)
- 90% Three Star or better
- 16 less road closures (5 yr)
- 160 less hours of road closures (5 yr)
- Average travel speed for freight will be 84 km/h (an 11 km/h improvement)
- 10mins average travel time saving in 2046

Programme investment profile  
**H/H/0.5-0.8**  
 Programme cost range **\$700-\$900m**

	Taupo - Hatepe	Hatepe - Motuoapa	Motuoapa - Turangi	Turangi - Rangipo	Rangipo - Desert Road Three Sisters & Desert Road curves	Desert Road - Waiouru Desert Road straights
<b>Activity</b>	Short Term - Passing and overtaking investigation, safety management, walking and cycling improvements	Short Term - Hazard protection, intersection safety improvements, minor ice warning improvements, walking and cycling improvements Medium Term - Replacement of Tauranga-Taupo bridge Medium-Long Term - Realignment between Hatepe Hill and Motuoapa	Short Term - Safer speed consideration and flood resiliency improvements Short-Medium Term - Passing/overtaking with safer corridors improvements	Short term - Isolated hazard protection, shoulder widening, passing/overtaking improvements and safer corridors improvements	Short-Medium Term - Snow/ice activated warning signs/pavement markers, barrier system upgrades, delineation improvements, slow vehicle bay extensions, camber improvements, surfacing enhancements Medium-Long Term - Safe system transformation, realignment between Three Sisters and the Desert Road Summit	Short Term - Delineation improvements, surfacing enhancements, median and delineation improvements, snow/ice activated warning signs/pavement markers Medium Term - Passing/overtaking improvements
<b>Capital cost (\$m)</b>	11-16	450-540	4-6	4-6	225-320	6-10
<b>Operational &amp; Maintenance cost (\$m)</b>	0.25-0.35	0.5-0.7	0.4-0.6	0.15-0.25	1.7-2.3	1.2-1.6
<b>BCR</b>	1-3	<1	>5	1-3	<1	>5
<b>Corridor wide activities</b>	Short Term - Improved contractor responsiveness through NOC, new crash and event recovery equipment purchased and located along the corridor Short Term - Traveller information improvements, permanent detour guidance, variable messaging signs, telco dead-zone elimination					

# SH1 TAUPO TO WAIOURU

State Highway 1 (SH1) is of national significance for moving people and goods critical to the country, region and local communities, is the primary north-south road-based transport route in the North Island and is a national route in the one network road classification (ONRC).

This journey connects the upper North Island, central regions, lower North Island and the South Island.

From a customer perspective the journey between Taupo and Waiouru is one of the most variable and least approachable sections of SH1. It provides an inconsistent level of service with significant out-of-context curves around Lake Taupo and in parts of Desert Road. The corridor is characterised by high value/volume freight and high occupancy vehicles due to the heavy freight and tourism function of the journey. This section of SH1 experiences substantial variation in traffic demands and peaks associated with weekends, holidays and events (eg multi sports and cyclists). The mix of traffic and recreational activity along the lake foreshore creates significant conflict between local activity and through traffic.

Travel speeds are inconsistent with tight bends, some with advisory speeds of 25km/h. Conversely low traffic volumes on parts of Desert Road are high speed environments where road users can be distracted by the scenery. Journeys are affected by closures resulting from crashes or due to adverse alpine weather conditions on Desert Road. The average duration of closure on Desert Road is 11 hours and, depending on location, alternative routes can add 40 - 120 minutes to the journey.

The geology of the area, particularly around Lake Taupo foreshore and section between the Desert Road summit and Rangipo, result in high levels of land slips and land falls closures and delays compared with national and regional levels. Consequently this part of the network is one of the most expensive sections of the highway network to operate and maintain, in some areas five times greater per kilometre than the average highway maintenance costs. Not only is this due to geology but the increasing deterioration of the underlying asset as well as difficulty to maintain some remote and constrained sections such as the Desert Road and Three Sisters.

A major concern for this section of SH1 is the possible failure of SH1 along Lake Taupo and in the Three Sisters due to a high impact low probability (HILP) event which would have a significant impact on customers.

The recommended programme aims to address road user safety, and provide a reliable and efficient corridor commensurate with the route classification and wide range of users (freight, general and high level of tourism/ recreational activity).

There is no evidence to suggest a major shift in goods transported by the Main Trunk rail line between Hamilton and Palmerston North to road, which would significantly affect the programme or its outcomes. We have, however, considered the viability of encouraging a greater uptake of freight on the alternative route (SH32) around Lake Taupo to Turangi. This option has been discounted due to the cost to upgrade the route to an appropriate level of service and the ongoing requirement to provide a strategic connection to Napier (SH5) and Taupo which remains on the existing alignment.

There are potentially significant wider national and regional economic development benefits associated with the future role and purpose of land adjacent to the existing corridor alongside Lake Taupo, were SH1 to move inland, that need to be explored further as we work with local communities and Taupo District Council through the next phase of development. The recommended programme is also inherently risky due to the world heritage status of the national park. The Lake Taupo foreshore and the Central Plateau are also significant to iwi. We have involved the Department of Conservation and iwi representatives in developing this programme and recognise the importance of developing strong partnerships/ collaborative approaches as we consider the options, and wider opportunities, in more detail.

## PROGRAMME MULTI-CRITERIA ASSESSMENT

The programmes are different combinations of activities. Alternative programmes were developed and assessed against the investment objectives and other criteria.

		Programme 1	Programme 2	Programme 3	Programme 4	Programme 5	Programme 6	Programme 7	Programme 8	Programme 9	Programme 10
		Current operating LoS & levels of investment	Shift freight corridor to west of Lake Taupo (SH32 & SH41)	Low cost safety & improved driver information	Tourists, active modes & community connectivity	Corridor wide safety improvements & speed management	Improved Desert Road resilience & Lake Taupo foreshore reliability	Freight shift to rail	Major realignment Hatepe Hill - Rangipo & realignments through Three Sisters and Desert Road (curves)	Major realignment Hatepe Hill - Motuoapa & realignments through Three Sisters and Desert Road (curves)	SH1 realignments plus improved maintenance & network management
INVESTMENT OBJECTIVES KPI OUTCOMES	Reduction in deaths and serious injuries (Proportion of reduction of DSI from current levels) (Estimated reduction in deaths and serious injuries per 10 year period)	5% - 10% 5 - 9	1	1	-2	2	1	1	40% - 50% 36 - 55	35% - 45% 32 - 48	25% - 35% 23 - 38
	Improved road safety risk assessment rating (KiwiRAP) (Proportion of length 3 star or better) (KiwiRAP) (Proportion of length 4 star or better)	82% - 88% 11% - 16%	-1	1	0	1	1	1	91% - 97% 59% - 65%	90% - 96% 39% - 45%	85% - 90% 15% - 21%
	Improved travel time reliability (minutes of variance between the median and 85th percentile corridor travel times)	7.1 - 9.1	2	1	1	1	1	1	4.6 - 6.6	5.2 - 7.2	6.5 - 8.5
	Maintained or improved efficiency (median corridor travel time in minutes)	82 - 88	-2	1	-2	1	1	1	68 - 74	72 - 78	80 - 86
	Median freight travel speed between Taupo and Waiouru	73 - 77kph	0	0	-1	0	1	0	85 - 89kph	84 - 88kph	76 - 80kph
	Reduced closures in a year (number of closure events per five year period)	52 - 62	-1	0	-2	0	0	0	25 - 35	36 - 46	39 - 49
	Reduced average closure periods (duration of road closure events per five year period in hours)	410 - 510	-1	-1	-1	0	1	+1/0	150 - 250	160 - 260	250 - 350
OTHER FACTORS	Effectiveness	--	--	--	--	0	0	--	+++	+++	+
	Risk	--	--	+	+	++	--	--	--	--	+
	Public and stakeholders	--	-	+	+	+	-	--	--	+	+
	Inter/ dependencies	++	---	++	++	++	+	---	---	--	+++
	Feasibility	+++	---	+++	+++	+++	-	---	---	-	+
	Affordability	+++	---	+++	++	++	++	---	---	-	+
	Costs - including operations and maintenance	\$95 - \$115 m	\$1.4 - \$2.4 b	\$145 - \$160 m	\$160 - \$180 m	\$190 - \$220 m	\$190 - \$220 m	TBD	\$1.1 - \$1.3 b	\$700 - \$900 m	\$325 - \$425 m
Benefit cost ratio	-	0.2 - 0.4	1.5 - 2.5	0.4 - 0.7	1.5 - 2.5	1 - 2	0.1 - 0.2	0.3 - 0.5	0.5 - 0.8	0.8 - 1.1	

The recommended programme is Programme Option 9 - short term safety, short to medium term resilience investment (as shown in the figures below) plus new alignment Hatepe Hill to Motuoapa (or similar) and, realignments and/or viaduct(s) between Rangipo and the Desert Road summit. The recommended programme incorporates a mix of both infrastructure and non-infrastructure improvements.

Recommended programme

### STAKEHOLDERS INVOLVED IN THE PBC



### TRIGGER POINTS, RISKS AND UNCERTAINTIES

Trigger, risk and/or uncertainty	Time	Impact level	Impact on programme	Comments
Land acquisition: Engagement will need to occur with the land holders including the Department of Conservation, Iwi and others to identify the potential land available for re-alignments of SH1	2016-2020	High	The proposed realignments of SH1 are predicated on the ability to acquire the required land to the east of Lake Taupo and between Rangipo and Desert Road summit	Engagement with land holders has commenced and will likely require a number of years continued consultation to confirm the feasibility of the land acquisitions and the various alignments (ie reconnecting to SH1 either north or south of Motuoapa)
Consenting for re-alignments: There will be a requirement for consenting for sections of the SH1 that are proposed to be realigned, in particular through the Tongariro National Park	2020-2025	High	Consenting for the programme is not expected to impact programme delivery if successful but will impact the type of engineering and environmental design and implementation	Due to the environmental importance of the region as well as areas of cultural significance it is expected that there will be a focus on minimising impacts (ie migration of animals in the Tongariro National Park as a world heritage area)
Full or partial failure of SH1: There is a considerable risk that due to deterioration or an event that SH1 along Lake Taupo may fail	Ongoing	High	This would result in full or partial closure of the highway and major impact on the local communities through severance	This is a serious and imminent risk, there have been no detailed studies to identify the probable occurrence and impacts
Revocation: If the realignments occur there will be a need to revoke the existing sections of the highway to Taupo District Council	10-15 years	Low	The impact will be timing and financial and dependent on discussions with Taupo District Council	This should not impact the programme with regards to timing but may impact the level of funding and investment prior to the revocation

### IMPLEMENTATION PARTNERS

The Transport Agency is the primary funding partner for the delivery of the programme. Taupo District Council will be a co-investor and implementation partner for some improvements along the corridor or in providing new transport infrastructure for walking and cycling and potentially a bike trail. Local Iwi groups, land owners and the Department of Conservation are important implementation partners and will need to be critical to the successful planning and delivery of the programme, in particular the proposed realignments of the highway corridor.