From Recovery to Resilience

Strategic Network Resilience for Rural Local Roads

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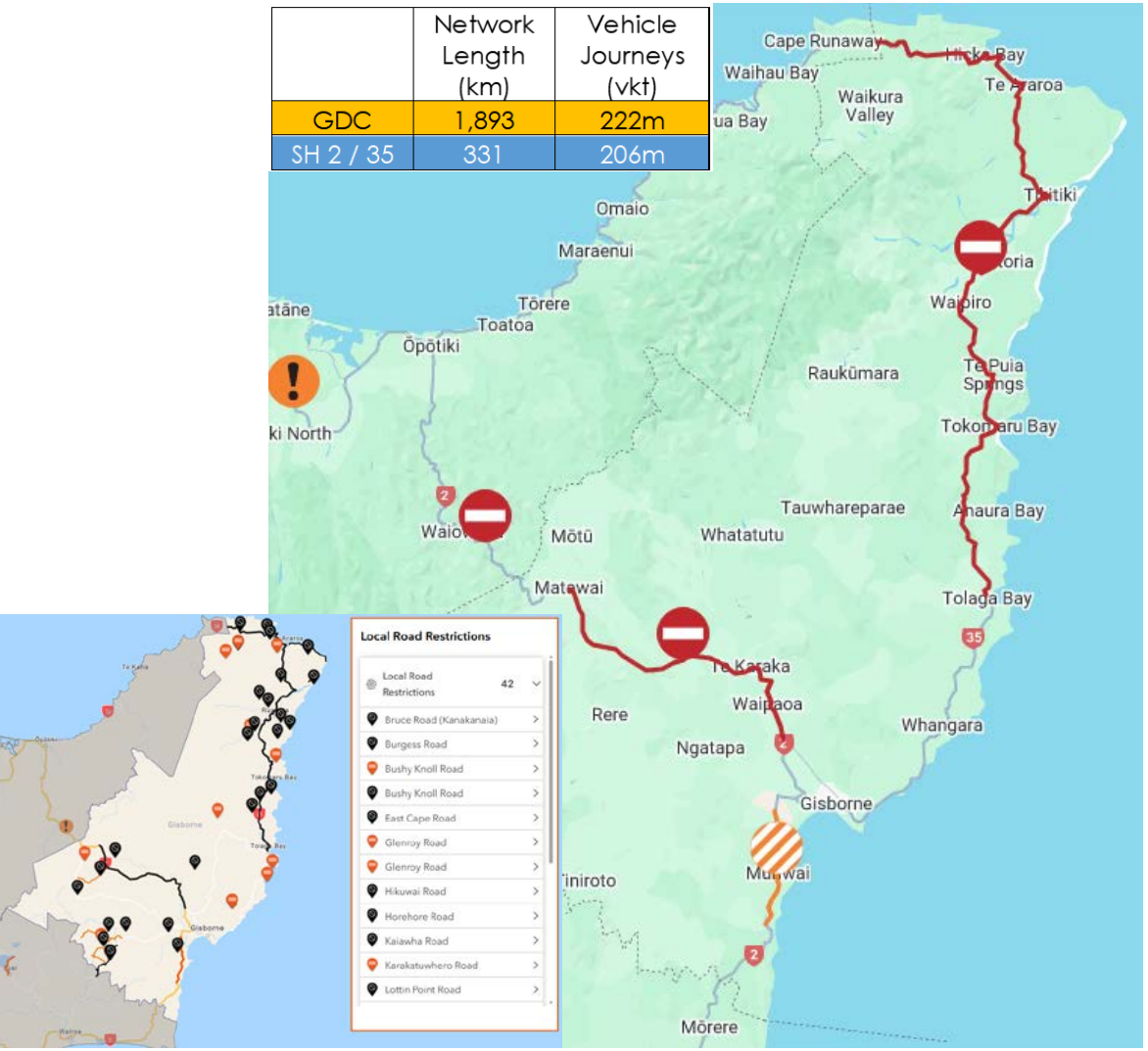
Rural & Regional Lifelines (D2)

Te Araroa on the East Coast. Photo: Supplied

Te Tairāwhiti Region

	Network Length (km)	Vehicle Journeys (vkt)
GDC	1,893	222m
SH 2 / 35	331	206m



- Small population (1% of NZ), low rate base, low socio-economic ratings.
- Large lifeline role (2% of NZs roads). 3% land of NZ, quarter of it maori owned.
- Roads shut often for long periods with no viable detours. Knock on effects to other regions. Long distances. 16 townships.
- Vulnerable assets and unstable geology.
- Learned acceptance of connectivity loss.
- Highest road safety risks (speed, fatigue..), 80% more freight per capita.
- Growth potential, fertile soils, large region, beautiful places, work life balance and rich culture.
- Highest proportions Māori (56%), 80% rural. Disadvantaged Communities.

Tairāwhiti Local Road Network

Severe weather events in 2023 caused significant damage

Roads

3,000 faults registered
250 major drop outs
650,000m³ of silt in drains, slips and roads

Bridges

8 bridges destroyed beyond use
10 with major structural issues
43 with major scouring

Slash

77 bridges with slash

19 significant storms since June 2021

Jan-26	State of Emergency
Jan-26	Heavy Rain Event
Jul-25	Heavy Rain Event
Jun-25	Heavy Rain Event
May-25	Heavy Rain Event
Mar-25	Storm Event (Cyclone Alfred)
Dec-24	Heavy Rain Event
Jun-24	Heavy Rain Event
Nov-23	Heavy Rain Event
Oct-23	Ex tropical Lola
Sept-23	Heavy Rain Event
Jun-23	State of Emergency
Feb-23	Mangapapa Rain Event
Feb-23	Cyclone Gabrielle SoE
Jan-23	Cyclone Hale SoE
Nov-22	Heavy Rain Event
Mar-22	State of Emergency
Nov-21	State of Emergency
Jun-21	Heavy Rain Event

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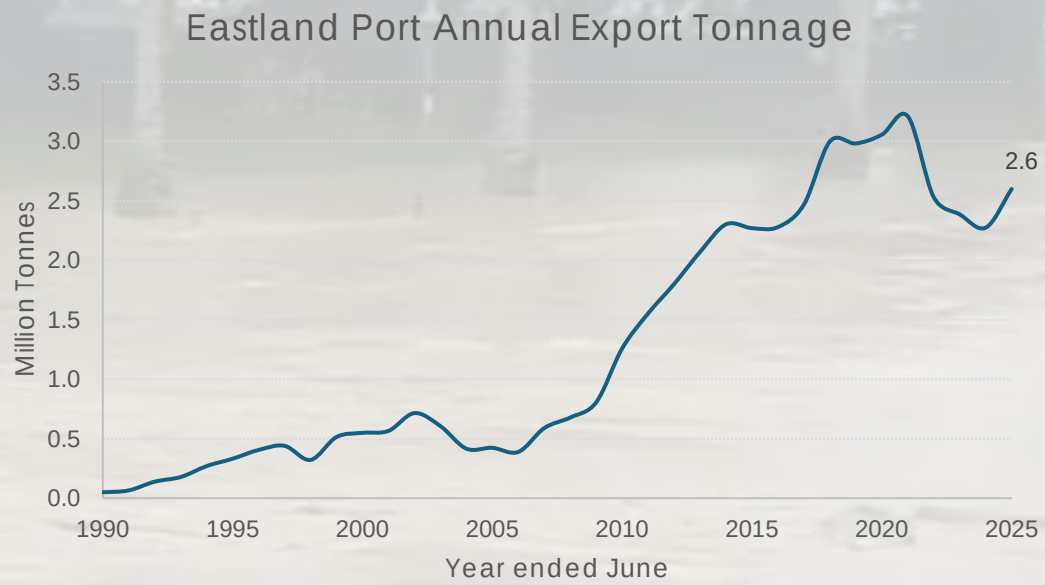
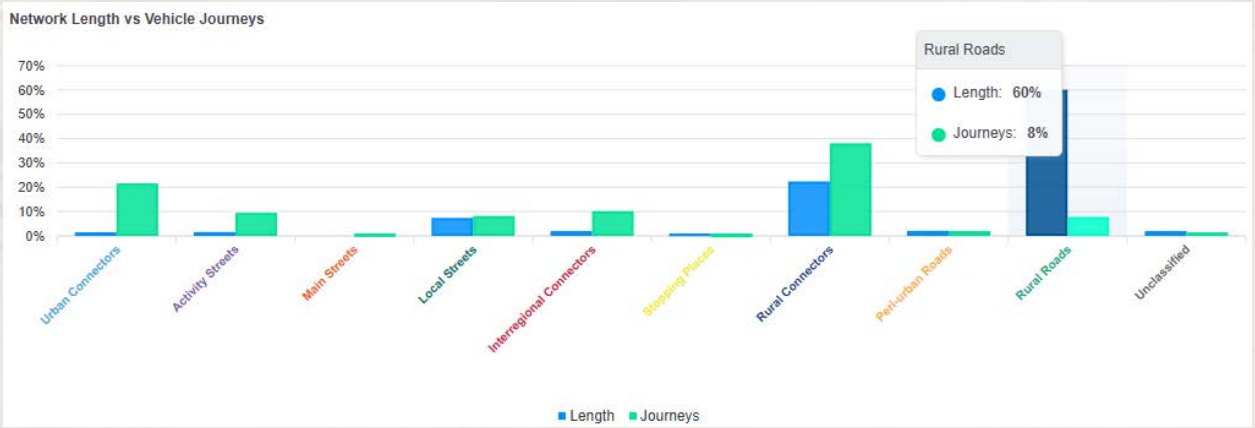
Regional Road Challenges

- 60% of roads carry 8% traffic
- Forestry tonnage has increased 500% in 12yrs
- Forecast to reach 4.5m tonne in next few years
- Forestry routes not built for HPMVs from base up
- 1 logging truck = 10,000 cars pavement wear
- EW increased from 9% budget 2016 to 60% 2023





Strategic Roading Network Resilience Case

Problem 1 (resilience risks reduce access and economic performance).

Problem 2 (asset resilience under-investment).

Problem 3 (future land use changes and levels of service).

Resilience Investment Priorities

Lifelines	• Emergency services: access to Ambulance, Police or Fire Station • Power: access to electricity sub-station • Other transport connections: access to port and airport • Utilities: access to water or waste water treatment plant • Civil defence: access to emergency welfare centre • State Highway detour: alternative regional access to State Highway
Cultural	• Māori cultural connectivity: access to Marae • Māori places of significance: access to Waahi Tapu areas • Other gathering places: access to places of worship
Social	• Education: access to tertiary education • Education: link used as a school bus route • Healthcare: access to healthcare centre • Healthcare: access to hospital • Communities: access to dwellings / settlements
Economic	• Employment: access to jobs • Agriculture: access to farmland / grassland • Horticulture: access to horticulture • Forestry: access to forestry

Levels of Service

LoS Grade	A
CUSTOMER	
Availability (service disruption)	Minimal disruption expected from unplanned events. Aim to open at least one lane within 24 hours of unplanned event. Notify public of estimated road closure timeframe within 2 hours.
Safety & accessibility	Mostly forgiving roads and roadsides, accessible for travel modes and vehicle types, with no significant safety hazards.
FORM & FUNCTION	
Road surface & drainage	Two lane, full width sealed road surface, with generally straight alignment and well drained.
Structures	Bridges are two lane; accessible to HPMV and overweight/over dimension HCVs (up to 62 tonne).
Asset management approach	Proactive maintenance and renewal undertaken to ensure maximum asset life and resilience.

LoS Grade	B
CUSTOMER	
Availability (service disruption)	Minor disruption expected form unplanned events. Aim to open at least one lane within 1-3 days of unplanned event. Notify public of estimated road closure timeframe within 4 hours.
Safety & accessibility	Road suitable for most drivers and all vehicle types, although may be more challenging for learner drivers. Road user safety guidance provided at high risk locations.
FORM & FUNCTION	
Road surface & drainage	Two land sealed road surface with some lower standard sections that are narrower and winding. Generally well drained with limited risk of surface water.
Structures	Bridges may be one land; accessible to all standard HCVs (up to 44 tonne) and may be accessible to HPMVs (up to 52 tonnes).
Asset management approach	Proactive maintenance and renewal to maintain safety and manage asset conditions. Some non-hazardous road surface defects.

LoS Grade	E
CUSTOMER	
Availability (service disruption)	Very high disruption expected from unplanned events. Unplanned events may result in prolonged closure (e.g. months).Notify public of estimated road closure timeframe within 1 week.
Safety & accessibility	Road conditions vary considerably following disruptions with significant safety hazards. Only suitable for experienced drivers and 4x4 vehicle types. Route unsuitable for Class 1 HCVs.
FORM & FUNCTION	
Road surface & drainage	Unsealed road surface with winding geometry, one lane roads with narrow width (< 4m). Fit-for-purpose drainage in place, but low lying areas are likely to flood easily during heavy rainfall events.
Structures	One lane bridges with weight restrictions(max weight 4 tonnes) or low level ford crossings.
Asset management approach	Predominantly reactive maintenance and renewal to achieve minimum standard at least cost. Dust management only in extreme cases. Temporary repairs used to reduce significant hazards. Non-hazardous road surface defects likely to be present for extended periods of time.

LoS Grade	C
CUSTOMER	
Availability (service disruption)	Moderate disruption expected from unplanned events. Aim to open at least one lane within 3 days to 2 weeks of unplanned event. Notify public of estimated road closure timeframe within 24 hours.
Safety & accessibility	Road suitable for most moderately experienced drivers and most vehicle types. Lower speeds and greater driver vigilance required on some sections. Road user safety guidance provided at high risk locations.
FORM & FUNCTION	
Road surface & drainage	Sealed or unsealed road surface, generally two way (with some narrower sections) or wide one lane road (> 6m). Adequate drainage in place, but surface water is possible during severe rainfall events.
Structures	Bridges may be one lane; standard HCV access (up to 44 tonnes).
Asset management approach	More reactive maintenance where there are future planned renewals. Dust mitigation in place for unsealed roads. Non-hazardous road surface defects may be present for limited periods of time.

LoS Grade	F
CUSTOMER	
Availability (service disruption)	Severe disruption expected from unplanned events. Unplanned events may result it permanent closure. Notify public of estimated road closure timeframe within 1 week.
Safety & accessibility	Not for general access, as noted by appropriate signage. Suitable for 4x4, ATV and horses only. No HCV access.
FORM & FUNCTION	
Road surface & drainage	One lane farm track or paper road with winding geometry, narrow width (< 3m). Minimal proactive drainage.
Structures	Wet river ford crossings only.
Asset management approach	No scheduled maintenance or renewal.

LoS Grade	D
CUSTOMER	
Availability (service disruption)	High disruption expected from unplanned events. Aim to open at least one lane within 2 weeks to 1 month of unplanned event. Notify public of estimated road closure timeframe within 3 days.
Safety & accessibility	Road may be challenging for inexperienced drivers and inaccessible for some vehicle types (e.g. small 2WD or low riding vehicles), with variable conditions following disruptions and safety hazards present. Users require focus and awareness to travel safely. Route may be closed to HCVs during winter.
FORM & FUNCTION	
Road surface & drainage	Typically unsealed road surface with winding geometry, generally one lane or narrow width (< 6m). Adequate drainage in place, but surface water is likely during heavy rainfall events.
Structures	Bridges are one lane; HCV weight restrictions apply.
Asset management approach	Maintenance and renewal undertaken to achieve minimum standard at least cost. Dust management limited to times of very dry conditions. Temporary repairs may be used to reduce significant hazards. Non-hazardous road surface defects may be present for extended periods of time.

Balanced Reach – Preferred Programme

Category	Description	Responses
Investment objectives	Resilience	Are we spending on the right part of the network?
	Level of Service (LoS)	How much are we reducing resilience risk?
		Are we meeting our target LoS?
	Feasibility	Are we meeting our minimum LoS?
		Are there roads where we will not meet minimum LoS?
Critical success factors		Can we feasibly carry out the investment approach within the 30-year timeframe?
	Achievability	Can the investment approach be delivered within the 30-year timeframe?
	Certainty	Are we confident we will get the outcomes we want?

System Change

(regulatory and planning for the long term)

Refined Business as Usual

(proactive asset management)

Targeted Interventions

(vulnerable assets on highest importance roads)

Balanced Reach – Preferred Programme

Type	Interventions	Description
System change	Dynamic Adaptive Pathways (DAP) planning	Lowest Importance roads with high or extreme exposure have DAP plans for managed retreat (50 km).
	Risk based property rating and development levies	Properties accessed via roads with high or extreme risk have charges or levies imposed to fund improvements or maintenance of the road (133 km).
	User pays road maintenance and ownership	Rural low and lowest importance roads with high or extreme risk are transitioned to user pays (11 km).
	Asset retirement plans	Lowest importance roads with extreme vulnerability are planned for retirement when they are due for renewal (21 km).
	District Plan provisions	Provisions for new development reduce use and deterioration of roads with extreme exposure (138 km).
	Mātauranga Māori	Mātauranga Māori in decision making for high and highest importance roads.
	Regulatory changes	Suitable rural land uses are enabled through regulation to reduce impacts that increase network vulnerability (40 km).
	Spatial planning	Rural roads with extreme risk may be downzoned, and therefore not maintained / reinstated following an event (40 km).

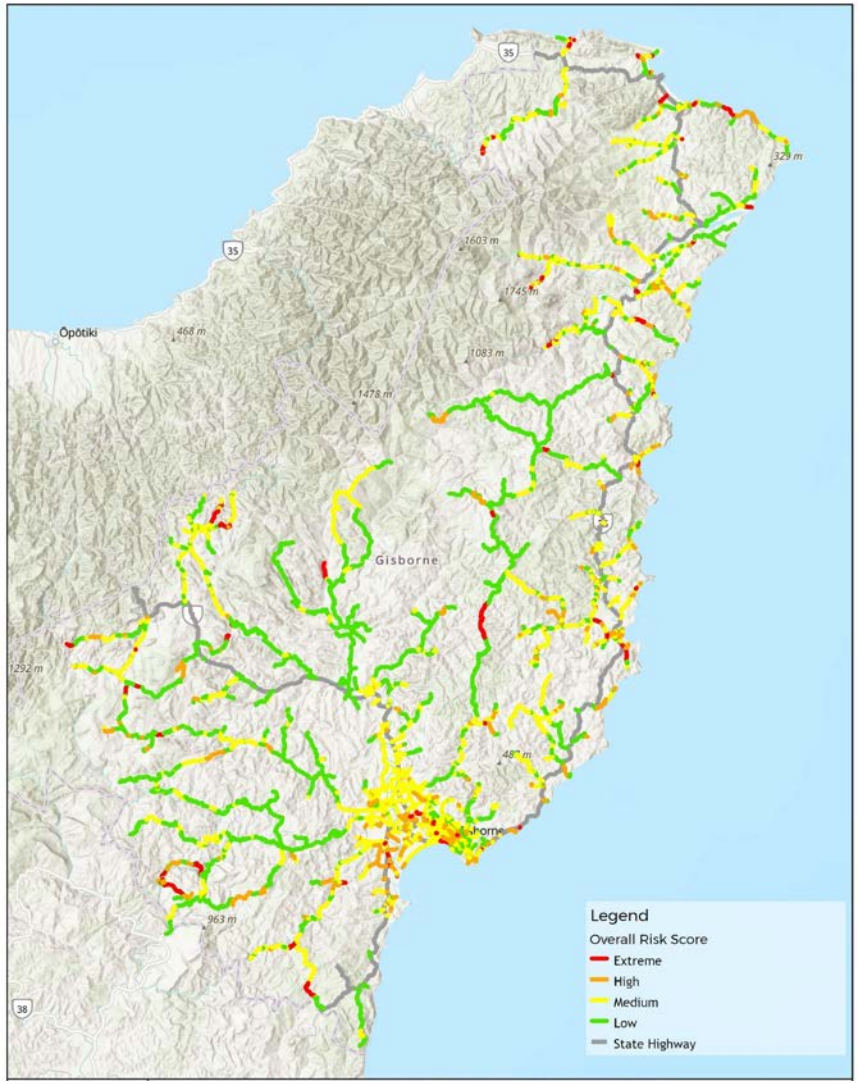
Type	Interventions	Description
Business as usual with refined intentions	Sealed road pothole prevention programme	Sealed roads are treated annually for crack filling, rut filling, scabbing repairs, small patch sealing (726 km).
	Sealed road resurfacing and rehabilitation	10% of sealed roads are resurfaced or rehabilitated annually.
	Sealed roads reverted to unsealed surfaces	Low and lowest importance sealed rural roads are reverted to unsealed at end of economic life (124 km).
	Seasonal road use restrictions	Low and lowest importance unsealed rural roads with resilience risk of medium or higher have seasonal restrictions for heavy vehicles (210 km).
	Unsealed roads maintenance and metalling programme	All unsealed roads are graded annually (982 km). All unsealed roads have metal proactively overlaid over the 30-year period.
	Asset criticality assessment and monitoring	Assets on highest importance roads have active condition monitoring (3 km).
	Bridge deck & drainage maintenance programme	Bridges on high and highest Importance roads are cleaned annually (66 bridges), the rest of the network are cleaned every two years (219).
	Culvert cleaning and maintenance programme	Culverts on high and highest importance roads are inspected and cleaned every two years (1,410 culverts), the rest of the network are inspected and cleaned every five years (6,830).
	River management maintenance strategies	Routine maintenance of waterway at bridges on high and highest importance roads every second year (66 bridges), the rest of the network every three years (219).
	Surface drainage maintenance programme	Surface drainage on high and highest importance roads are renewed every 10 years (400 assets), the rest of the network are renewed every 15 years (1,340).

Balanced Reach – Preferred Programme

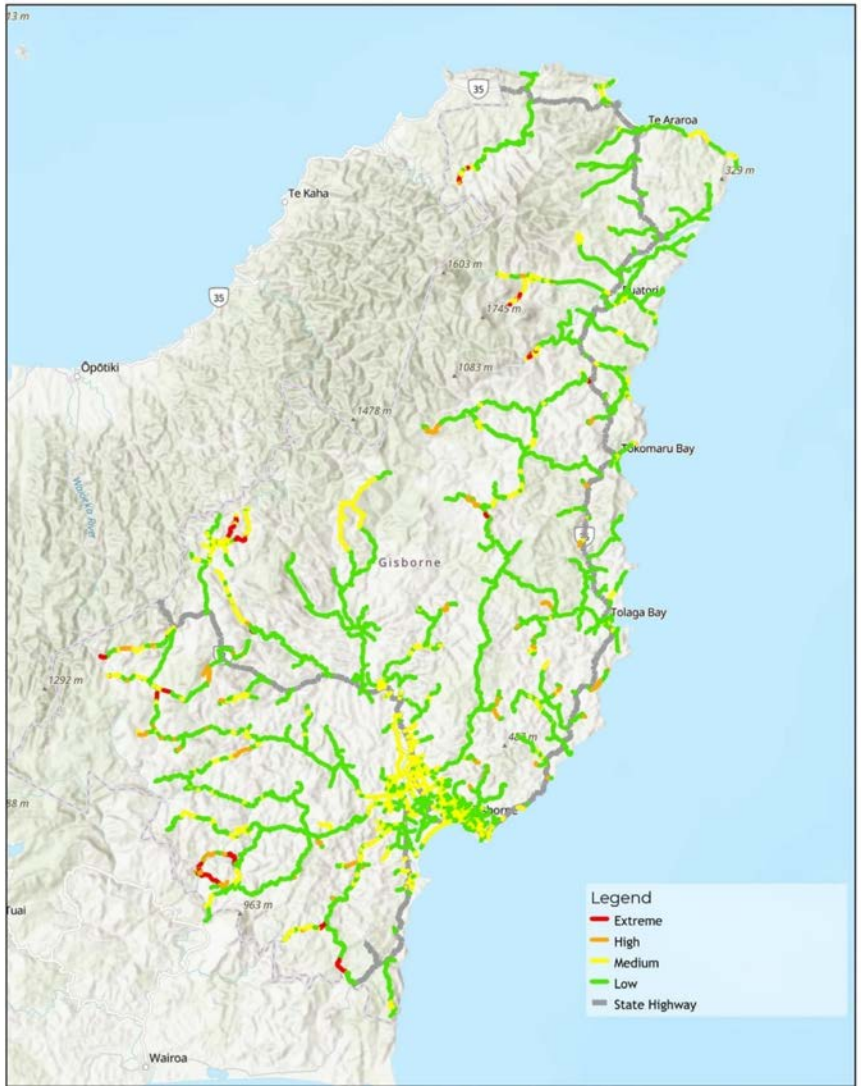
Type	Interventions	Description
Isolated / targeted interventions	Alternative river crossings	Half of the bridges on lowest importance roads are reinstated with low level crossings (e.g. floodable fords) when they reach end of economic life (22 bridges).
	Temporary river crossings	Half of the bridges on lowest importance roads are reinstated with temporary crossings (e.g. bailey bridges) if they are damaged in an event (22 bridges).
	Bridge deck replacement	Replace bridge decks for all bridges on high and highest importance roads (57 bridges).
	Bridge replacement	Replace bridges at 100 years old on highest importance roads (4 bridges).
	Bridge seismic strengthening	Strengthen bridges on highest importance roads (12 bridges).
	Culvert renewals and capacity improvements	Renewal of culverts at 50 years old on high and highest importance roads (7,000 culverts).
	Coastal protection using groynes and planting	Protect high and highest importance roads with high or extreme coastal risk (38 km).
	Green corridors for surface water management	Implement on high and highest importance roads with high or extreme flooding risk in urban environments (2 km).
	Retaining walls	Engineered retaining installed for half of high and highest importance roads with high or extreme slope stability risk (7 km).
	Slope protection	Slope protection (rock fences, debris flow barriers) installed for half of high and highest importance roads with high or extreme slope stability risk (7 km).
	Surface drainage improvement	Improvements on high and highest importance roads with high or extreme flooding risk (46 km).
	Stream daylighting and riparian planting	Restore natural waterways adjacent to high and highest importance roads with high or extreme flooding risk in urban environments (2 km).

A Future State for Roads

Business as Usual

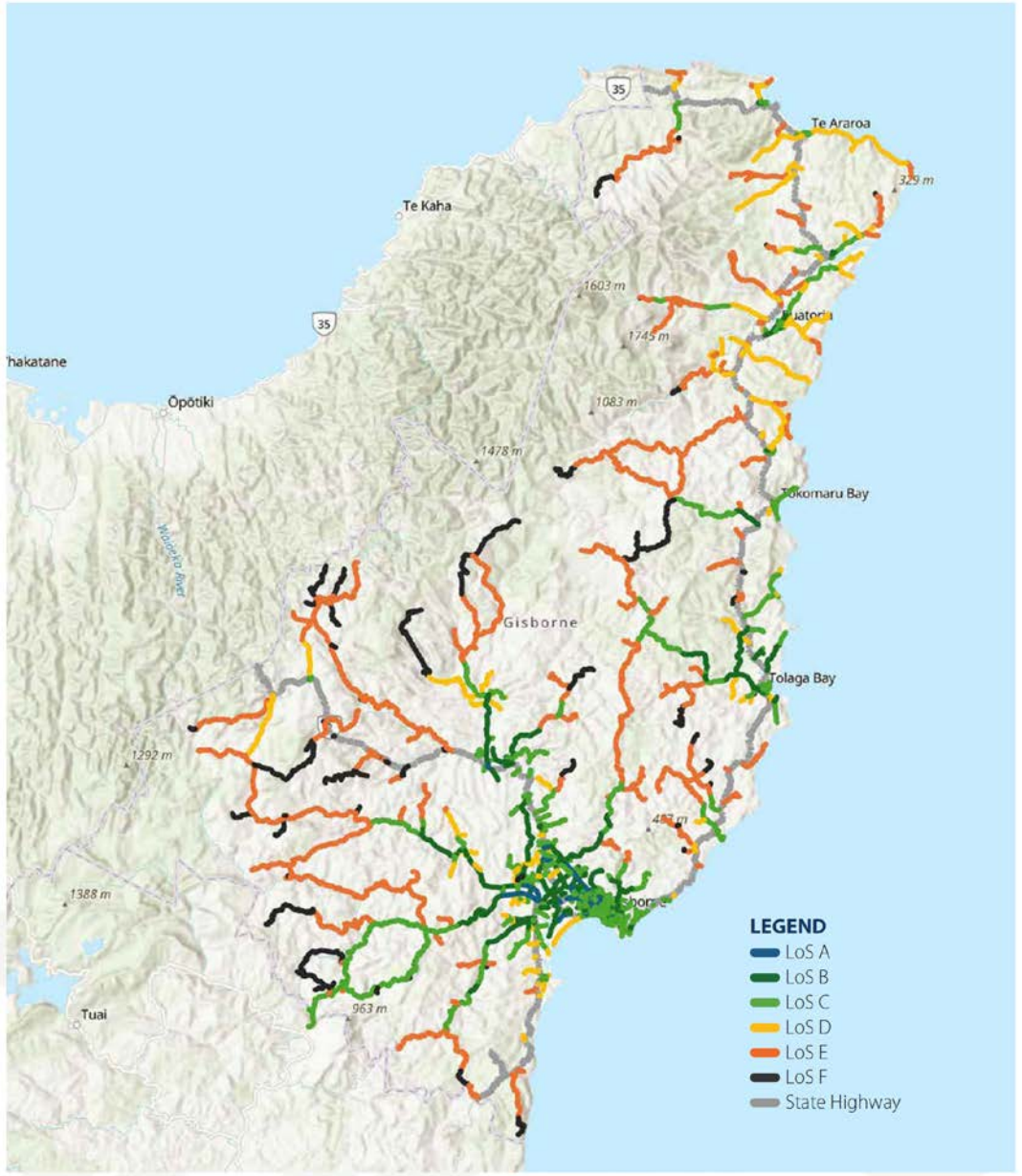


Balanced Reach Programme



A Future State for Roads

Level of road importance	Length of road subject to residual resilience risk [and change from existing] (kilometres)			
	Minor	Medium	High	Extreme
1: Highest	31 [+26]	28 [-22]	0 [-3]	0 [0]
2: High	251 [+122]	91 [-82]	0 [-35]	0 [-5]
3: Moderate	259 [+196]	81 [-128]	0 [-54]	0 [-14]
4: Low	189 [+98]	65 [-58]	0 [-34]	0 [-6]
5: Lowest	529 [+106]	180 [-86]	65 [-3]	32 [-16]



Balanced Reach Preferred Programme

- Resilience is a long-haul – i.e. 30-year affordable programme.
- Community engagement is hugely important to discuss trade-offs.
- Strong governance throughout PBC development.
- Robust and evidence-based prioritisation is essential.
- Strong commercial and management cases focus on delivery.