

Mataikona Single Stage Business Case

PREPARED FOR MASTERTON DISTRICT COUNCIL | JUNE 2020

Revision schedule

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Quality statement

Project manager	Project technical lead
Sarah Lloyd	Andrew Maughan

PREPARED BY Courtney McCrostie		09 / 06 / 2023
CHECKED BY		
REVIEWED BY Kylie Huard		4 / 05 / 2023
APPROVED FOR ISSUE BY Andrew Maughan		09 / 06 / 2023

Stantec Building, Level 15, 10 Brandon Street, Wellington 6011
P.O Box 13052, Christchurch 8141
Tel +64 4 381 6700
STATUS FINAL | Project No 310205311



Executive summary

Introduction

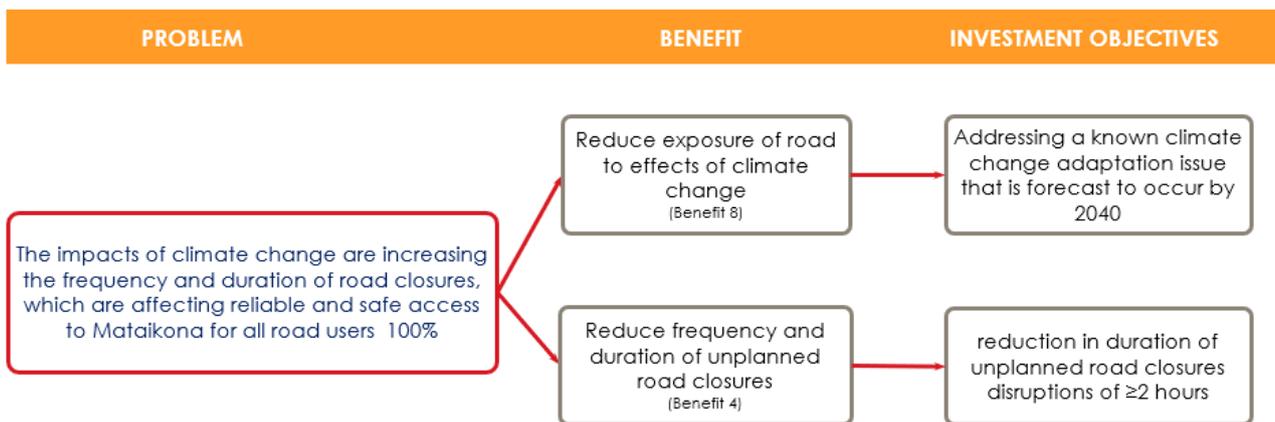
The Mataikona Road is a 13 km long, mostly gravel road that provides access to three coastal settlements, several farming and forestry properties, and the Mataikona Rocks¹. Mataikona Road provides the only vehicle access to these locations. The entire road has slowly been under pressure from storm events and sea erosion and has become a significant maintenance problem.

Council and Waka Kotahi have funded several temporary repairs in recent years, with varying degrees of success. The small ratepayer base and low volume of traffic using the road make it challenging to justify continual funding for repairs and upgrades when the completed work is unlikely to survive a year. If the current on-going maintenance and emergency work on Mataikona Road were to stop, it is anticipated that sections of the road would be lost to the sea in less than a year. This would mean there would be no access to or from Mataikona.

Following Cyclone Gabrielle, in 2023, sections of the road were washed out completely and the road has had to be temporarily diverted onto private land so the community can remain connected to the rest of the Masterton District. The current situation is not sustainable, and certainty is required regarding future access to and from Mataikona.

Problems, Benefits and Investment Objectives

The problems, benefits and investment objectives for this project were determined by the project team and are shown below.



Options Development and Assessment

A long listing workshop was held with the community on 23 July 2022, with approximately 80 people attending. Community members were invited to suggest possible interventions for various issues affecting the road. These suggested interventions were screened alongside interventions identified by the Stantec technical team and Council staff using the Early Assessment Sifting Tool, and the remaining interventions were included in a long list of 10 packages of work.

The long list of packages was narrowed down using a multi criteria analysis. The assessment criteria were developed in discussion with Council and Waka Kotahi, and included the project investment objectives, critical success factors and three of the four 'wellbeings' (economic, social and environmental). Assessment of the fourth wellbeing (cultural) was separately undertaken by Ngāti Kahungunu ki Wairarapa and Rangitāne o Wairarapa, who chose to provide input by ranking the packages in order of preference.

The packages which received the highest ranking in the MCA (Options 5, 6, and 7) were ultimately considered unaffordable for Council, with an estimated cost range of between \$30M to \$270M (MDC's total annual rates revenue per annum is \$32M). The alternate route packages (Options 8, 9, and 10) were also considered unaffordable, as well as being socially unacceptable as they would cut the community off from the rest of the region. The remaining packages (Options 1, 2, 3, and 4) performed poorly in the MCA assessment and only Option 4 was considered to provide a positive contribution to the investment objectives. This was a challenge; the best solutions had affordability issues, and the options that were affordable did not fully address the problems.

¹ They are the main visitor attraction along the corridor and are considered one of the region's hidden geological gems. They are visited regularly by holiday makers in the area and are frequently used as a field trip location for geology students.

Preferred Option

The outputs of the MCA, mana whenua rankings and economics assessments were presented to a stakeholder workshop and community meeting on the 3 September 2022. The purpose of the workshop was to highlight the challenges and trade-offs of each package and to get feedback on which package or combination of packages was preferred. The stakeholders and mana whenua preferred the 'strengthen' option (Option 5). However, they recognised the challenges with this option relating to cost and other trade-offs. They therefore proposed a more affordable hybrid package. This hybrid option was taken forward for further investigation and economic assessment. The hybrid option combines elements of:

- the 'retreat' package (Option 4) where the road can be realigned (where possible and feasible),
- increased maintenance and
- priority strengthening (when and where this can be afforded).

Funding

The estimated cost to complete the full hybrid option was higher than anticipated so the hybrid option was further developed to provide 3 sub-options:

- Option A: the lowest cost option which addressed the critical risks only,
- Option B: a medium cost option which addressed critical and high risks, and
- Option C: the original hybrid option, which addressed all risks.

The economic performance of these three different investment strategies was compared. Investment Option B, addressing the critical and high risks, gives the highest BCR of 1.78 and is most likely to provide the identified project benefits. This is the Preferred Option.

The project has an indicative Priority 5 under the 2021-24 Investment Prioritisation Method. Based on the 2021/24 NLTP, projects within the local road activity class that achieve Priority 1-6 are considered 'Probable' for funding priority. This project achieves this threshold and is therefore expected to achieve probable funding priority.

Discussions with the Waka Kotahi Investment Advisor recommended breaking the project into discrete packages of work and funding these through low cost, low risk (LCLR) improvements. This approach has the benefit of being preferred by Waka Kotahi and allows for simpler or quick win remediations to be implemented now. However, there is also the risk that only some of the work will get completed as each package will be assessed on its own.

Regardless of which funding option is chosen there will be additional funding required over and above what was budgeted in the Long Term Plan (LTP). Options for funding this requirement include private investment from the like of iwi groups or forestry companies, or investment from other government agencies such as the Ministry for Transport, Ministry for the Environment, or Ministry for Social Development.

		Option A: Critical Risks	Option B: Critical and High Risks	Option C: All risks
Investment Rational	Assumed deteriorating quality of access from ²	2030	2065	2070
	Assumed likelihood of disruption	6/ 10 years	5/ 10 years	5/10 years
	Impact relative to Do Min	\$5M	\$56M	\$56M
	Project expected estimate ³	\$18.3M	\$32.8M	\$37.2M
	Impact versus cost	0.31	1.78	1.57
	Net Present Value	-\$48.1M	\$27.8M	\$32.0M
Funding	Long Term Plan Budget	\$11,000,000	\$11,000,000	\$11,000,000
	- Council Share	\$4,840,000	\$4,840,000	\$4,840,000
	- Waka Kotahi Share	\$6,160,000	\$6,160,000	\$6,160,000
	Additional funding required	\$7,300,000	\$21,800,000	\$26,200,000

² This is a high-level assumption based on historic disruption information, hazard risk analysis and engineering judgement. It is the year from which access may no longer be suitable for some vehicles or there is a significant reduction in the level of service required.

³ Project base estimate plus approximately 20% contingency



Next Steps

The existing emergency maintenance and repair regime is not sustainable for Council, nor does it provide resilient access for residents. If funding partners and Council agree that road access to Mataikona should be retained the preferred option (Option B) will provide more resilient access to Mataikona and the surrounding areas. To complete the project the following tasks are required:

- Funding arrangements:
 - Council endorsement of the preferred way forward (Option B)
 - Confirm with Waka Kotahi that LCLR improvements is the recommended funding strategy for this project. If this is the case, group the work into discrete packages using Appendix N for guidance.
 - Seek SSBC approval from Waka Kotahi
 - Rationalise the cost estimates and see if any savings can be made.
 - Determine how to address the additional \$21.8M required funding. The new Transport Resilience Fund may be an option, although it would not be able to cover the full amount required.
 - Assessment of impact to Council loans and rates
- Design and long-term planning
 - Investigate and implement development restrictions along Mataikona Road as part of the District Plan.
 - Identify individual packages of work for LCLR funding
 - Development of detailed design tendering documentation.
- Consultation:
 - Identify and consult with iwi and other affected parties.
 - Inform community of the planned works
- Preliminary work:
 - Property procurement with landowners as required for the Preferred Option.
 - Tender and award of detailed design including resource consenting.
 - Begin collecting baseline data for missing benefit measures.
 - Develop construction tendering documentation.
 - Tender for construction.
- Construction

The main risks for delivery of the next stage of work are:

- Securing funding for the project
- Emergency and maintenance funding will still be required
- Time required for consenting and associated consultation (if required)
- Property acquisition

Should the additional funding be unable to be secured the current approach of emergency works following events should be utilised.



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Part A: Strategic Case

We design with community in mind



1 Introduction

1.1 Purpose

Mataikona Road provides the only access to three beach front settlements and farming and forestry areas. Since at least 1963 the area has been subject to erosion, and sections of the route are now at risk of washing out entirely. Masterton District Council (Council) need to provide resilient and sustainable access to Mataikona. This document demonstrates why this is so important and identifies the preferred option to achieve this outcome. It provides residents with certainty around future access to their properties, and Council with a way forward.

Part A discusses the problems, benefits, investment objectives and opportunities that were confirmed by Council and Waka Kotahi following the Investment Logic Mapping workshop. It presents the evidence in support of the problems and investigates the case for investment. Part B presents the process used to identify the preferred option. Part C provides a technical assessment and details of the recommended option. Part D presents a plan for implementation.

1.2 Background

The Mataikona Road is a 13 km long, mostly gravel road that provides access to three settlements and Mataikona Station. The northern end of the road connects with Pack Spur Road which extends 6 km before it crosses into private land. There are several residential, farming, and forestry properties accessed off the road, as well as the Mataikona Rocks, a well known geological location. Mataikona Road provides the only vehicle access to these locations. The entire route has slowly been under pressure from storm events and sea erosion. It is now becoming a significant maintenance problem and sections of the route are at real risk of washing out entirely, isolating the community.

Council and Waka Kotahi have funded several temporary repairs works in recent years, with varying degrees of success. The small ratepayer base, and low traffic volume of the road make it challenging to justify continual funding for repairs and upgrades when the completed work is unlikely to survive a year. If the current on-going maintenance and emergency work on Mataikona Road were to stop, it is anticipated that sections of the road would be lost in less than a year, severing access.

1.3 Study Area

Castlepoint is a popular tourist destination on the east coast of the lower North Island located 60 km northeast of Masterton, about a 50-minute drive. The Mataikona Road travels north up the coast from Castlepoint and provides access to several residential, farming, and forestry properties, as well as the Mataikona Rocks. The focus of this Strategic Case is the Mataikona Road (Figure 1-1).

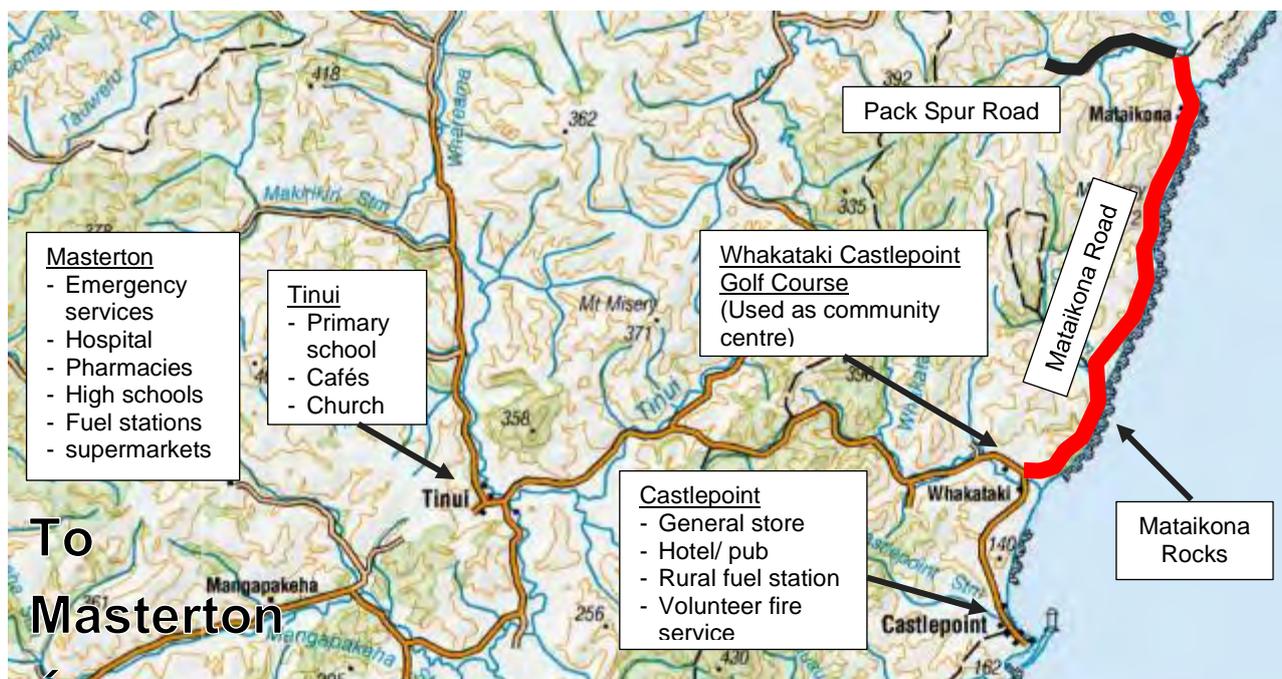


Figure 1-1: Project area

2 Context

2.1 Social

2.1.1 Demographics

The 2018 Census recorded 195 people living in Statistical Area (SA) 7022197. This is a large area that covers the Mataikona Road and stretches from Mataikona south to Whakataki, and from the coast west to Tinui, as shown in Figure 2-1. While this is a greater area than our area of interest, it is the most refined data available. The Census data shows the population of Mataikona Road and surrounding area has remained largely similar between the 2006 and 2018, although a decline was noted in the recorded population in the 2013 census. Despite the population of the area remaining steady there are signs that the demographics of the community may be changing, with a slight decline in the number of children, but a significant increase in the number of people aged over 65 (Figure 2-2).

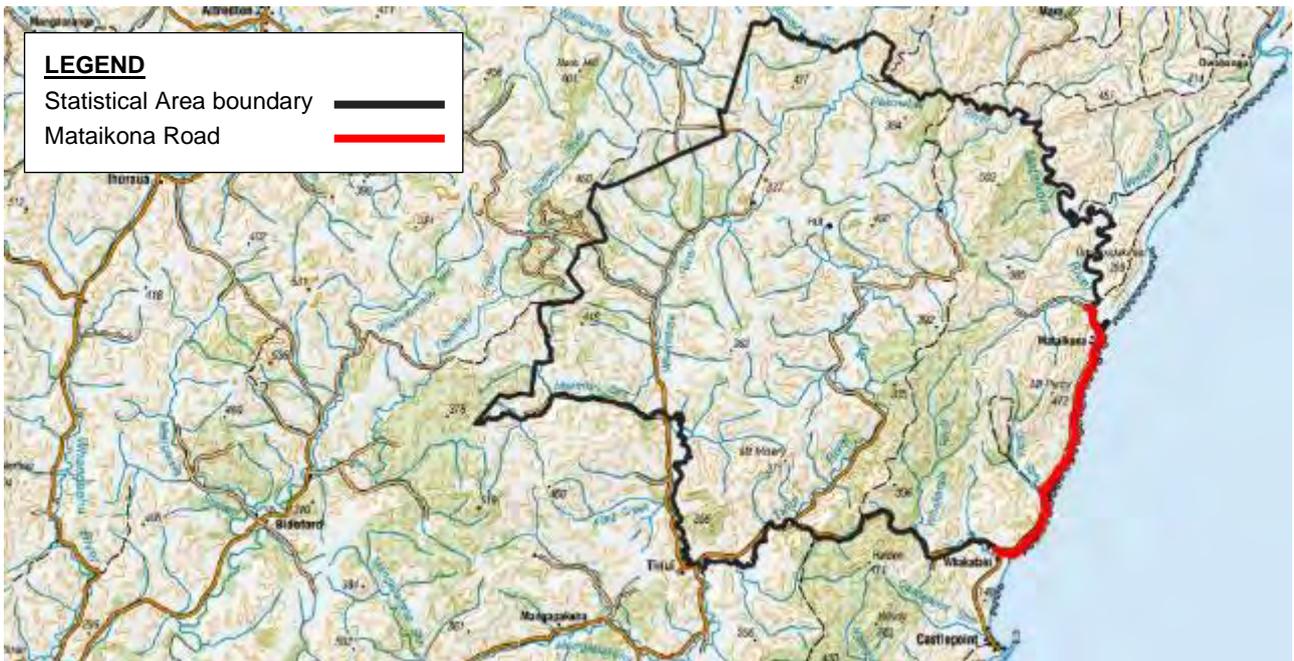


Figure 2-1: Statistical Area 7022197 boundary

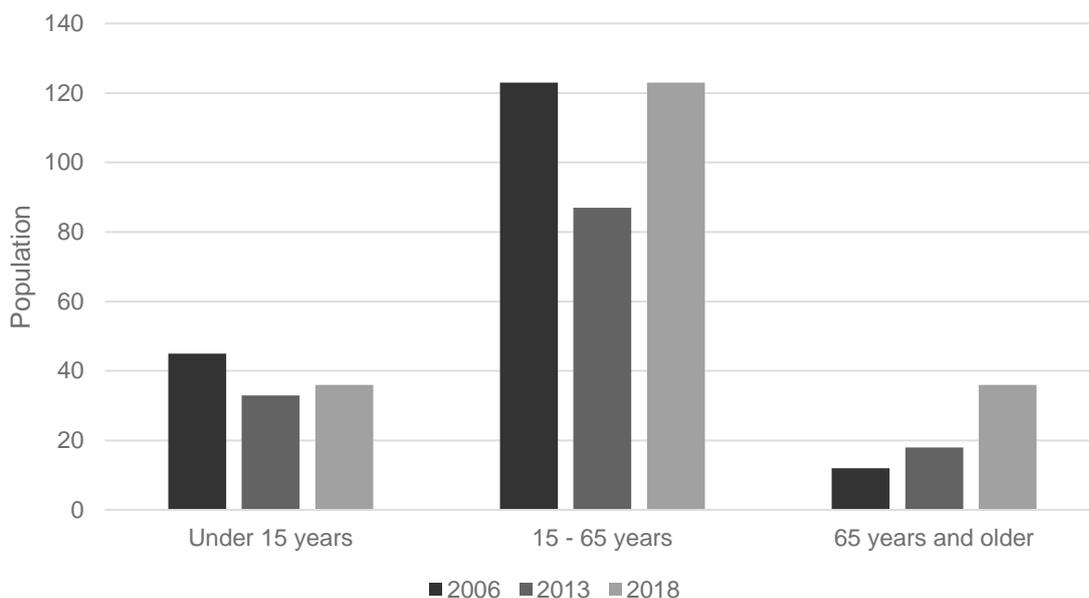


Figure 2-2: Demographics for Mataikona Road and the surrounding areas (SA 7022197)



2.1.2 Permanent and Part Time Residents

The 2018 Census recorded 180 dwellings in SA 7022197, of which 38% (68) were empty at the time of the census. While SA 7022197 covers a larger area than just Mataikona Road, it does give an indication that the area potentially has a lot of holiday homes. The Council database shows there are 95 rateable residential properties accessed using Mataikona Road, 80 on Mataikona Road and 15 on Pack Spur Road. Of these, 13 properties are currently listed on various holiday accommodation sites.⁴ There are also a number of non-consented buildings tucked in along the road.

A survey was completed following the first round of community engagement to understand how and why the road is used and its role in supporting residents or businesses. Of the 65 responses received, 50 stated they were residents, and of those 50, 25 were permanent residents and the other 25 were weekenders.

2.1.3 Community Facilities

The closest facilities for residents and visitors are the Castlepoint store, Whakataki Hotel, and Whakataki rural fuel station. The community center is located at the Whakataki Castlepoint Golf Course. The closest school is the Tinui Primary School, 20 km inland from Castlepoint. All other facilities such as secondary schools, pharmacies, medical centers, the hospital, and other emergency services are in Masterton.

The Mataikona branch of the Castlepoint Volunteer Fire Brigade was established in 2018. Although they have limited equipment, they are a very important part of the emergency response for any events along the road, as having them able to respond can give at least a 20-minute head start to the crew based at Castlepoint. If the Mataikona Road is impassible at the south end, then the Castlepoint based crew will be unable to respond nor will any Masterton based services, so the Mataikona crew are the only possible emergency response. Most callouts are for medical events rather than fires. The Mataikona volunteers responded to 10 events in 2019, 13 events in 2020, and 10 events in 2021. There have been three call outs so far in 2022.⁵

2.2 Ecology

Mataikona Road runs alongside a highly dynamic and sensitive coastal environment, and its surrounding catchments encompass pockets of indigenous vegetation, complex riverine and stream systems, pasture, and forestry. There are three river mouths along the road (Figure 2-3) and all are identified by Greater Wellington Regional Council (GWRC) as having significant indigenous biodiversity values. (refer to Appendix A for more detail).

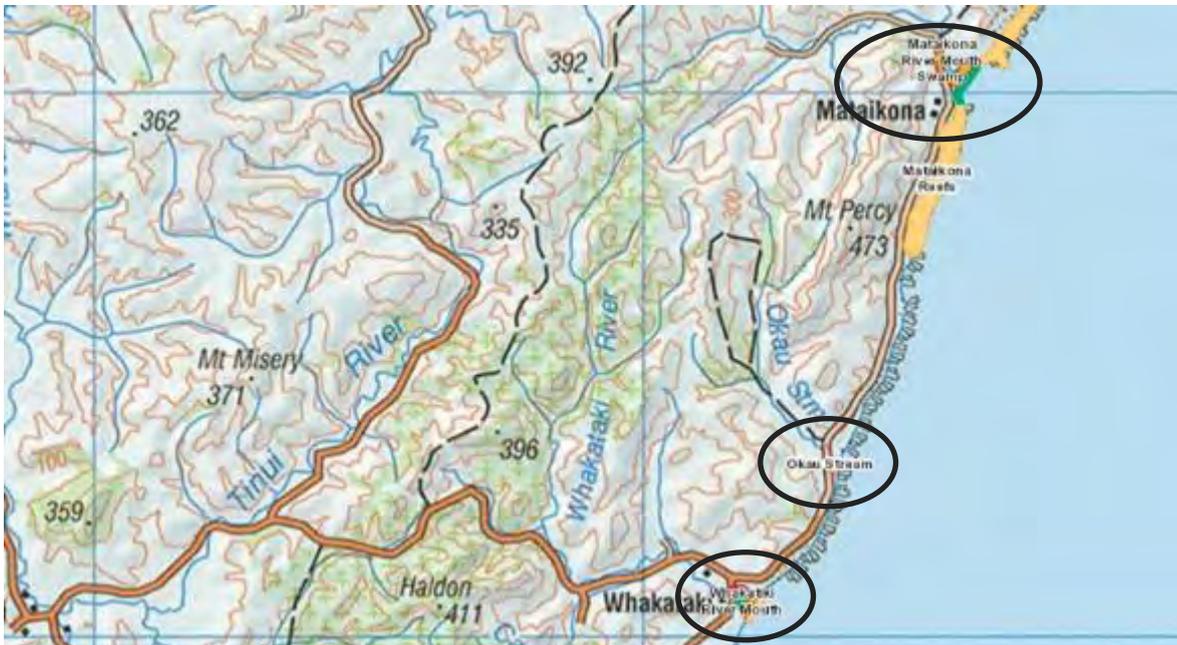


Figure 2-3: Ecosystems and habitats with significant indigenous biodiversity values

2.3 Culture and Archaeology

There are two iwi in the Wairarapa, Rangitāne o Wairarapa and Ngāti Kahungunu ki Wairarapa.

⁴ Five properties are listed on [Airbnb](#), six properties are listed on [Bookabach](#), and six properties are listed on [Holiday Houses](#). Two properties were lists on both Airbnb and bookabach, and another two were listed on both Holiday Houses and airbnb (13/06/2022)

⁵ Email received from Anders Crofoot on Wednesday 3 August 2022

During conversations with mana whenua it was noted that there are a number of karaka trees planted on the land behind the road, particularly around the middle settlement in the foothills below Mount Percy. These trees were often used to indicate boundaries and planted around villages. Because of this there are likely to be artifacts or areas of significance, documented or otherwise, in and around these trees.

The entire coast between the Whakataki River mouth and Mataikona River mouth, including the Mataikona reefs north of the Mataikona River mouth, is highlighted as an area with significant mana whenua values in the Greater Wellington Regional Council Proposed Natural Resources Plan. Rangitāne hapū had permanent and seasonal occupational sites along the entire coastline and Mataikona was one of these. Beach-side settlements were used as a base to harvest seafood⁶. The beach was used as a location to dry and/or smoke the harvest which was then stored and could be traded or taken to inland settlements.⁷

There are many wāhi tapu and archaeological sites in the coastal area. There are over 100 recorded archaeological sites between Mataikona and Whareama (15 km south of Castlepoint), with the majority located within a few hundred metres of the sea on the stretch of coast between Mataikona and Castlepoint. The sand dunes along the coast contain archaeological remains such as moa bones and eggshell, and midden debris cover many hectares through the dunes. It was also traditional for sand dunes to be used for burials, and at least nine occurrences of human remains have been recorded between Mataikona and Whareama.

Well known wāhi tapu along Mataikona Road include:

- **Te Wharepouri Mark:** A sandstone pillar was erected to mark Te Wharepouri making peace with Te Potangara. When Mataikona Road was built, the pillar was destroyed, and the existing cairn was erected.
- **Taraoneone Pā:** This was an important pā near the summit of Mount Percy. Karaka groves can be found further down the slope towards the sea.
- **Te Rerenga o Te Aohuruhuru:** This is a large rock on the foreshore at Mataikona and is where Aohuruhuru leapt to her death after being shamed by her husband. It is locally known as Suicide Rock.

Thirteen sites are recorded in the District Plan and these are shown in Figure 2-4.

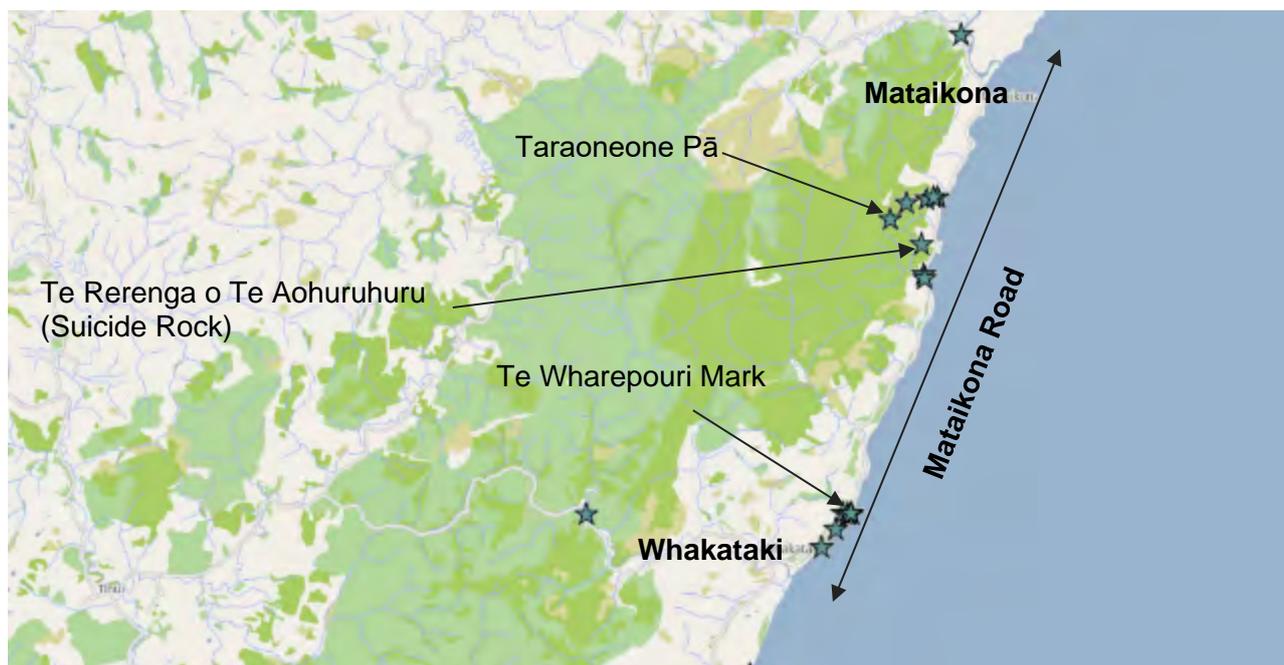


Figure 2-4: Documented archaeology sites⁸

2.4 Geological

The first 2 km of the Mataikona Road winds up around the base of Front Hill, the road then drops down to sea level at Sandy Bay. The road then climbs around Second Hill and then comes back down to sea level and hugs the coastline line up to the Mataikona River mouth. The road is mostly built on poorly lithified⁹ sedimentary deposits (sandstone), with

⁶ koura (crayfish), inanga, kina, pāua, oysters and other shellfish, shark and other fish

⁷ Greater Wellington Regional Council. 2019. "Schedule D3: Statutory Acknowledgements from the Rangitāne Tū Mai Rā (Wairarapa Tamaki nui-ā-Rua) Claims Settlement Act 2017." In *Proposed Natural Resources Plan*.

⁸ Base map: <https://archsite.eaglelegis.co.nz/NZAAPublic>

⁹ Transformed into stone

small sections built on loose gravel, sand, silt and clay at Sandy Bay and the northern end of the road, as shown in Figure 2-5. This means that the ground is weak once disturbed, subject to dispersion through groundwater runoff, and is susceptible to erosion.

It should also be noted that the coastline alongside Mataikona Road is sinking at an average rate of 6.11mm per year¹⁰. This is purely due to ongoing tectonic movement, but not earthquakes. As such the impacts of sea level rise and climate change is accelerated, and the impacts of inundation and storm surges will be felt sooner.

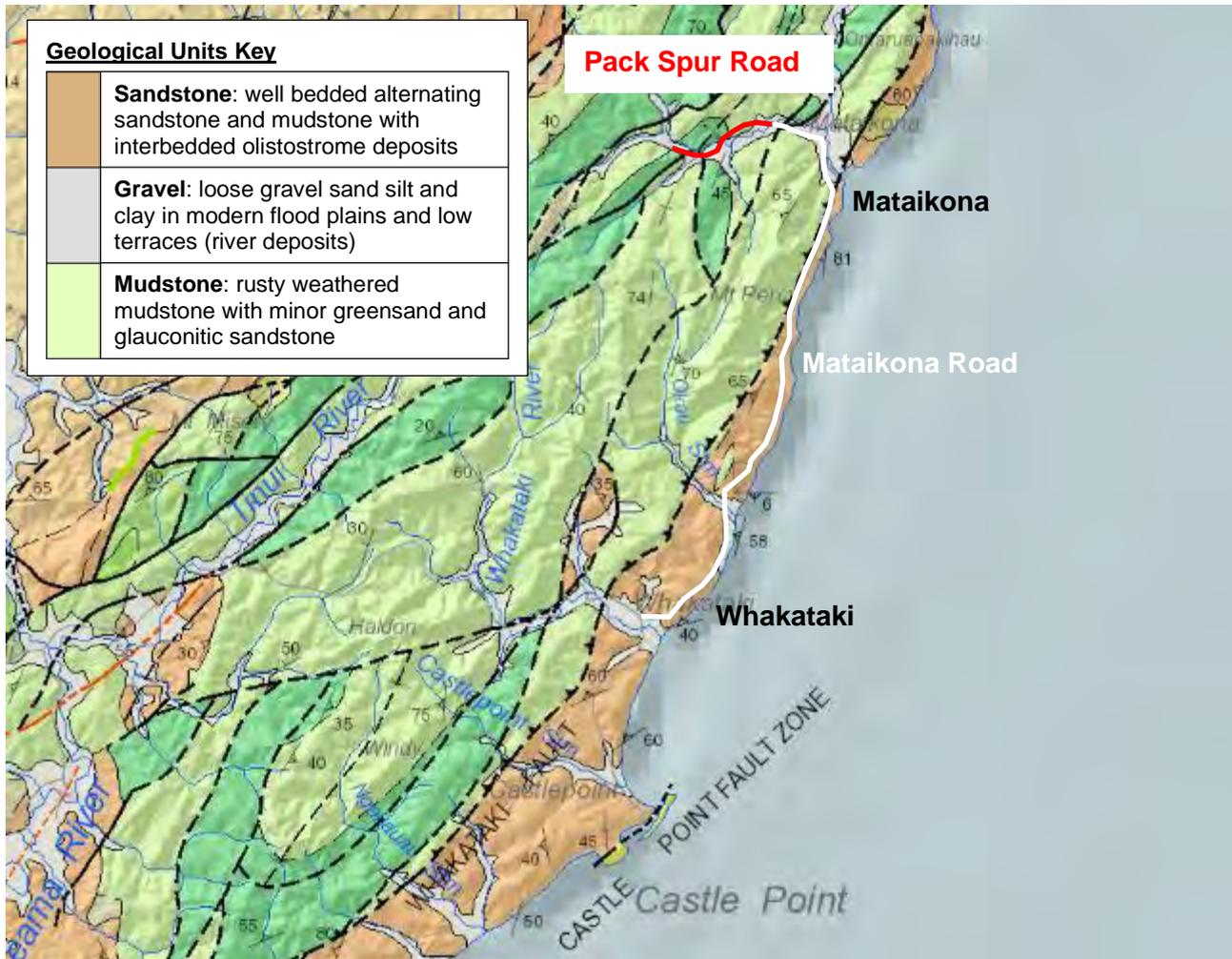


Figure 2-5: Geology of the Mataikona Road¹¹¹²

The Mataikona Rocks are located 3km along the road opposite Sandy Bay and are identified as a significant geological site in both the Wairarapa Combined District Plan and the GWRC Proposed Natural Resources Plan.

2.5 Economic

The main economic activities being undertaken on Mataikona Road are forestry, sheep and beef farming, and beekeeping. There is a new forestry proposal at Mataikona Station, and the privately owned forestry blocks along Pack Spur Road will be due for harvest in the next few years. The farming along the corridor is mostly livestock. The economic scale of these activities is still to be determined.

There are also a handful of properties utilised as holiday homes or rented out as holiday accommodation. The main visitor attraction along the corridor is the Mataikona Rocks, and they are considered one of the region's hidden geological gems. They are visited regularly by holiday makers in the area and are frequently used as a field trip location for geology students.

There are no other major economic activities in the study area.

¹⁰ Average vertical land movement of sites 2374 – 2378 from the NZ Sea Rise Map, Takiwā. <https://searise.takiwa.co/> (14/06/2022)

¹¹ GNS Science. (n.d.). *New Zealand Geology Web Map*, Layer: 1:250K Geology (more detail) – Geological units. <https://data.gns.cri.nz/geology/>

¹² Base map: <https://data.gns.cri.nz/rqmad/downloads/webmaps/250K-Geological-Map.html>

2.6 Transport

Mataikona Road starts at Whakataki, just north of Castlepoint, and provides the only publicly maintained access to properties along the road. The road is 13km long and is only sealed for the first 4.5 km, the remainder of the road is unsealed. The road is very narrow (mostly single lane, between 3.5 m and 5 m width), has a tortuous alignment, and little to no shoulder. The posted speed limit is 100 km/h; however, the mean operating speed is just 30-40 km/h¹³ due to the nature of the road. For the most part the road is approximately three to four meters above mean sea level, however in places it is less than one meter.¹⁴

There is a four wheel drive (4WD) route available along Pack Spur Road. However, this is not an all-weather route and is only suitable for confident drivers in appropriate vehicles. Part of the formed road is on private property and is maintained by Council on an as needs basis. Figure 2-6 shows the difference between the formed road alignment and the legal road parcel. If a suitable vehicle is used, and the road is dry the route is passable. However, it adds 30 km, and 80 minutes of travel time to any trip to-or-from Castlepoint, compared to the current 25-minute trip from Castlepoint to Mataikona Station.



Figure 2-6: Pack Spur Road road parcel versus actual alignment

Council completed traffic counts on Mataikona Road at the end of June 2022. The counts ranged from 111 vehicles per day with 22.5% heavy vehicles (25) at the beginning of Mataikona Road to 25 vehicles per day with 0% heavy vehicles just north of Sandy Bay. Storm damage repair works were underway at the time and may have affected traffic volumes.

The MobileRoad website gives an estimated average daily traffic of 144 vehicles per day with 10% heavy vehicles at the start of the road 28 vehicles per day with 13% heavy vehicles at the northern end of the road. The heavy vehicles using the corridor are mainly stock and logging trucks. Council reports that vehicles of this size can have problems on some sections of the road, and oncoming vehicles may need to reverse back until they find a suitable location where they can let the heavy vehicles pass.

There is anecdotal evidence that on fine days, over the weekends, and during the summer there are significantly more trips made along the road due to families visiting for the day, or people going diving.

Mataikona Road is classified as an 'Access' road under the One Network Road Framework (ONRC) and as a 'Rural Road' under the One Network Framework (ONF). The descriptions for these classifications are shown in Table 2-1.

¹³ Waka Kotahi NZ Transport Agency. (n.d.). *MegaMaps Edition III*, Layer: Speed Management Framework 2020 – Mean Operating Speed. <https://maphub.nzta.govt.nz/megamaps/>

¹⁴ Greater Wellington Regional Council. 2019. GWRC Contours 5m - Sheet BP36. <https://data-gwrc.opendata.arcgis.com/maps/GWRC::wellington-region-5m-contours/about>

Table 2-1: Road classification descriptions

System	Classification	Description
One Network Road Classification	Access	This is often where your journey starts and ends. These roads provide access and connectivity to many of your daily journeys (home, school, farm, forestry etc). They also provide access to the wider network.
One Network Framework	Rural Road	Rural roads primarily provide access to rural land, for those that live there, and in support of the land-use activity being undertaken. Rural roads are the most common and most diverse roads in rural areas. They have no appreciable on-street activity occurring and in many parts of the country are unsealed. Some rural roads are important for freight, collecting dairy and forestry and other primary produce from their source, while others, where volumes of vehicular traffic are very low, can provide safe and pleasant recreational and tourism routes, including the New Zealand Cycle Trail and Te Araroa (New Zealand's walking trail). In some parts of New Zealand, rural roads are utilised more by people riding horses than by vehicles.

Castlepoint and the Mataikona Road are accessed via the Masterton-Castlepoint Road.

3 Defining the Problem

3.1 Problem Definition

The following problem statement was developed by the project team:

- **Road Availability:** The impacts of climate change on Mataikona Road are increasing the frequency and duration of road closures, which are affecting reliable to safe access to Mataikona for all road users.

The problem statement can be split into cause, effect and consequence as shown in Table 3-1.

Table 3-1: Problem statement breakdown

Problem Statement: The impacts of climate change on Mataikona Road are increasing the frequency and duration of road closures, which are affecting reliable to safe access to Mataikona for all road users	
Cause	<ul style="list-style-type: none"> • Sea level rise • Land subsidence over time • Increased storm frequency and intensity • Coastal erosion • Slips and dropouts • Lack of viable alternatives
Effect	<ul style="list-style-type: none"> • Increased frequency of road closures • Increased duration of road closures
Consequence	<ul style="list-style-type: none"> • Increasing maintenance costs • Poor resilience • Unsafe route for users

3.2 Cause

3.2.1 Sea Level Rise and Land Subsidence

Climate change is contributing to sea level rise. So far, the oceans have taken up most of the additional heat, and as the water warms up, it expands. This combines with melting land-based ice (such as glaciers) to contribute to rising sea levels.

New Zealand’s mean relative sea level has risen 1.81 (±0.05) millimetres per year on average since records began more than 100 years ago. However, the rate of sea level rise around New Zealand is increasing. The average rate of sea-level rise for 1961–2018 was twice the average rate between the start of New Zealand records and 1960. This has caused an increase in coastal flooding which will only be exacerbated by future sea level rise.¹⁵

As discussed in Section 2.4 the coastline along Mataikona Road is sinking at an average rate of 6.11 mm per year¹⁶, due to tectonic readjustment. This, combined with the increasing rate of sea level rise means that the frequency of inundation and storm surges will increase, as will the impacts of these events.

Figure 3-1 shows the expected sea level rise under the SSP5-8.5 projection¹⁷ combined with the predicted vertical land movement for the Mataikona coastline, and the likely confidence intervals. It shows that by 2045 the sea level along the Mataikona Road will be likely be 0.5 m higher than it was in 2005, and by 2075 it will likely be 1 m higher than in 2005.

¹⁵ Ministry for the Environment & Stats NZ (2020). *New Zealand’s Environmental Reporting Series: Our atmosphere and climate 2020*.

¹⁶ Average vertical land movement of sites 2374 – 2378 from the Takiwā NZ Sea Rise Map, accessed 14 June 2022 <https://searise.takiwa.co/>

¹⁷ A worst-case scenario with increased investment in fossil fuels, etc. This would likely result in a 4.4°C warmer world by 2080.



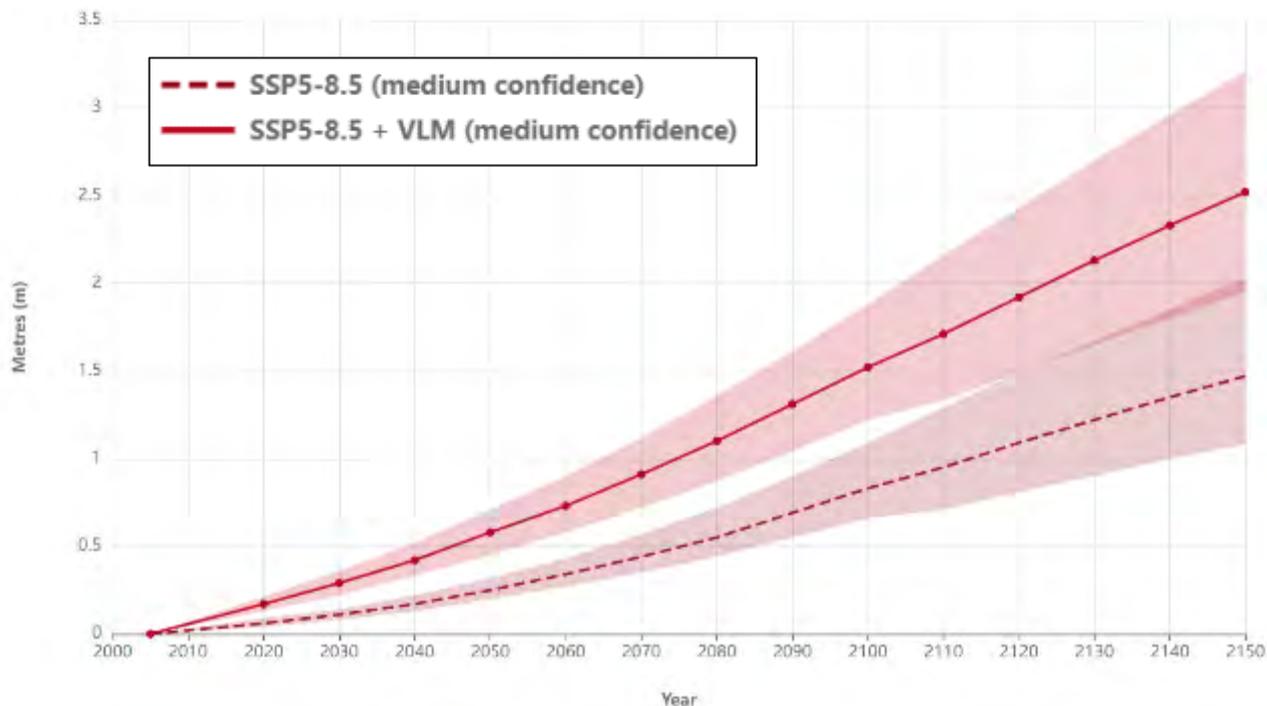


Figure 3-1: Sea level rise prediction by decade for site 2377¹⁸

As stated in Section 2.6 parts of the Mataikona Road are already at, or just above, sea level. These areas are already experiencing problems. For example, at the Mataikona settlement whenever there is a storm surge sand, driftwood and other debris are washed up and over the bank onto either side of the road (Figure 3-2).



Figure 3-2: Driftwood either side of Mataikona Road just north of Mataikona¹⁹

3.2.2 Weather Events

According to the National Institute of Water and Atmospheric Research (NIWA) Historic Weather Events Catalogue there have been several events over the years that have impacted Mataikona and Castlepoint.²⁰ The full list can be found in

¹⁸ Takiwā. n.d. "Sea level predictions by decade, projection to 2150 (medium confidence)." Accessed 27 June 2022. <https://searise.takiwa.co/>

¹⁹ Screen shot from video footage provided by MDC. Video taken 19 April 2022.

²⁰ Castlepoint was included in the search as it is far more likely to show up in national records and any significant rainfall recorded in Castlepoint will also have fallen on Mataikona Road.

Appendix B. The impacts of the weather events have ranged from minor property damage through to flooding, slips, and loss of lifeline infrastructure.

Figure 3-3 shows the number of recorded weather events by decade. The 2000's stand out as there were 10 weather events during this time, with four being recorded in 2004 alone. There was also a significant event in early 2005 which closed Mataikona Road for 10 days. It should be noted that there are unlikely to be accurate records from before the 1970's.

There appears to be a data gap between 2011 and 2021, as there are no records of weather events during this time. It is hoped the workshop will help to address this gap.

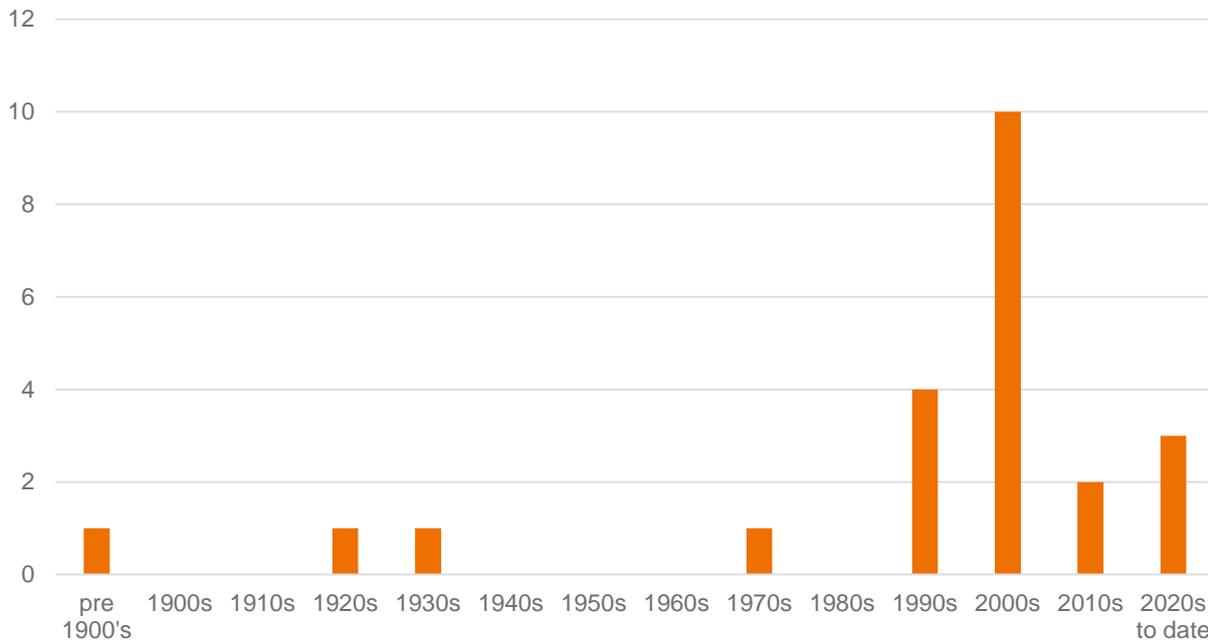


Figure 3-3: Number of weather events impacting Mataikona and Castlepoint by decade

Climate projections for the Wellington region point to slightly less rainfall overall, but more intense extreme, rare rainfall events.²¹ The key environmental impacts to the Wairarapa Coast that will likely affect the Mataikona Road are:²²

- Increased flood intensity
- Increased coastal inundation
- Increased erosion
- Biodiversity losses
- Ocean acidification
- Increased wildfire

In terms of extreme rainfall events by 2040 there is projected to be a 0%-15% increase in the amount of rain falling during heavy rainfall days (> 99th percentile of daily rainfall). The 2090 projection is 0%-30%. This indicates that rain events may become heavier. The following comment is made by GWRC:

“Although the uncertainty in average rainfall range is high, extreme rainfall increases are more certain due to the increased amount of water vapour that the atmosphere can hold as it gets warmer (about 8% increase in saturation vapour per degree of warming)”

3.2.3 Erosion

As discussed in Section 2.4 the Mataikona Road coastline is susceptible to erosion. This can very easily be seen by comparing the 1963 and 2021 aerial photography which shows coastal retreat along most of the road, particularly the northern end (Appendix C). During this time, the coast appears to have retreated up to 20m in some places and not at all in others, although it is hard to be sure given the resolution and lack of additional landmarks in the 1963 photography.

Comparison of the 2012/13 and 2021 aerial photography at 1139-1147 Mataikona Road (Figure 3-4 and Figure 3-5) shows that the coastline has retreated seven metres in eight years. At the current rate of retreat, the road in this location will be impacted by mid-2024, the property boundaries by 2037, the buildings by 2055.

Figure 3-6 shows known problem areas on Mataikona Road where the road has already been impacted by erosion.

²¹ Ministry for the Environment & Stats NZ (2020). *New Zealand's Environmental Reporting Series: Our atmosphere and climate 2020*.

²² Greater Wellington Regional Council (n.d.). *Whaitua Catchments Climate Change parameters*. <https://www.gw.govt.nz/environment/climate-change/impacts-on-our-region/>. Last updated 7 June 2022



Figure 3-4: 1139-1147 Mataikona Road (2013)²³



Figure 3-5: 1139-1147 Mataikona Road (2021)²⁴



Figure 3-6: Areas that are already impacted by erosion on Mataikona Road



3.2.4 Slips and Dropouts

The sections of road around Front Hill and on the approach to Te Rarena o Te Aohuruhuru (Suicide Rock) are vulnerable to slips and dropouts. The steep slopes above and below the road combined with the weak underlying geology (Section 2.4) contribute to this vulnerability. This is particularly true following rain events.

Multiple landslides have occurred above the road (refer to Figure 3-7 and Figure 3-8). They are generally shallow and appear to be weak surficial soils slipping over the sandstone bedrock. In other places, deeper failures have occurred which appear to be influenced by surface water flow in low points. Dropouts have also occurred below the road (refer to Figure 3-8). On the approach to Te Rarena o Te Aohuruhuru these appear to be due to coastal erosion undermining the toe of the slope below the road.²⁵



Figure 3-7: Slips on Front Hill²⁶



Figure 3-8: Slips and dropouts on approach to Te Rarena o Te Aohuruhuru (Suicide Rock)²⁷

3.2.5 Lack of Viable Detours

As discussed in Section 2.6, there are currently no viable alternate routes for access to Mataikona. The Pack Spur Road route is only suitable for 4WD vehicles and travels over private land, so it is not currently considered a viable alternative.

The lack of a viable detour means this corridor has a greater role in providing network resilience than what is implied through its official ONRC rating. The Waka Kotahi criticality assessment tool gives Mataikona Road a criticality score of '3' – Major. This correlates to an ONRC rating of Regional or Arterial, as shown by Table 3-2, compared to the road's existing ONRC rating of Access. The key reason for this score is that Mataikona Road is the only viable route for residents to access essential services such as hospitals, emergency services, major utility control centres, welfare centres, key retail outlets, schools, and major industry.

Refer to Appendix D for details of the route criticality assessment.

Table 3-2: Criticality scale conversion to new effective One Network Rading Classification

One network road classification	Score	Criticality
National or high volume	4	Vital
Regional or arterial	3	Major
Primary or secondary collector	2	Significant
Local or access	1	Local

²⁵ ENGEO. 2022. *Masterton District Council Geotechnical Hazard Initial Inspection Report*.

²⁶ Photo taken on 29/06/2022 during drone survey

²⁷ Photo taken on 29/06/2022 during drone survey



3.3 Effect

3.3.1 Frequent Road Closures

There is currently a data gap regarding the frequency and duration of closures of the Mataikona Road. We are hoping to close this gap during the Options Workshop to be held in late July.

Anecdotal evidence provided by Council suggests that closures are generally a maximum of one to two days. However, Front Hill, at the start of the road, was closed for 10 days in 2005 following a greater than 1 in 150-year rain event. During this time residents used either the beach or farm tracks to get around the closure and access their properties. There has also been a partial closure in place at the middle settlement since the March 2022 rain event to allow reinstatement works to be completed. The road is open in the morning and evening for residents to pass through but is closed to all other traffic.

The road closures are causing uncertainty around the future of the road and long-term access to Mataikona.

3.3.2 Impacts on Customer Service

As discussed in Section 3.2.5 the lack of a viable detour means Mataikona Road has an effective ONRC rating of Regional or Arterial. Table 3-3 details the resilience customer level of service outcomes for Regional, Arterial and Access routes. As Mataikona Road is anecdotally often closed during and after weather events, and no alternate routes exist, it rates very poorly in relation to the Regional and Arterial customer level of service outcomes. However, Mataikona Road does meet the requirements of an Access road.

Table 3-3: Fit for purpose customer level of service outcome assessment

Road category	Resilience customer level of service outcomes	Comments
Regional	Route is always available except during major-extreme weather or emergency events and viable alternatives nearly always exist. Rapid clearance of incidents affecting road users. Road users may be advised in advance of issues and incidents	The corridor is often closed following weather events. No viable alternatives exist
Arterial	Route is nearly always available except in major weather events or emergency event and where no other alternatives are likely to exist. Clearance of incidents affecting road users will have a high priority. Road users may be advised of issues and incidents	The corridor is often closed following weather events. No viable alternatives exist
Access	Route may not be available in moderate weather events and alternatives may not exist. Clearance of incidents affecting road users and road user information will have a lower priority.	The corridor is often closed following weather events. No viable alternatives exist

The criticality rating is only as detailed as providing an effective ONRC rating of Regional / Arterial, so both classifications has been included in the assessment against the customer level of service rating.

3.4 Consequence

3.4.1 Maintenance Costs

Mataikona is the most remote part of Masterton District's road network, therefore servicing the road is more challenging than other areas. The greater distance to travel incurs higher travel costs, and the site is also some distance from key resources like quarries, and concrete suppliers (the nearest of which is in Masterton some 70 km from Mataikona).

The more often an asset is damaged the more costs are incurred. A consequence of more frequent storms (as outlined in Section 3.2.2) is that there may be more occasions where the asset is damaged and needs maintenance – sometimes significant maintenance.

A comparison of the baseline maintenance costs and emergency works costs since 2014/15 are shown in Figure 3-9. It shows that while the baseline maintenance costs are decreasing, the emergency spend has been increasing since 2017/18 with a significant increase in 2021/2022. The emergency spend increase in 2021/2022 is largely due to the repair work undertaken following the March 2022 rain event which resulted in:

- **Dropouts and washouts:** six callouts/ sites \$365,365
- **Slips:** eight callouts/ sites \$107,712
- **Culverts:** three sites \$65,266
- **Debris and trees:** seven callouts/ sites \$10,046



Figure 3-9 also shows that the average baseline costs have been supplemented on average by more than 100% per annum since 2014/15. This has amounted to over \$1m in emergency spending since that time, without a resolution to the problem.

The downward trend in baseline maintenance spending is concerning. It means quick wins such as minor drainage improvements may not be getting implemented. Despite this, it is unlikely that the decreasing baseline maintenance spend has a significant impact on the overall emergency spend. This is because the most expensive emergency repairs often relate to slips, dropouts and washouts and there is very little proactive maintenance that can be implemented to prevent this within the current maintenance budget.

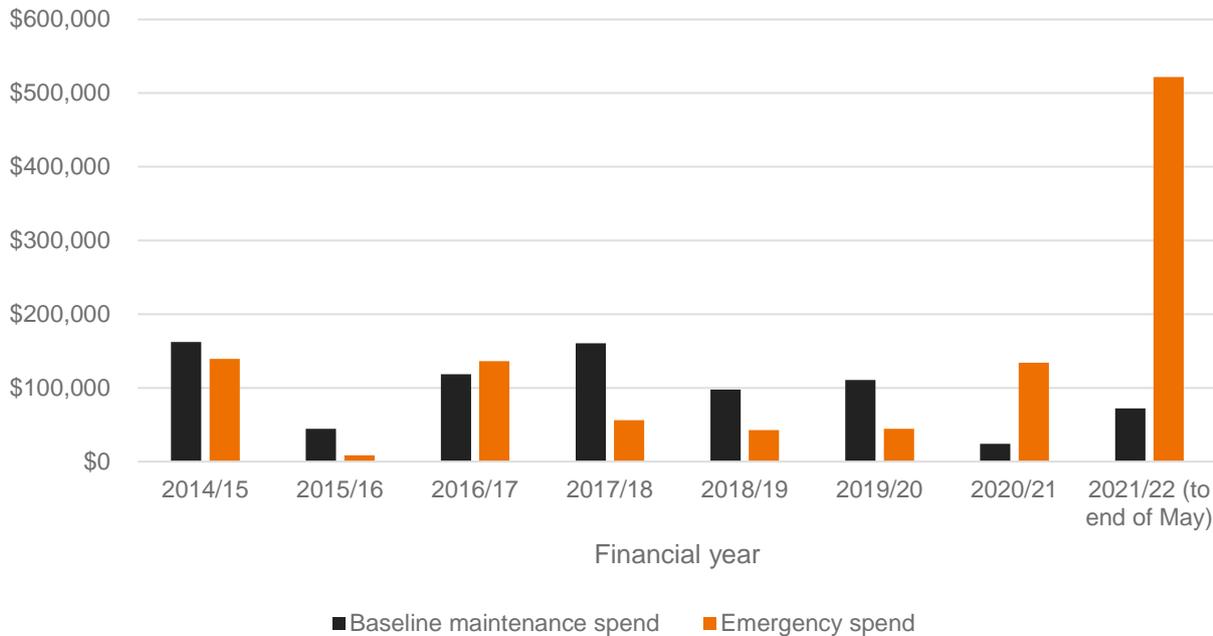


Figure 3-9: Comparison of baseline maintenance and emergency spending

Figure 3-10 shows where the emergency spend has been used along the road and generally what for. It also shows the significant increase in emergency spending in 2021/22 compared to the total of the previous five years. Figure 3-9 shows the following:

- While there have been several overslips on Front Hill, they are not too expensive to repair
- Second Hill has only had one significant slip since 2016/17
- Dropouts occur along the length of the road, but there is a cluster in South Mataikona
- The 2021/22 dropout repair for the Middle Settlement is significantly more expensive than any other.

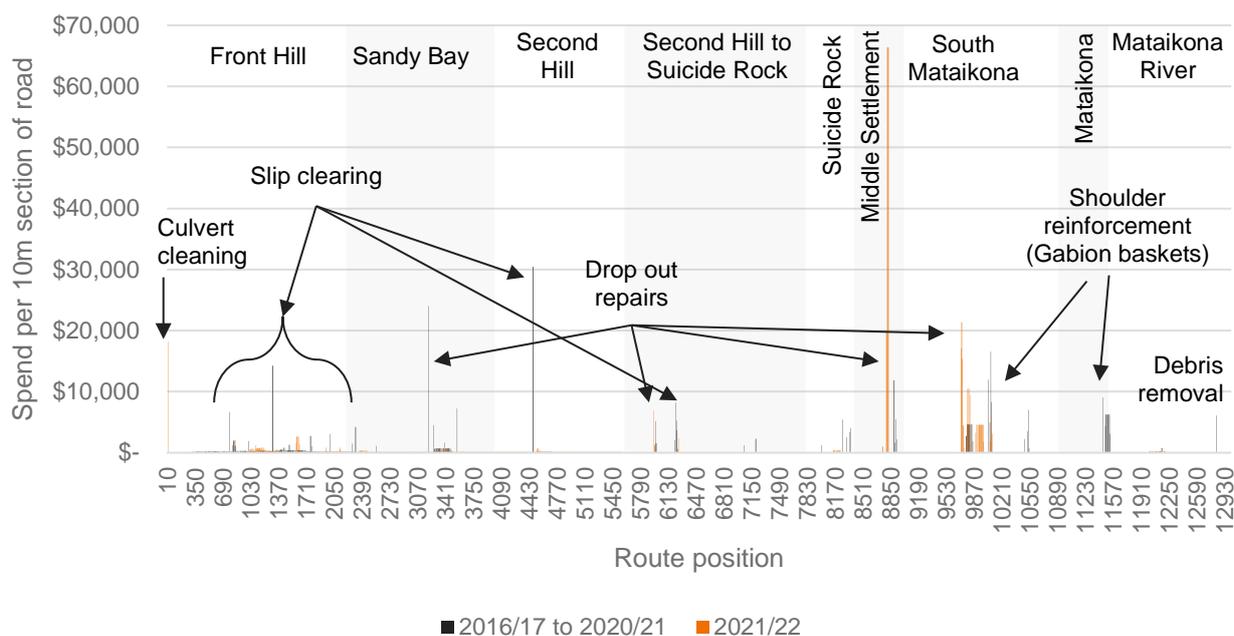


Figure 3-10: Comparison of 2021/2022 emergency spend to previous five year spend²⁸

3.4.2 Poor Resilience

The Waka Kotahi National Resilience Programme Business Case (PBC) provides a risk framework for assessing resilience risks, that can then be compared nationally.

The resilience risk rating combines considerations such as the:

- frequency of events: Occurs approximately every 5-50 years or more (based on current data)
- duration of closures: generally, 1-2 days, with one extreme closure of 10 days
- length of the available detour: there is no reliable detour available
- ONRC rating: Regional/Arterial as per the criticality assessment (Section 3.2.5). Access as per the ONRC.

The initial assessment of the project area undertaken indicates that there is a major resilience risk (4L). This is not quite the highest risk score but is in the high-risk bracket –likely with severe consequence - as shown by Table 3-4.

For full assessment details refer to Appendix E.

Table 3-4: Risk rating matrix

		Combined Likelihood		
		Unlikely	Likely	Very Likely
Combined Consequence	1	Minor (1UL)	Minor (1L)	Minor (1VL)
	2	Minor (2UL)	Moderate (2L)	Moderate (2VL)
	3	Moderate (3UL)	Moderate (3L)	Major (3VL)
	4	Moderate (4UL)	Major (4L)	Extreme (4VL)
	5	Major (5UL)	Extreme (5L)	Extreme (5VL)

²⁸ Refer to Section 9.1 for details on each road section.



3.4.3 Unsafe Route

Events such as slips and dropouts clearly present safety risks, but also contribute to the overall risk of the road by further narrowing lane width. Parts of the corridor have limited approach sight distance so drivers could be caught unaware of a hazard. Given the available width there is little room for drivers to undertake evasive manoeuvres around natural events such as rockfall, and water ponding/surges.

There is very little crash data available for Mataikona Road, there are only five recorded crashes between 2012 – 2021. This is not unexpected given the low traffic volumes and rural nature of the area. It is more than likely that for minor and non-injury crashes the locals pull themselves out if they are stuck, so the crashes do not get reported. The assessments of the reported crashes highlights alcohol and speed as the two main crash causes. The corridor has several steep banks, cliffs and rock faces, and hazards on either side. Therefore, any error may result in the vehicle entering or striking an unforgiving roadside environment.

Mataikona Road has a very poor (High) infrastructure risk rating (IRR). Poor IRRs indicate that the standard of the road infrastructure is less than satisfactory in terms of safety. Key factors for the poor IRR along the corridor include the narrow lane width, narrow shoulders, roadside hazards, and at time torturous alignment.

The poor IRR means there is an increased level of safety risk for drivers – a risk that also has knock-on effects to resilience as an injury crash has the potential to block the road, and emergency services may have to travel some distance to attend the crash, and to re-open the road.

3.5 Summary

The key points from the above sections are summarised in Table 3-5, and any data gaps are highlighted. Based on this information there is a case for change.

Table 3-5: Summary of evidence

Evidence		Key Points
Cause	Sea level rise and land subsidence	By 2045 the sea level along the Mataikona Road will be likely be 0.5 m higher than it was in 2005, and by 2075 it will likely be 1 m higher than in 2005. Sections of the road are already experiencing overtopping.
	Weather events	There appears to be a data gap for weather events impacting Mataikona in the 2010s. Four events were recorded in the 1990s, 10 events in the 2000s, only two events in the 2010s, and two events so far for the 2020s. Climate projections for the region point to slightly less rainfall overall, but more intense extreme, rare rainfall events.
	Erosion	At the current rate of retreat, the road at Mataikona will be impacted by mid-2024, the property boundaries by 2037, the buildings by 2055.
	Slips and dropouts	The ground along the Mataikona coast is weak once disturbed, subject to dispersion through groundwater runoff, and is susceptible to erosion. The weak ground combined with the steep slopes along Front Hill, Second Hill, and Suicide Rock results in slips and drop outs, particularly during rain events. Dropouts also occur where the sea is eroding the base of the road.
	Lack of detours	There is no viable alternative route for Mataikona Road. For the community this means the road is the only way they can access essential services such as hospitals, emergency services, major utility control centres, welfare centres, key retail outlets, schools, and major industry. For the farms and forestry blocks this means stock and logs cannot be transported.
Effect	Road closures	Anecdotal evidence suggests that closures are generally a maximum of one to two days and occur at least once a year. The data available suggests a frequency of approximately every 5-50 years There was a closure of 10 days in 2005. The road closures are causing uncertainty around the future of the road and long-term access to Mataikona



Evidence		Key Points
	Customer service	Mataikona Road does not meet the customer level of service outcomes for resilience when accessed as an arterial or regional road (as per the criticality rating). It does meet the level of service outcomes when accessed as an access road.
Consequence	Maintenance costs	<p>The baseline maintenance spend has been decreasing since 2017/18, and the emergency spending has been increasing since this time. While the baseline maintenance spend has been decreasing it is not believed to be contributing to the increasing emergency spend due to the limited maintenance budget and the nature of the emergency repairs required.</p> <p>The emergency spend for 2021/22 almost quadrupled the average emergency spend for the previous years.</p> <p>Areas with the most emergency spending over the past five years include:</p> <ul style="list-style-type: none"> • Front Hill (slip clearing) • Second Hill to Suicide Rock (drop out repairs) • Middle Settlement (drop out repairs) • South Mataikona (drop out repairs and shoulder reinforcement) • Mataikona (shoulder reinforcement and debris removal)
	Poor resilience	The resilience risk rating for Mataikona Road is Major based on closures occurring every 5-50 years or Extreme if they occur at least once a year as per the anecdotal evidence.
	Unsafe route	<p>There is very little crash data available for Mataikona Road.</p> <p>The community say that unless emergency services are required, they will usually pull themselves out if they are stuck. Despite this there have been several comments made around trying to improve road safety due to the number of heavy vehicles on the road and the limited number of safe passing opportunities.</p>

4 Investment Objectives and Benefits

4.1 Investment Objectives

Two investment objectives have been identified for the project, as shown in Figure 4-1. The investment objectives clarify the future access needs. They summarise the desired outcomes of any investment, articulating what is needed to address the gap between existing and future needs. The agreed Business Case Outcome Statement is 'Provide resilient and sustainable access to Mataikona'.

The evidence presented supports the problem statement.

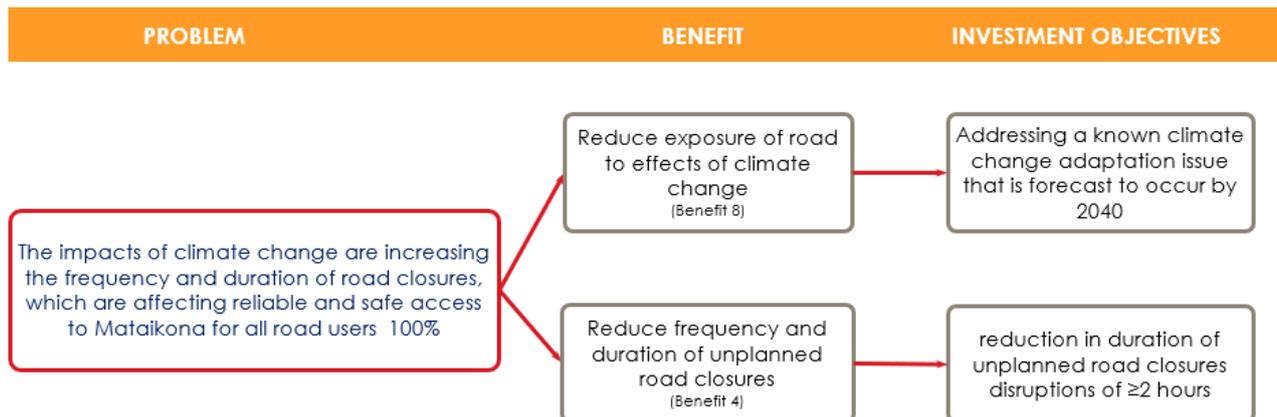


Figure 4-1: Investment logic map

4.2 Benefits

A benefits framework has been developed following discussion of project benefits at Workshop One. Measures have been identified for each project benefit and are based on the Waka Kotahi Benefits Framework. The measures allow the success of any implementation programme to be measured.

Table 4-1 outlines the measures and available baseline data for each benefit.

Table 4-1: Proposed benefits, measures, and baseline data

Benefit	Measure	Baseline
<p>Reduced Exposure of the Road to the Effects of Climate Change</p> <p>Reducing the roads exposure to the impacts of climate change will assist in reducing the frequency of road closures. It will also provide the community and local businesses certainty around the future of route.</p>	4.1.2: Level of service and risk	The WK National Resilience PBC states the Mataikona risk rating is Major (4L)
<p>Reduced Frequency and Duration of Unplanned Road Closures</p> <p>Improving the resilience of Mataikona Road will reduce ongoing maintenance and emergency restoration costs for the Council and minimise the risk of road closures. Closure of the road impacts on access for the community and local business, as there is no all-weather alternative route, and no alternative route for heavy vehicles.</p>	5.1.4: Number and duration of resolved road closures.	TBC

4.3 Opportunities

The opportunities associated with the project are detailed below. These were drafted by the project team during Workshop One and confirmed with Waka Kotahi at a later meeting.

- Safe access:** In the event of a preferred option emerging that includes physical works to the existing corridor, or a new corridor, then any changes will likely result in benefits to both safety and resilience. For example, retaining structures may result in shoulder widening and/or roadside barriers.



5 Constraints, Assumptions and Uncertainties

Any work completed to address the problem at Mataikona will be subject to constraints, assumptions and uncertainties as defined below:

- Constraints are limitations imposed on the investment proposal from the outset.
- Assumptions are made to simplify decision making. The values of assumptions are not certain and will create risks.
- Uncertainties are an event or change in conditions that may result in a different future state from that originally anticipated or assumed.

The known constraints are:

- **Material supply:** The supply of appropriate rock for rock armouring and similar interventions is very limited

The assumptions made are:

- **Future land use:** it is anticipated that under the National Adaptation Plan development along Mataikona Road will not be encouraged. Because of this the demand for the road is not expected to increase.

The main uncertainties associated with this project are as follows:

- **Future storm events:** Mataikona is extremely susceptible to damage from large easterly storms, as well as events induced from climate change such as sea level rise, inundation, and flooding. Exposure to these events may result in changes to the future state of the road and surrounding community.
- **COVID-19:** the widespread impacts of the COVID-19 pandemic are creating numerous uncertainties and challenging long held assumptions. People are changing how, when and where they work and study, which influences travel behaviour.
- **Government reforms:** major reforms are currently underway that may result in significant changes to local government governance and operations. The three key reform programmes are Three Waters, Resource Management and the Future for Local Government. These changes are expected to result in structural changes that may impact decision making, budgets, and the prioritisation and delivery of key services.
- **Price volatility:** multiple factors have resulted in particularly volatile prices in recent times that are impacting the cost of living, oil prices and supply chain security. This is likely to negatively influence project delivery costs.
- **Consenting:** The GWRC response to the National Adaptation Plan is unknown, so the future consenting risks associated with the works are unknown
- **Funding:** Should Waka Kotahi funding not be available alternate funding streams are uncertain.

6 Stakeholders

There are a number of partners and key stakeholders with an interest in providing resilient and sustainable access to Mataikona (Table 6-1). As part of the SSBC, a facilitated workshop was held in July 2022 with Council and residents to:

- Present background information
- Confirm the problem statements and benefits
- Seek additional evidence for the strategic case
- Understand community aspirations and opportunities
- Discuss potential options to address problems

Table 6-1: Key stakeholders

Stakeholder	Roles and responsibility
Waka Kotahi NZ Transport Agency	Waka Kotahi's primary purpose is to provide transport solutions for a thriving New Zealand. They achieve this by investing in land transport activities, regulating access and use of the land transport system, and maintaining, operating, planning for and improving the state highways.
Mana Whenua	Rangitāne o Wairarapa and Ngāti Kahungunu ki Wairarapa are the local iwi and are important partners for the project. The land to the north of the Mataikona River is Maori Freehold Land and there are a number of wāhi tapu along Mataikona Road. The focus will be on delivering a fit for purpose solution.
Masterton District Council	Council provides and manages development, infrastructure and community services. In terms of transportation Council is responsible for the planning and operation of the local road network within its territorial boundary, and the development of this business case. Council is responsible for operation and management of Mataikona Road.
Residents and business owners/operators	Residents and business owners/operators have been invited to participate in the process. The focus of the community will be to ensure that the proposed benefits and options are desired and supported by the community.

Additional meetings were held with representatives from Kahungunu ki Wairarapa and Rangitāne o Wairarapa in the week before the workshop to discuss the project, the workshop, and any concerns they had (refer to Appendix F for meeting minutes).

7 Strategic Alignment

Table 7-1 describes how this project aligns with national and regional strategies and policies. The assessment demonstrates a close alignment, as the overarching strategies have a strong focus on providing access and resilience, while enabling tourism growth.

Table 7-1: Strategic alignment

Document	Alignment
<p>Government Policy Statement on Land Transport 2021</p> <p>The Government Policy Statement (GPS) on Land Transport 2021 outlines the Government’s priorities for land transport, providing direction and guidance to those who are planning, assessing, and making decisions on transport investment for the next 10 years. The GPS 2021 builds on the strategic direction of the previous GPS, and identifies four strategic priorities for investment: safety, better travel options, improving freight connections and climate change.</p> <ul style="list-style-type: none"> • Safety: Developing a transport system where no-one is killed or seriously injured. • Better Travel Options: Providing people with better transport options to access social and economic opportunities. • Improving Freight Connections: Improving freight connections for economic development. • Climate Change: Developing a low carbon transport system that supports emission reductions, while improving safety and inclusive access, and alignment with the National Adaptation Plan to create a network that is resilient to climate change effects. 	<p>Alignment is strongest with climate change (through adaptation). There is also alignment with safety.</p> <p>Overall alignment rating is STRONG (although ratings vary across priorities)</p>
<p>Arataki 2 – Waka Kotahi’s 10-year plan</p> <p>Arataki presents Waka Kotahi’s 10-year Plan for what is needed to deliver on the government’s current priorities and sets out the long-term outcomes for the land transport system. It outlines the key drivers; the context for change, the current and future pressures, and how these pressures will shape the land transport system. The key step changes are:</p> <ol style="list-style-type: none"> 1. Improve urban form: this step change seeks to improve connections between people, product, and places by using planned land-use and an integrated transport system. 2. Transform urban mobility: shift reliance on private vehicles to more sustainable transport solutions for the movement of people and freight. 3. Significantly reduce harms: transition to a transport system that reduces deaths and serious injuries and improves public health. 4. Tackle climate change: enhance communities’ long-term resilience to the impacts of climate change and support the transition to a low-emissions economy. 5. Support regional development: optimise transport’s role in enabling regional communities to thrive socially and economically. 	<p>The project aligns most strongly with tackling climate change as it aims to enhance the community’s long-term resilience to the impacts of climate change. It also seeks to support regional development through greater availability of the corridor.</p> <p>Overall alignment rating is STRONG (although ratings vary across levers)</p>
<p>Waka Kotahi New Zealand Transport Agency Road to Zero 2020 – 2030</p> <p>The Road to Zero road safety strategy outlines a plan to stop people being killed or injured on New Zealand roads. The strategy marks a step-change in road safety, placing human wellbeing and community liveability at the centre of road transport planning.</p> <p>The vision of Road to Zero is “a New Zealand where no one is killed or seriously injured in road crashes”. The Strategy outlines improvements that will be undertaken, focusing on actions in five key areas: infrastructure improvements and speed management; vehicle safety; work-related road safety; road user choices; and system management.</p>	<p>This project is aligned to the Road to Zero vision, given that improvements to the corridor would likely also improve the overall safety.</p> <p>(MODERATE)</p>



Document	Alignment
<p>Ministry for the Environment National Adaptation Plan</p> <p>The first National Adaptation Plan sets out what the Government will do to enable better risk-informed decisions, drive climate-resilient development in the right locations, help communities assess adaptation options (including managed retreat) and embed climate resilience into all of the Government's work. The long-term adaptation goals identified by the plan are to reduce vulnerability, enhance our ability to adapt, and strengthen our resilience. The plan identifies four adaptation options: avoid, protect, accommodate and retreat.</p>	<p>The Mataikona SSBC seeks to address identified climate adaptation issues. Options will fit within the four identified adaptation options.</p> <p>(STRONG)</p>
<p>National Resilience Programme Business Case</p> <p>The National Resilience PBC provides information on natural hazards to the transport system. Two investment objectives were used in the PBC;</p> <p>All communities and businesses are well informed about what the risks of disruption to their transport connections are, and what their choices are</p> <p>The land transport system would be more resilient in the face of a change hazard profile.</p>	<p>The Mataikona SSBC seeks to address identified resilience issues. Options would be an opportunity to improve adaptation to climate change, and that moves towards longer term resilience.</p> <p>(STRONG)</p>
<p>Draft Regional Land Transport Plan 2021-2031</p> <p>The key transport investment priorities of Greater Wellington Regional Land Transport Plan (RLTP) 2021 to 2031 are for:</p> <ul style="list-style-type: none"> • Public Transport Capacity • Travel Choice • Strategic Access • Safety • Resilience 	<p>This project is identified in the RLTP regional programme and addresses the resilience priority outlined in the Plan.</p> <p>(STRONG)</p>
<p>Masterton District Infrastructure Strategy (2021-2051) (Draft)</p> <p>The Strategy provides an outline of the management of infrastructure over the next 30 years.</p>	<p>Mataikona Road is listed as an important route vulnerable to natural hazards.</p> <p>Road upgrade and resilience work on Mataikona Road is listed as a significant infrastructure project required from 2021.</p> <p>(STRONG)</p>
<p>Masterton District Council Nga Huarahi Waka/ Rooding Asset Management Plan (2021 – 2031)</p> <p>The Plan provides a strategic approach to managing the district's assets to help contribute to the Council's stated community outcomes.</p>	<p>Mataikona Road is a listed as a critical asset vulnerable to flooding, windstorm, tsunami, wildfire, and landslide.</p> <p>The only planned capital expenditure on Mataikona Road is the Mataikona Front Hill upgrade. This work will begin in the 2021/22 financial year with a \$200k spend, followed by \$11m worth of works in 2024/25 and 2025/26.²⁹</p> <p>(STRONG)</p>

²⁹ While any works to Mataikona Road will have a strong alignment with the Asset Management Plan, this is not currently reflected in Council's baseline maintenance spending for the road. Refer Section 3.4.1.



Part B: Identifying the Preferred Option

We design with community in mind



8 Approach to Optioneering and Assessment

Part B of this report describes how the long list of package options for Mataikona Road was developed, and the process leading to the emerging preferred option. The identification and assessment of options was informed by the evidence base, and feedback from MDC and the wider stakeholder group (gathered through workshops and meetings). The planned filtering and assessment process is shown in Figure 8-1. However, the process followed was slightly different due to very different outcomes from the various assessments and was as described below:

1. **Identify the long list of interventions:** This was based on engineering judgement and feedback from stakeholders.
2. **Screening list of interventions:** An initial comparative assessment of the long list was undertaken using the Early Assessment Sifting Tool (EAST). Each intervention was assessed against the two project investment objectives, as well as the technical difficulty criteria based on how well the interventions aligns with each relevant criterion. Interventions that did not perform well during this screening stage were eliminated. This initial assessment was undertaken by Stantec staff.
3. **Develop packages (options) of work:** Using the refined list of interventions, various draft packages of work were developed. Each package has a core theme or outcome and consist of alternative interventions for each corridor zone, aligned to the overall outcome sought from each package.
4. **Assessment of packages:** A meeting was held with Council to assess the different options. This assessment used multi-criteria analysis (MCA) to assess each option against key criteria. Scoring was undertaken by technical specialists within Stantec and Council staff. The options were also ranked by mana whenua in order of preference and were assessed based on economic impact. These assessments were supposed to inform the short list; however, they all gave very different answers.
5. **Discussion with stakeholders:** A summary of the MCA, mana whenua rankings and economic impact were presented to stakeholders and the wider community during a workshop on 3 September 2022. The focus of this workshop was to highlight the challenges and trade-offs of each package and to get feedback on which package or combination of packages was preferred. An emerging preferred option was identified at this workshop.

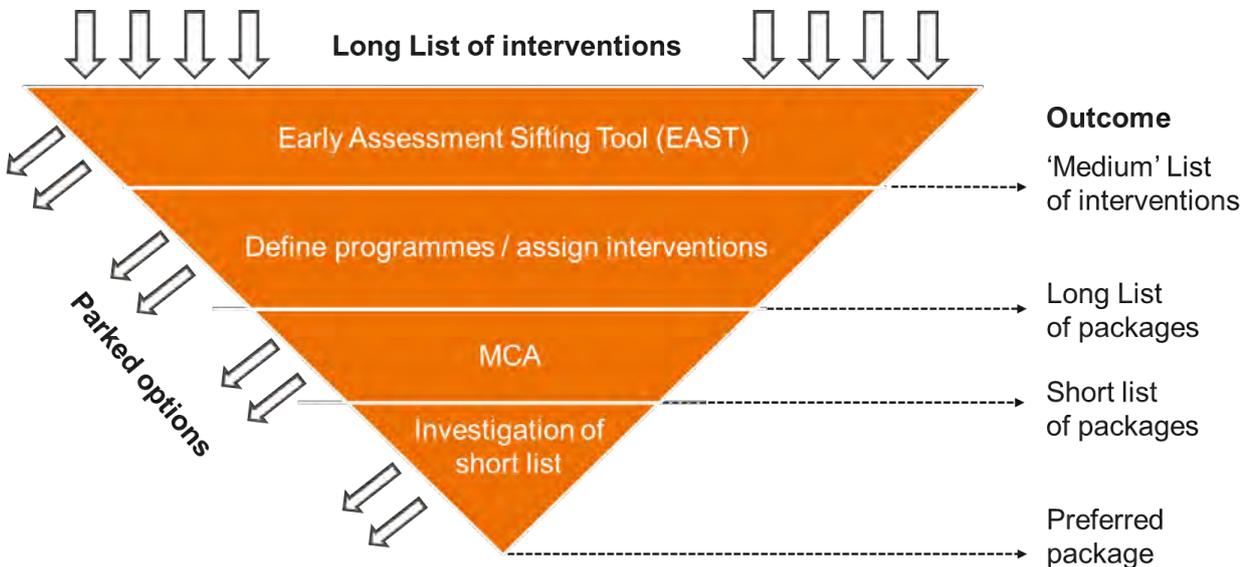


Figure 8-1: Diagram of the sifting and assessment process

9 Long List Development

9.1 Long List Workshop

A stakeholder workshop and community open day was held on 23 July 2022 to confirm the case for change and identify potential interventions to address the problems on Mataikona Road (refer to Appendix G for the workshop slides and notes).

Following the workshop, the corridor was split into nine zones based on key geographic features such as steep terrain, coastal section, or settlement to facilitate optioneering. The road sections are as described in Table 9-1 and shown in Figure 9-1.

Table 9-1: Mataikona Road section descriptions

ID	Section Name	Group	Start CH ³⁰	End CH	Length (m)
1	Front Hill	Hill	0	2,200	2,200
2	Sandy Bay	Settlement/ Coastal	2,200	4,000	1,800
3	Second Hill	Hill	4,000	5,600	1,600
4	Second Hill to Suicide Rock	Coastal	5,600	7,800	2,200
5	Suicide Rock	Hill	7,800	8,400	600
6	Middle Settlement	Settlement/ Coastal	8,400	9,000	600
7	South Mataikona	Coastal	9,000	10,900	1,900
8	Mataikona	Settlement/ Coastal	10,900	11,500	600
9	Mataikona River	Coastal/ river	11,500	13,000	1,500



Figure 9-1: Mataikona Road sections for optioneering

³⁰ CH refers to 'chainage' which is used as a location reference in roading. The chainage is 0 at the start of the road, where it intersects with Masterton-Castlepoint Road at Whakataki, and 13,000 at the end of the road, where it becomes Pack Spur Road.

9.2 Interventions

A long list of 18 potential interventions for the corridor were identified. This list was informed by feedback from the first stakeholder workshop, site visits, and discussions with Council, and includes things like:

- Over slip protection
- Under slip protection
- Coastal erosion protection
- Drainage improvements
- Road widening
- Surfacing improvements
- Safety improvements
- Increased maintenance
- Road retreat
- Alternative routes
- Abandonment of the road

An initial coarse assessment of the long list was undertaken using a modified version of the Early Assessment Sifting Tool (EAST), where interventions were assessed against the two investment objectives and the technical difficulty criteria. The following three interventions were eliminated through this process (refer to Appendix H for the results from the EAST assessment):

- **Surfacing improvements:** This does not address the investment objectives and MDC do not have budget to increase their sealed network.
- **Safety improvements:** This included things like barriers and curve re-alignment. These interventions do not achieve the investment objectives. This is not a safety project, and while there may be some safety benefits gained, it is not the primary focus of the project.
- **Bridge improvements:** This is in relation to the bridge north of Sandy Bay. During a site visit Council stated that there were no major concerns with the bridge, and they did not think any improvements were required. The improvements suggested by the community did not contribute to achieving the investment objectives.

9.3 Packages of Work

Following the EAST assessment, the remaining 15 interventions were used to develop 10 packages of work as follows:

1. Do nothing
2. Do minimum
3. Minor improvements
4. Retreat
5. Strengthen
6. Optimised (low cost)
7. Optimised (high cost)
8. Alternate route 1
9. Alternate route 2
10. Alternate route 3

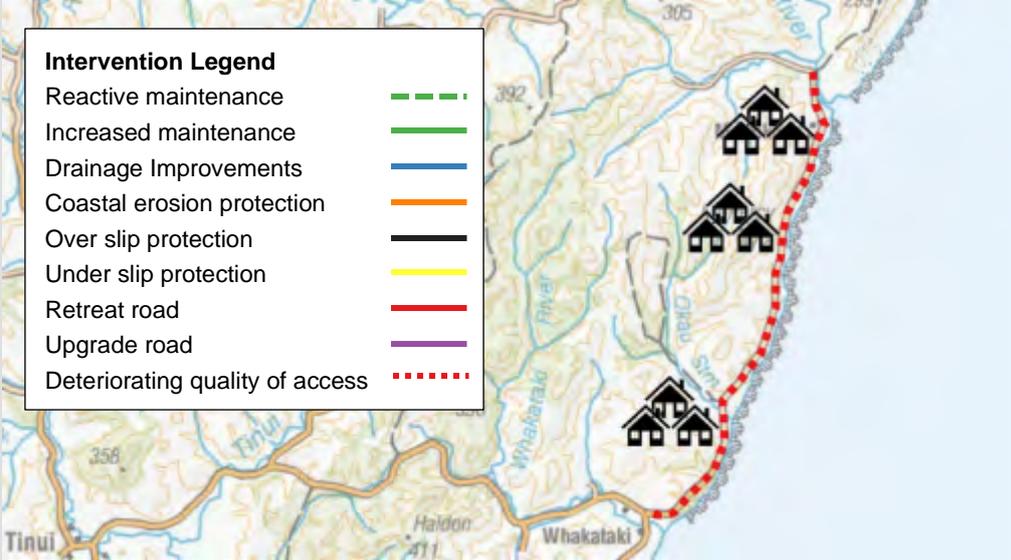
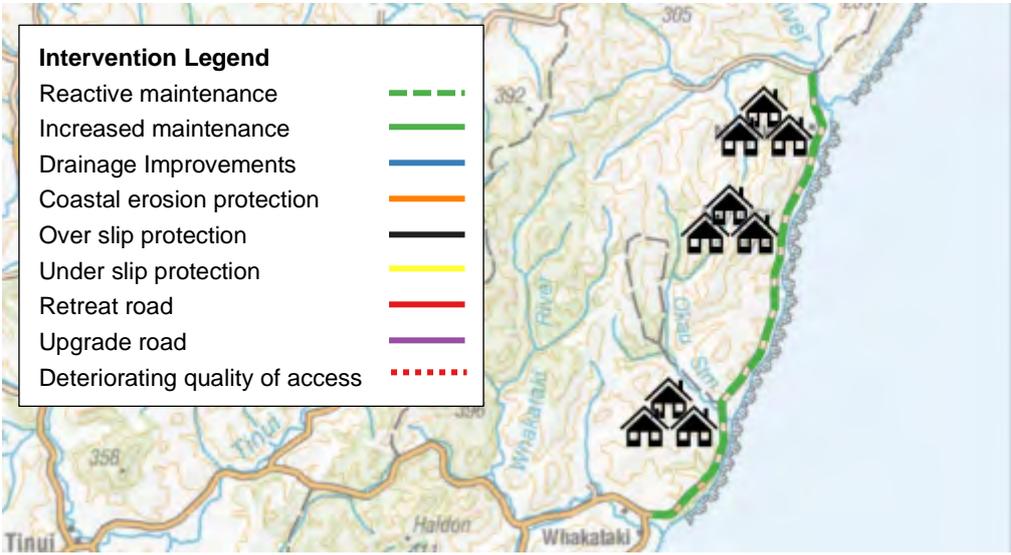
Details of each of these packages is provided in Table 9-2. Each of the 10 packages has a core theme or outcome and is made up of alternative interventions, aligned to the overall outcome sought from each package. The packages are also aligned to the possible strategic responses identified in the Waka Kotahi National Resilience Programme Business Case (PBC) as follows:

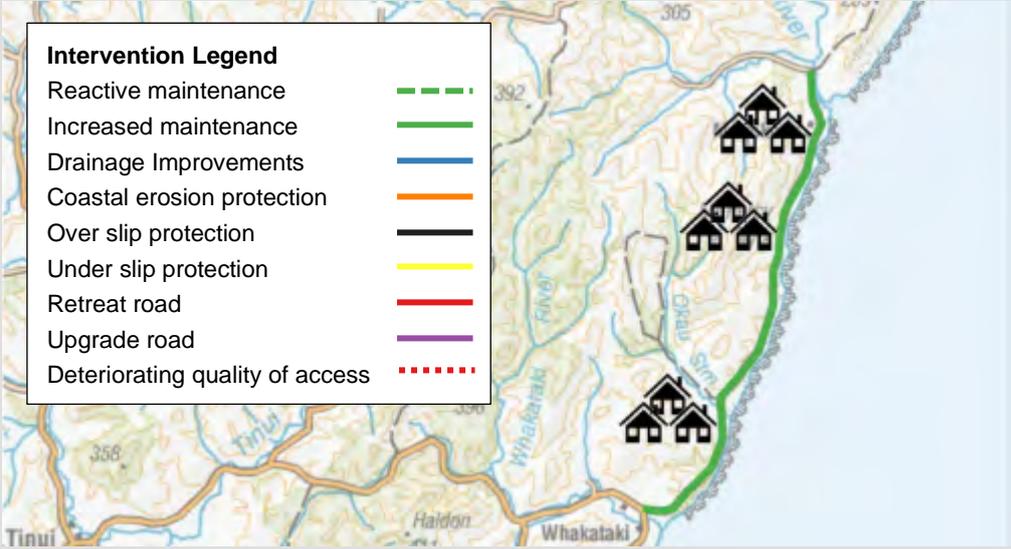
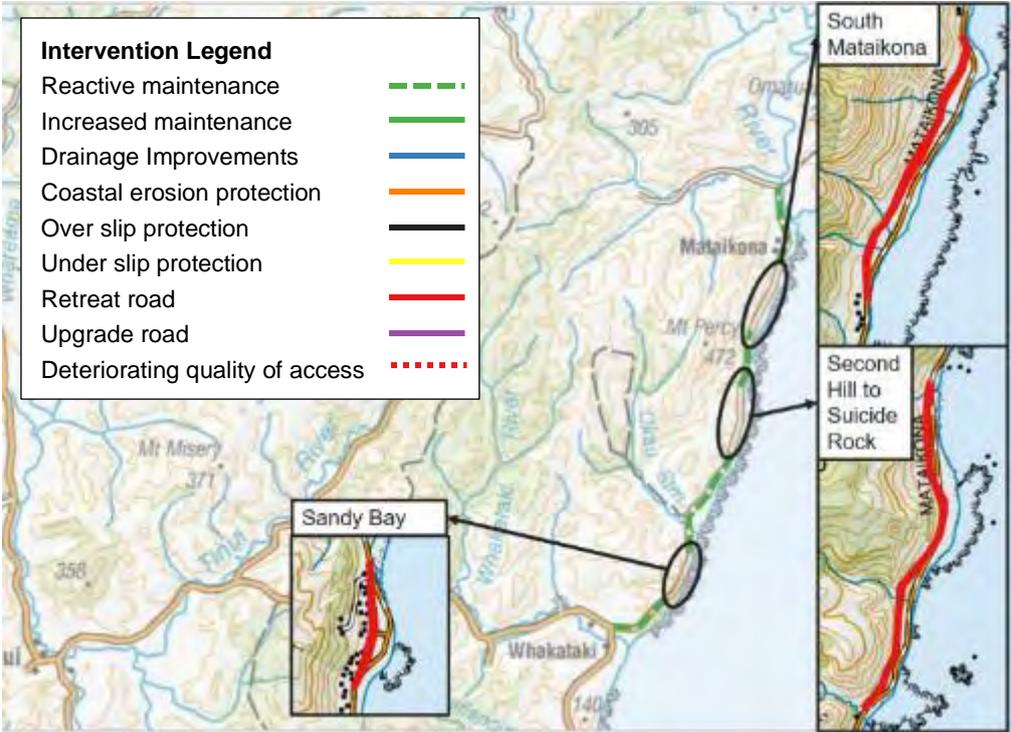
- **Defend:** develop solutions to mitigate the risk of disruption, for example flood protection or slope stabilisation
- **Accommodate:** plan for periodic disruption, for example providing for rapid reinstatement, detour routes and/or timely information
- **Retreat:** re-route journeys away from the impacted corridor

A Do Nothing and a Do Minimum package were considered because all options should be considered in the business case process. The Do Nothing package assumes that Council will continue with routine maintenance along Mataikona Road for as long as they are able, but will not reinstate the road if sections are eroded during storms or high rainfall events. The Do Minimum package assumes that routine maintenance and emergency reinstatement of the road following storm events will continue for the next 10 years. This is aligned with the existing reactive maintenance response currently in place and forms the baseline for comparison for the economic assessment.

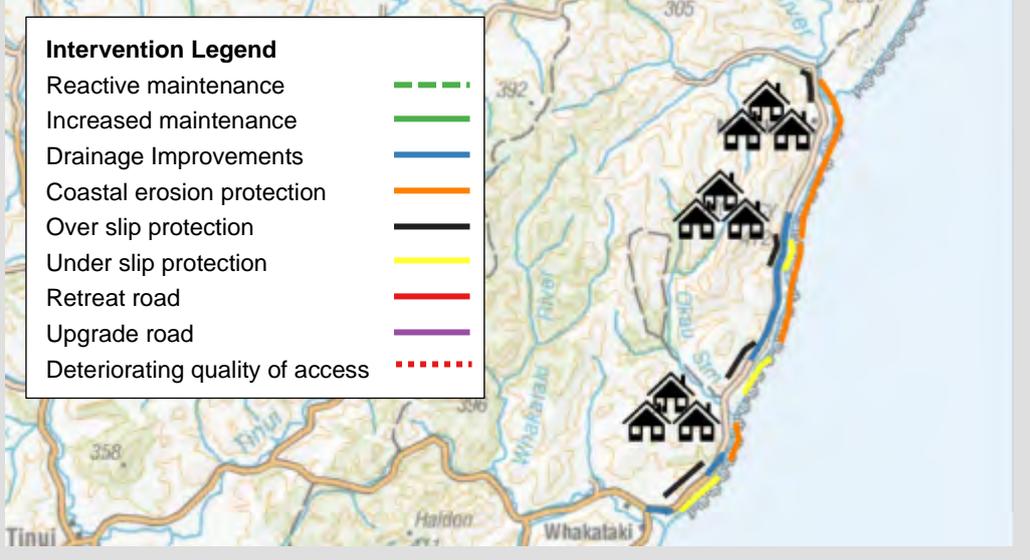


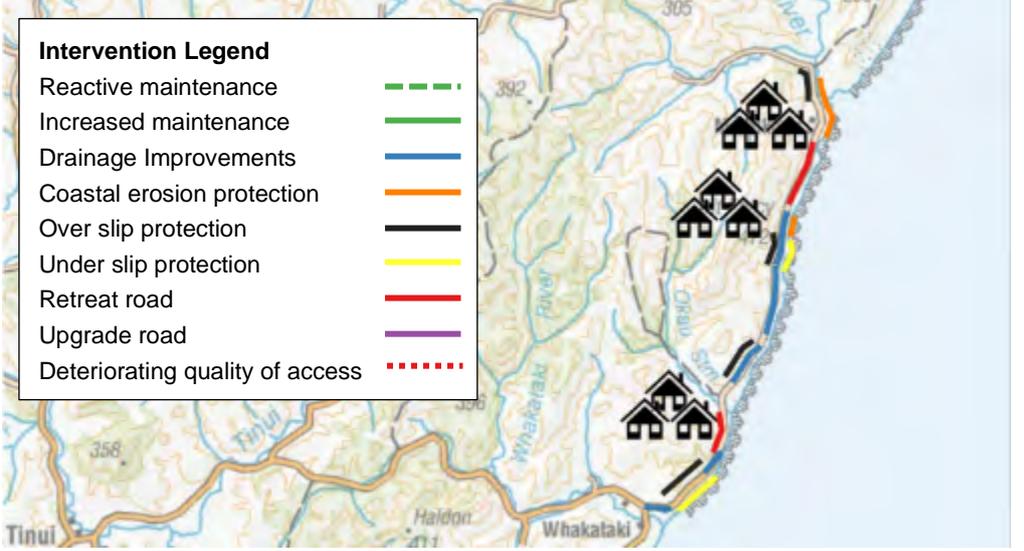
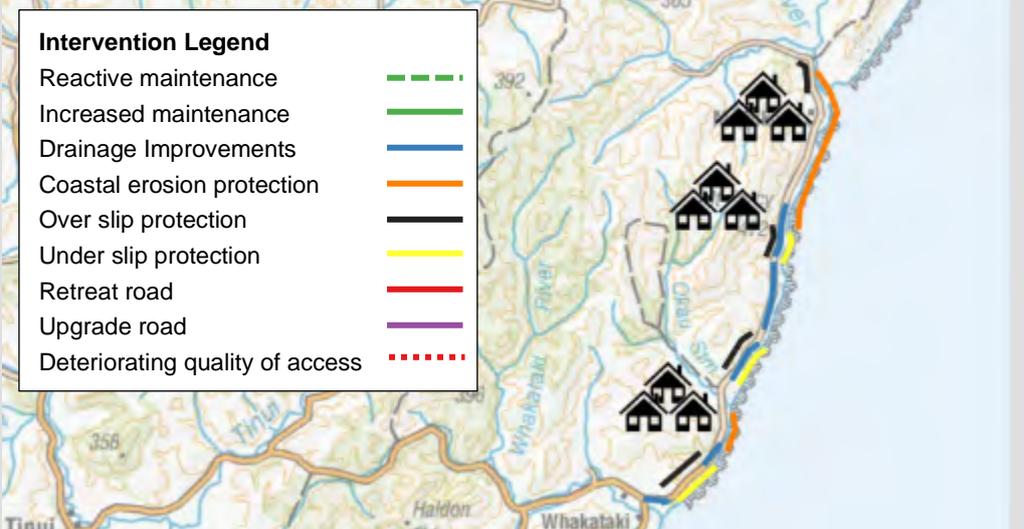
Table 9-2: Long list of package options

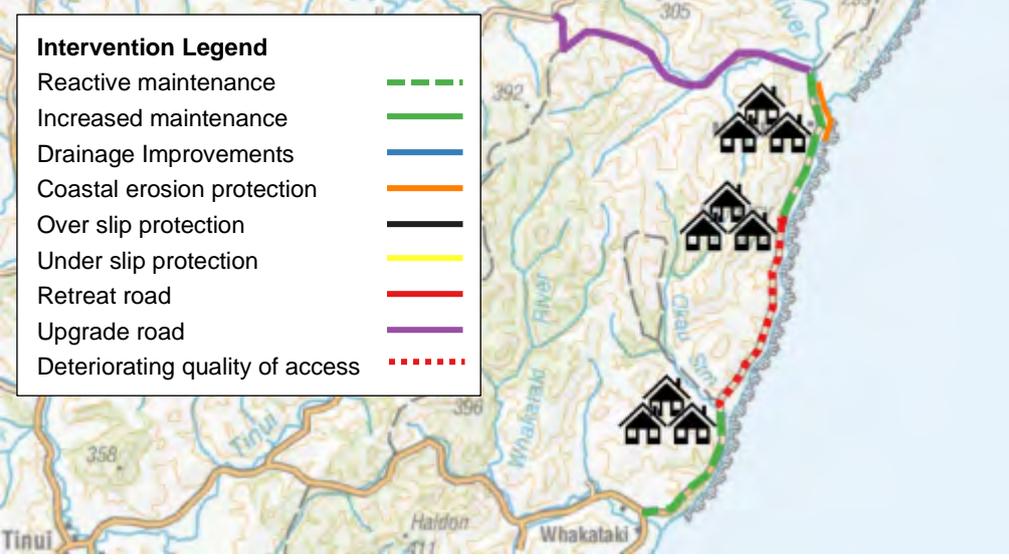
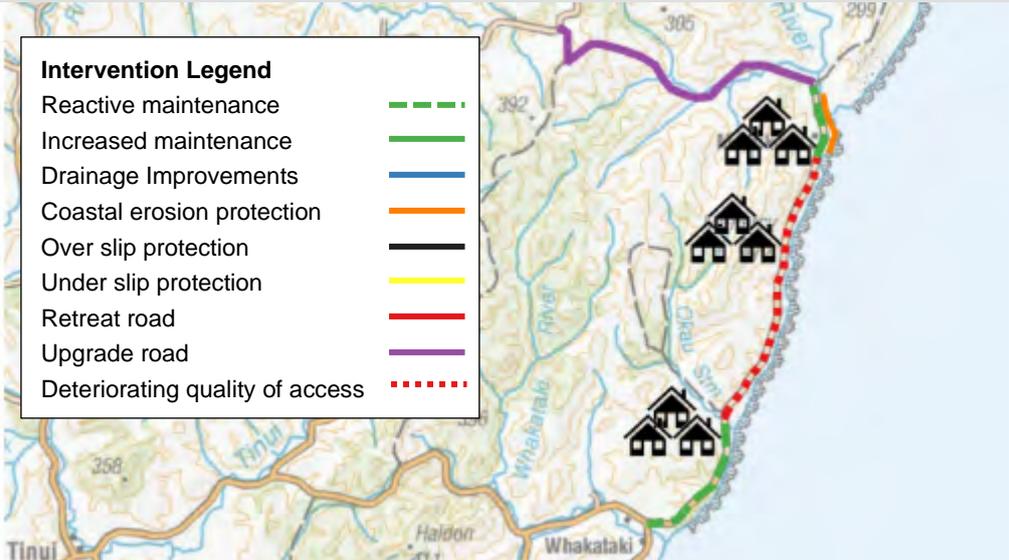
ID	Package option	Description
1	<p>Name: Do nothing</p> <p>National Resilience PBC response group: NA</p>	<p>Acceptance that key sections of the corridor cannot be protected against natural hazards, and that access can no longer be guaranteed. Continuing with reactive maintenance, but not necessarily restoring the road to its pre-damaged standard.</p> 
2	<p>Name: Do minimum</p> <p>National Resilience PBC response group: Accommodate</p>	<p>Plan for periodic disruption and trigger reactive response to natural hazards through emergency spend funding to maintain access along the corridor, but not necessarily restoring road to pre-damaged standard after 2032.</p> 

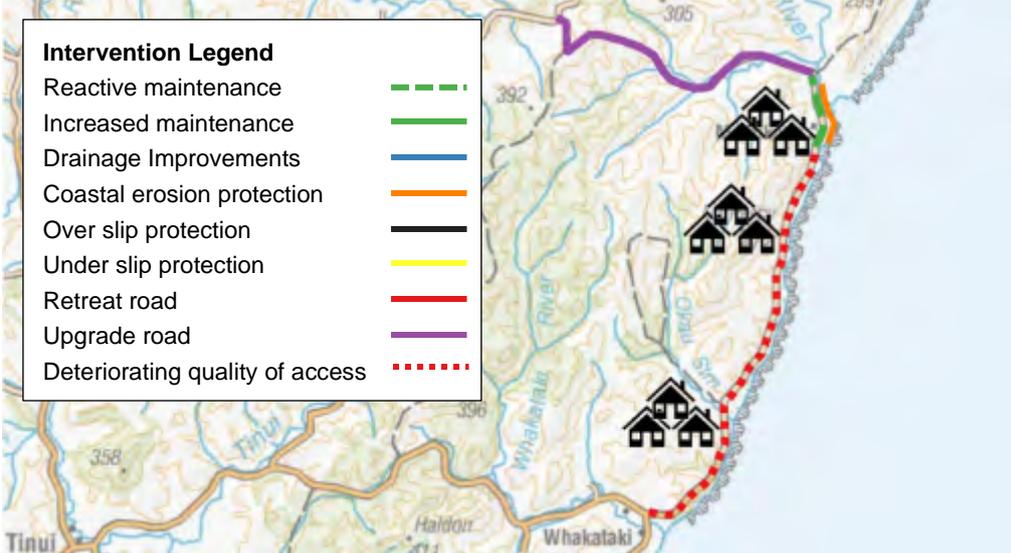
ID	Package option	Description
3	<p>Name: Minor Improvements</p> <p>National Resilience PBC response group: Defend/ Accommodate</p>	<p>Increase preventative maintenance along Mataikona Road (drainage improvements, clean out culverts prior to storm events, etc).</p> <p>A small fund is available for targeted rock armouring (or other appropriate strengthening works) prior to the area being impacted by coastal erosion.</p> 
4	<p>Name: Retreat</p> <p>National Resilience PBC response group: Retreat</p>	<p>Retreat the road inland where there is space to do so but maintain the alignment in front of the three settlements. Maintain the remainder of the road as per the Do Minimum (Option 2).</p> 



ID	Package option	Description									
5	<p>Name: Strengthen</p> <p>National Resilience PBC response group: Defend</p>	<p>Complete longer-term repairs for over slips, under slips and coastal erosion in all areas of concern along the length of Mataikona Road.</p> <table border="0"> <tr> <td> 1. Front Hill <ul style="list-style-type: none"> • Drainage improvements • Over slip protection </td> <td> 4. Second Hill to Suicide Rock <ul style="list-style-type: none"> • Coastal erosion protection • Drainage improvements </td> <td> 6. Middle Settlement <ul style="list-style-type: none"> • Coastal erosion protection • Drainage improvements </td> </tr> <tr> <td> 2. Sandy Bay <ul style="list-style-type: none"> • Coastal erosion protection • Drainage improvements </td> <td> 5. Suicide Rock <ul style="list-style-type: none"> • Drainage improvements • Over slip protection • Under slip protection </td> <td> 7. South Mataikona <ul style="list-style-type: none"> • Coastal erosion protection </td> </tr> <tr> <td> 3. Second Hill <ul style="list-style-type: none"> • Drainage improvements • Over slip protection • Under slip protection </td> <td> 8. Mataikona <ul style="list-style-type: none"> • Coastal erosion protection </td> <td> 9. Mataikona River <ul style="list-style-type: none"> • Over slip protection • River erosion protection </td> </tr> </table>  <p>The map shows Mataikona Road with various colored lines indicating planned interventions. The legend defines these as: Reactive maintenance (green dashed), Increased maintenance (green solid), Drainage Improvements (blue solid), Coastal erosion protection (orange solid), Over slip protection (black solid), Under slip protection (yellow solid), Retreat road (red solid), Upgrade road (purple solid), and Deteriorating quality of access (red dotted). The map also shows the Whakataraka River, Tinui, and Whakataki.</p>	1. Front Hill <ul style="list-style-type: none"> • Drainage improvements • Over slip protection 	4. Second Hill to Suicide Rock <ul style="list-style-type: none"> • Coastal erosion protection • Drainage improvements 	6. Middle Settlement <ul style="list-style-type: none"> • Coastal erosion protection • Drainage improvements 	2. Sandy Bay <ul style="list-style-type: none"> • Coastal erosion protection • Drainage improvements 	5. Suicide Rock <ul style="list-style-type: none"> • Drainage improvements • Over slip protection • Under slip protection 	7. South Mataikona <ul style="list-style-type: none"> • Coastal erosion protection 	3. Second Hill <ul style="list-style-type: none"> • Drainage improvements • Over slip protection • Under slip protection 	8. Mataikona <ul style="list-style-type: none"> • Coastal erosion protection 	9. Mataikona River <ul style="list-style-type: none"> • Over slip protection • River erosion protection
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6	<p>Name: Optimised (low cost)</p> <p>National Resilience PBC response group: Hybrid (Defend / Accommodate / Retreat)</p>	<p>A tailored programme of low-cost interventions that best address the problems in each section of Mataikona Road in the short to medium term.</p> <table border="0"> <tr> <td> 1. Front Hill <ul style="list-style-type: none"> • Drainage improvements • Over slip protection </td> <td> 4. Second Hill to Suicide Rock <ul style="list-style-type: none"> • Drainage improvements </td> <td> 7. South Mataikona <ul style="list-style-type: none"> • Retreat road </td> </tr> <tr> <td> 2. Sandy Bay <ul style="list-style-type: none"> • Retreat road • Drainage improvements </td> <td> 5. Suicide Rock <ul style="list-style-type: none"> • Drainage improvements • Over slip protection • Under slip protection </td> <td> 8. Mataikona <ul style="list-style-type: none"> • Coastal erosion protection </td> </tr> <tr> <td> 3. Second Hill <ul style="list-style-type: none"> • Drainage improvements • Over slip protection </td> <td> 6. Middle Settlement <ul style="list-style-type: none"> • Coastal erosion protection • Drainage improvements </td> <td> 9. Mataikona River <ul style="list-style-type: none"> • Over slip protection • Under slip/ river erosion protection </td> </tr> </table>	1. Front Hill <ul style="list-style-type: none"> • Drainage improvements • Over slip protection 	4. Second Hill to Suicide Rock <ul style="list-style-type: none"> • Drainage improvements 	7. South Mataikona <ul style="list-style-type: none"> • Retreat road 	2. Sandy Bay <ul style="list-style-type: none"> • Retreat road • Drainage improvements 	5. Suicide Rock <ul style="list-style-type: none"> • Drainage improvements • Over slip protection • Under slip protection 	8. Mataikona <ul style="list-style-type: none"> • Coastal erosion protection 	3. Second Hill <ul style="list-style-type: none"> • Drainage improvements • Over slip protection 	6. Middle Settlement <ul style="list-style-type: none"> • Coastal erosion protection • Drainage improvements 	9. Mataikona River <ul style="list-style-type: none"> • Over slip protection • Under slip/ river erosion protection
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ID	Package option	Description									
	Optimised (low cost) continued										
7	Name: Optimised (high cost) National Resilience PBC response group: Hybrid (Defend/ Accommodate)	<p>A tailored programme of high-cost interventions that best address the problems in each section of Mataikona Road in the long term.</p> <table border="0"> <tr> <td> 1. Front Hill <ul style="list-style-type: none"> • Drainage improvements • Over slip protection • Over slip protection </td> <td> 4. Second Hill to Suicide Rock <ul style="list-style-type: none"> • Drainage improvements </td> <td> 7. South Mataikona <ul style="list-style-type: none"> • Coastal erosion protection </td> </tr> <tr> <td> 2. Sandy Bay <ul style="list-style-type: none"> • Coastal erosion protection </td> <td> 5. Suicide Rock <ul style="list-style-type: none"> • Drainage improvements • Over slip protection • Under slip protection </td> <td> 8. Mataikona <ul style="list-style-type: none"> • Coastal erosion protection </td> </tr> <tr> <td> 3. Second Hill <ul style="list-style-type: none"> • Drainage improvements • Over slip protection • Under slip protection </td> <td> 6. Middle Settlement <ul style="list-style-type: none"> • Coastal erosion protection • Drainage improvements </td> <td> 9. Mataikona River <ul style="list-style-type: none"> • Over slip protection • Under slip/ river erosion protection </td> </tr> </table> 	1. Front Hill <ul style="list-style-type: none"> • Drainage improvements • Over slip protection • Over slip protection 	4. Second Hill to Suicide Rock <ul style="list-style-type: none"> • Drainage improvements 	7. South Mataikona <ul style="list-style-type: none"> • Coastal erosion protection 	2. Sandy Bay <ul style="list-style-type: none"> • Coastal erosion protection 	5. Suicide Rock <ul style="list-style-type: none"> • Drainage improvements • Over slip protection • Under slip protection 	8. Mataikona <ul style="list-style-type: none"> • Coastal erosion protection 	3. Second Hill <ul style="list-style-type: none"> • Drainage improvements • Over slip protection • Under slip protection 	6. Middle Settlement <ul style="list-style-type: none"> • Coastal erosion protection • Drainage improvements 	9. Mataikona River <ul style="list-style-type: none"> • Over slip protection • Under slip/ river erosion protection
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ID	Package option	Description
8	<p>Name: Alternate route one</p> <p>National Resilience PBC response group: Retreat</p>	<p>Upgrade Pack Spur Road so it is accessible for light vehicles in most weather conditions and protect the Mataikona River section from erosion.</p> <p>Mataikona Road between Whakataki and Sandy Bay, and Mataikona and the middle settlement will receive reactive maintenance, but not necessarily restoring the road to the pre-damaged standard after 2032.</p> <p>Mataikona Road between Sandy Bay and the middle settlement will continue to receive reactive maintenance, but not necessarily restoring road to pre-damaged standard.</p> 
9	<p>Name: Alternate route two</p> <p>National Resilience PBC response group: Retreat</p>	<p>Upgrade Pack Spur Road so it is accessible for light vehicles in most weather conditions and protect the Mataikona River section from erosion.</p> <p>Mataikona Road between Whakataki and Sandy Bay will receive reactive maintenance, but not necessarily restoring the road to the pre-damaged standard after 2032.</p> <p>Mataikona Road between Sandy Bay and Mataikona will continue to receive reactive maintenance, but not necessarily restoring the road to the pre-damaged standard. Due to this the existing level of road access to the middle settlement may be lost.</p> 

ID	Package option	Description
10	<p>Name: Alternate route three</p> <p>National Resilience PBC response group: Retreat</p>	<p>Upgrade Pack Spur Road so it is accessible for light vehicles in most weather conditions and protect the Mataikona River section from erosion.</p> <p>Mataikona Road between Whakataki and Mataikona will continue to receive reactive maintenance, but not necessarily restoring road to pre-damaged standard. Due to this the existing level of road access to Sandy Bay and the middle settlement may be lost.</p> 

The National Adaptation Plan was published on 3 August 2022 by the Ministry of the Environment. It identifies four adaptation options that should be considered for areas under threat:

- **Avoid:** for example, by locating development away from areas prone to hazard
- **Protect:** for example, by building protective structures such as sea walls
- **Accommodate:** for example, by incorporating adaptation options into the design of developments
- **Retreat:** for example, by relocating existing development away from high-risk areas.

Although the Plan was released after the long list of package options was confirmed, the packages align with three of the four adaptation options: protect, accommodate, and retreat. Although avoidance was not explicitly considered under the National Resilience PBC and is not specifically mentioned in any of the packages, Council should consider limiting further development along Mataikona Road and Pack Spur Road due to the threat to Mataikona Road.

10 Assessment

10.1 Multi-Criteria Analysis

10.1.1 Assessment Criteria

A multi-criteria analysis (MCA) was used to assess the long list of packages. Assessment criteria were developed in discussion with Council and Waka Kotahi, and included the project investment objectives, critical success factors and three of the four 'wellbeings'. Assessment of the fourth wellbeing (cultural) was separately undertaken by two iwi groups, who chose to rank the packages in order of preference.

Weightings for each of the criteria were also developed in discussion with Council. The assessment criteria, description and relevant weightings are summarised in Table 10-1.

Table 10-1: Assessment criteria

Theme	Criteria	Description	Weighting
Investment Objectives (40%)	Addressing a known climate change adaptation issue (60%)	Does the option reduce exposure to climate change risk or other natural hazards over time?	24%
	Reduction in duration of unplanned road closures (40%)	Does the option reduce the occurrence of unplanned road closures, or reduce the duration of unplanned road closures?	16%
Wellbeings (20%)	Natural environment (40%)	How well does the option avoid or minimise adverse effects on the natural environment (e.g., air and water quality, terrestrial and aquatic ecology, soils, visual amenity values)?	8%
	Social and community (40%)	To what extent does the scheme effect social and community values, such as <ul style="list-style-type: none"> • feelings of community • access to emergency services • access to the beach 	8%
	Economic development and growth (20%)	How well will the option support the population and economic growth?	4%
Critical Success Factors (40%)	Property impacts (50%)	What is the scale of property impacts? Can the necessary property rights be obtained? Does the option impact access?	20%
	Technical difficulty (50%)	How difficult will the option be to design and construct? Are there any material supply constraints that will impact this?	20%

Other assessment criteria were initially considered but then discarded due to double counting or for other reasons as outlined below:

- **Consentability:** This criterion was discarded as not enough is known at this stage to accurately score the consentability of the various packages.
- **Climate change adaptation:** This criterion was excluded as it was considered to be double counting Investment Objective 1 and the environmental wellbeing.
- **Safety and design:** This criterion was discarded as not enough is known at this stage to accurately score the safety and design of the various packages. Safety and design will be incorporated into the final design.
- **Value for money:** High level costs and benefits will be undertaken following the MCA of the shortlist of packages to inform decision makers to determine a preferred package of works.



10.1.2 Scoring

On Monday 15 August 2022 scoring of the package options was completed. The scoring was completed by qualified staff from Stantec and Masterton District Council. Relative scoring was used to assess the packages using a seven-point scale where:

- +3 means the option is strongly aligned with the criteria,
- -3 means the option is strongly misaligned with the criteria, and
- 0 means the option has no or neutral impact on the criteria

Table 10-2 provides a summary of the MCA scores for each option against the assessment criteria.

An explanation of the scoring for each option is provided in Appendix I.

Table 10-2: Multi-criteria analysis scores

Theme	Criteria	1. Do nothing	2. Do minimum	3. Minor Improvements	4. Retreat	5. Strengthen	6. Optimised (low cost)	7. Optimised (high cost)	8. Alternate route one	9. Alternate route two	10. Alternate route three
Investment Objectives	Climate change adaptation (24%)	-3	-2	-2	1	3	1	3	1	2	2
	Reduction in road closures (16%)	-3	-2	-1	1	3	2	3	1	2	2
Wellbeings	Natural environment (8%)	0	0	0	0	-3	-1	-2	-1	-1	-1
	Social and community (8%)	-3	-2	0	1	3	2	3	-2	-3	-3
	Economic (8%)	-3	-2	-1	2	3	2	3	-2	-2	-3
Critical Success Factors	Property impacts (20%)	-3	-2	0	-2	2	1	2	-1	-2	-3
	Technical difficulty (20%)	3	2	2	1	-2	2	-1	1	1	1
Weighted Score		-1.6	-1.0	-0.3	+0.4	+1.3	+1.3	+1.6	+0.1	+0.2	-0.1
Ranking		10	9	8	4	2	2	1	6	5	7

10.1.3 Sensitivity Analysis

A sensitivity analysis was completed to test how sensitive the final MCA rankings were to alternative priorities by altering the weighting of various criteria. Nineteen different scenarios were tested. For 16 scenarios, the top three ranked packages (Strengthen, Optimised: High Cost, and Optimised: Low Cost) remained the same, although the order of these three packages did vary. In the three scenarios where the top three ranked packages differed, the top three packages were consistent and in the same order: Optimised (Low Cost), Optimised (High Cost), and Retreat.

This highlights that the criteria are not especially sensitive to the weightings applied, and the recommended shortlist of packages is sound.

Refer to Appendix J for further information and results of the sensitivity tests.

10.2 Iwi Assessment

Local iwi groups, Rangitāne o Wairarapa and Ngāti Kahungunu ki Wairarapa were asked to provide feedback on the long list of packages. They chose to rank the packages from their most to least preferred and provided any other commentary they thought relevant. Table 10-3 shows the rankings provided by Rangitāne o Wairarapa and Ngāti Kahungunu ki Wairarapa. The options both groups ranked highly are the strengthen and the optimised (high cost) options.

Ngāti Kahungunu ki Wairarapa stated that their order of preference was based on maintaining stock truck access to Owāhanga Station on the other side of the Mataikona River in Tararua District. Rangitāne o Wairarapa stated that a lot of work would be required to bring Pack Spur Road up to standard and that climate change is contributing to an increasing number of hill slips.

Table 10-3: Mana whenua rankings of options

Option	Ngāti Kahungunu ki Wairarapa	Rangitāne o Wairarapa
1. Do nothing	10	Yes
2. Do minimum	8	Yes
3. Minor improvements	7	No
4. Retreat	8 ³¹	Yes
5. Strengthen	1	Yes
6. Optimised (low cost)	1	No
7. Optimised (high cost)	3	Yes
8. Alternate route 1	4	No
9. Alternate route 2	4	No
10. Alternate route 3	4	No

10.3 Economic Impact Assessment

Given the rural nature of Mataikona Road and limited data availability to inform the any economic assessment, a survey of residents and businesses was conducted to assess issues such as time of delays experienced and additional vehicle operating costs because of the road's condition. Then, consistent with the Waka Kotahi Monetised Benefits and Costs Manual (MBCM) (August 2021), the results of the survey were applied to monetise the following:

- **Cost of Disruption:** Several issues such as road dropouts, landslips, storm debris, and generally poor surface conditions cause delays to residents, businesses, and visitors. The cost was estimated using the MBCM Hourly Travel Time Cost/Person, multiplied by the additional travel time caused by disruption, plus estimated additional business costs incurred. The impact of each investment option was then measured by its effect on reducing disruption.
- **Vehicle Operating Costs:** The poor condition of the road results in additional costs to operate both personal and commercial vehicles. The cost was estimated using survey data collected on additional cost to both residents and businesses of operating their vehicles. The impact of each investment option was then measured by its effect on minimising additional vehicle operating costs.
- **Cost of Closure:** Closure of the road would result in multiple costs to society, including home demolition, home relocation, injurious affection, additional transport costs, and the potential for additional emergency services costs for those who remained. Given the effects of coastal erosion on the road and the lifespan associated with various upgrades, a series of assumptions have been made based on the estimated closing date of each option.
- **Reduced Maintenance Costs:** Each year the Council spends an increasing amount of money on emergency works to make the road passable. Therefore, any upgrades should help reduce these works by a commensurate amount.

³¹ Note: This ranking is not reflective of more recent feedback received from Ngāti Kahungunu ki Wairarapa. Refer to Section **Error! Reference source not found.** for more detail.



The cumulative impacts have been discounted at the standard MBCM discount rate of 4% over a 40-year period to assess the net present value of each option. The total impact of each option is then divided by the associated low and high capital cost of each option. This yields both a low and high benefit cost ratio (BCR), indicating the value for public sector investment. The results are detailed in Table 10-4, and summarised below:

- Option 1 – **Do Nothing**: results in very poor value for money due to the high costs placed on the public sector and the community from the deteriorating quality of access.
- Option 2 – **Do Minimum**: forms the baseline against which each of the options are assessed.
- Option 3 – **Minor Improvements**: indicate a high value for money on the lower cost estimate, stimulated by the short-term upgrades to extend the roads lifespan.
- Option 4 – **Retreat**: returns the highest value for money across all elements. This is driven by a strong combination of extended road lifespan and minimised disruption over the period 28 years enabled by the investment in retreating the road. It should be noted that Kahungunu ki Wairarapa considered this an unsatisfactory option.
- Option 5 – **Strengthen**: scored the highest combined MCA / Iwi scoring. While it drove the greatest level of return on investment, the scale of capital costs resulted in poor value for money and is considered unaffordable.
- Option 6 – **Optimised (Low Cost)**: scores relatively high on the combined MCA / Iwi scoring. Like Option 5, it generates a significant level of benefit but returns a poor value for money due to the high capital cost and is considered unaffordable.
- Option 7 – **Optimised (High Cost)**: scores relatively high on the combined MCA / Iwi scoring. Like Option 5 and Option 6, it generates a significant level of benefit but returns a poor value for money due to the high capital cost and is considered unaffordable.
- Options 8, 9 & 10: **Alternative Route Options**: all alternative route options scored relatively poorly on the combined MCA / Iwi scoring. However, due to the extended lifespan of various sections of the road and lower capital costs associated with the location-based investment, the resulting value for money outcomes were relatively high. It should be noted that Options 9 and 10 result in deteriorating quality of access for settlements along the road corridor, and that these interim economic results do not yet consider the additional travel time for residents and businesses either side of these settlements.

Refer to Appendix K for further information regarding the economic assessment.

Table 10-4: Impact versus cost assessment

		1. Do nothing	2. Do minimum	3. Minor improvements	4. Retreat	5. Strengthen	6. Optimised (low cost)	7. Optimised (high cost)	8. Alternate route one	9. Alternate route two	10. Alternate route three
Economic Impact		\$12m	\$12m	\$14m	\$28m	\$60m	\$60m	\$60m	\$60m	\$55m	\$35m
Capital cost range	Low cost	-	?	\$3m	\$3m	\$70m	\$30m	\$70m	\$12m	\$13m	\$15m
	High cost	-	\$2m	\$30m	\$6m	\$270m	\$150m	\$250m	\$25m	\$25m	\$25m
Impact vs cost ratio	High cost	-	-6.5	0.4	5.1	0.2	0.4	0.2	2.5	2.1	1.3
	Low cost	-		5.3	7.7	0.9	1.7	0.9	4.8	4.1	2.4

10.4 Summary of Assessment

The MCA rankings, local iwi preferences and the results from the economics analysis are summarised in Table 10-5. In addition, the table includes an estimated year of when the quality of access would deteriorate as well as the likelihood of disruptions based on the package of investment proposed.

The summary table revealed three distinct groups of packages. The highest ranked packages (Options 5,6, and 7) were ultimately considered unaffordable for Council, with an estimated cost range of between \$30m to \$270M (for context, MDC's total annual rates revenue is \$32M). The alternate route packages (Options 8,9, and 10) were also considered



unaffordable, as well as being socially unacceptable due to the fracturing of the community. The remaining packages (Options 1,2,3, and 4) performed poorly in the MCA assessment and do not deliver the investment objectives sought.

While the retreat option performed well in the MCA, this package was less favourable for Ngati Kahungunu ki Wairarapa due to the potential realignment conflicting with sites of cultural significance. However, subsequent discussions with Ngati Kahungunu ki Wairarapa have identified that retaining access to their farmland at Mataikona is a greater priority and they are keen to be involved in discussions regarding the potential retreat of the road.

Note that Table 10-5 shows the original ranking from Ngati Kahungunu ki Wairarapa for Option 4, and is not reflective of more recent discussions.

Table 10-5: Summary of Mataikona Road assessments

Considerations												
		1. Do nothing	2. Do minimum	3. Minor improvements	4. Retreat	5. Strengthen	6. Optimised (low cost)	7. Optimised (high cost)	8. Alternate route one	9. Alternate route two	10. Alternate route three	
Ranking	Ngati Kahungunu ki Wairarapa	10	8	7	8 ³²	1	1	3	4	4	4	
	Rangitane o Wairarapa	Yes	Yes	No	Yes	Yes	No	Yes	No	No	No	
	MCA	10	9	8	4	2	2	1	6	5	7	
Assumption	Deteriorating quality of access from	2027	2032	2040	2050	2122	2080	2100	2080	2080	2100	
	Likelihood of disruption	Every year	Every year	8/10 years	6/10 years	1/10 years	3/10 years	2/10 years	4/10 years	3 or 4/ 10 years	3/10 years	
Impact versus cost assessment	Economic Impact	\$12m	\$12m	\$14m	\$28m	\$60m	\$60m	\$60m	\$60m	\$55m	\$35m	
	Capital cost range	Low \$	-	?	\$3m	\$3m	\$70m	\$30m	\$70m	\$12m	\$13m	\$15m
		High \$	-	\$2m	\$30m	\$6m	\$270m	\$150m	\$250m	\$25m	\$25m	\$25m
	Impact vs cost ratio	High \$	-	-6.5	0.4	5.1	0.2	0.4	0.2	2.5	2.1	1.3
Low \$		-		5.3	7.7	0.9	1.7	0.9	4.8	4.1	2.4	

³² Note: This ranking is not reflective of more recent feedback received from Ngāti Kahungunu ki Wairarapa.



Part C: Preferred Option

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11 Selection of a Preferred Option

The outputs of the MCA, mana whenua rankings and economics assessments were presented to a stakeholder workshop and community meeting on the 3 September 2022. The purpose of the workshop was to highlight the challenges and trade-offs of each package and to get feedback on which package or combination of packages was preferred. Refer to Appendix L for the meeting notes and presented slides.

The stakeholders and mana whenua identified the Strengthen option (Option 5) as their preferred option. However, they recognised that due to cost and other trade-offs they proposed an alternative hybrid package if this can be funded. The hybrid option combines elements of:

- the retreat package where the road can be realigned (where possible and feasible),
- increased maintenance and
- priority strengthening (when and where this can be afforded).

The hybrid option should reduce costs to a manageable level for Council while achieving the investment objectives of addressing a known climate change adaptation issue and a reduction in the occurrence and duration of road closures.

12 Preferred Option Scope

12.1 Refinement of Option

As detailed above the preferred option is a hybrid. The high-level starting scope for the option was as shown in Figure 12-1. This was further investigated and refined as shown in Figure 12-2. For more detailed information regarding this process refer to the *Concept Design Note* in Appendix M.

While not strictly within scope of this project consideration should also be given to:

- Restricting further development in the area as it is expected that in the long term access will still be a problem.
- Establishing a fund through the Long Term Plan for community adaptation planning as the Bay of Plenty Regional Council has done. This fund is not just about infrastructure, but long term community led planning in the face of climate change.

Mataikona Road was impacted by the widespread devastation caused by Cyclone Gabrielle in early 2023. The event caused flooding, slips and riverbank erosion. The immediate response to these faults is not included in this business case, but the event may pull forward in-scope interventions that were originally planned for the longer term.



Figure 12-1: High level starting scope for hybrid option



Figure 12-2: Finalised scope for hybrid option

The hazards along the corridor were identified and risk assessed using a modified version of NZTA Z/44 – Risk Management Practice Guide. These risk levels were further refined following discussions with Council staff. The risk definitions are:

- Critical: need to be addressed now to prevent immediate loss of the road.
- High: should be addressed within the next five to ten years
- Medium and low: will likely need to be addressed in the future.

For a high-level summary of the risk level of the identified hazards, their proposed remediations, and indicative costs refer to Appendix N. These risk levels were used to develop three options – Option A shown in Figure 12-3 which addresses the critical risks only (things that need addressed now), and Option B shown in Figure 12-4 which addresses the critical and high risks (things that need addressed in the next five years). Option C shown in Figure 12-2 addresses all risks.



Figure 12-3: Critical risk hazard interventions





Figure 12-4: Critical and high-risk hazard interventions

12.2 Staging and Further Refinement

Priority should be given to the critical risks, particularly the following areas as they are already experiencing issues following Cyclone Gabrielle:

- Road retreat before Te Rerenga o Te Aohuruhur/ Suicide Rock
- Road retreat after the Middle Settlement
- Protection at the Mataikona River (some preliminary work has already been completed for this)

During discussions with Council staff, it was noted that the retreat section between the Middle Settlement and Matakona could be spilt into the section immediately north of the middle settlement and the remaining length. This is because the section immediately north of the settlement is currently under threat, but the remaining length could wait for 5+ years if needed.

The retreat at Sandy Bay is not expected to be required in the immediate future. However, the land acquisition could take years. Initial conversations should begin as soon as possible, and more refined alignment developed, if necessary, to guide this conversation

13 Economic Impact Assessment

As discussed in Section 10.3 there was limited data available to inform the economic assessment. The cost of disruption, vehicle operating costs, cost of closure, and reduced maintenance costs were based on the results of a survey of local businesses and residents. The estimated cost to complete the full hybrid option (Option C below) was higher than anticipated so assessment compares the economic performance of two sub-options (Option A and Option B):

- just investing in the critical risk locations
- investing in the critical and high risk locations
- investing in all identified improvements

The cumulative economic impacts have been discounted at the standard MBCM discount rate of 4% over a 40-year period to assess the net present value of the preferred option. Table 13-1 shows a summary of the benefit cost ratio and net present value for the three Hybrid Options and the key assumptions made about disruption, maintenance, and costs of closure.

The disruption assumptions (deteriorating quality of access and likelihood of disruption) are high level and based on historic disruption information and engineering judgement. Further modelling on climate change impacts would be required to provide a more detailed timeframe.

Table 13-1: Economic impact assessment for hybrid options

	Option A: Critical Risks	Option B: Critical and High Risks	Option C: All risks
Assumed deteriorating quality of access from ³³	2030	2065	2070
Assumed likelihood of disruption ³⁴	6/ 10 years	5/ 10 years	5/ 10 years
Impact relative to Do Min	\$5M	\$56M	\$56M
Project Expected Estimate ³⁵	\$18.3M	\$32.8M	\$37.2M
Impact versus cost³⁶	0.31	1.78	1.57
Net Present Value	PV Cost: \$17.7M	PV Cost: \$31.8M	PV Cost: \$36.0M
	PV Benefit: \$65.8M	PV Benefit: \$4.0M	PV Benefit: \$4.0M
	NPV: -\$48.1M	NPV: \$27.8M	NPV: \$32.0M

Option A, addressing critical risks, has a negative net present value and a ratio of less than one. Option B, addressing critical and high risks, gives the highest ratio of 1.78 and a positive net present value. However, the cost of Option B is still almost three times the amount allocated in Council’s LTP for the works. Option C, addressing all risks has a ratio of 1.57, and a positive net present value. However, it is the most expensive at \$37.2M.

Based solely on the economic impact assessment, Option B should be funded as it gives the best impact cost ratio. Option A should be discounted as ratio of less than one and negative net present value will make funding very difficult. Option C does not have as high an impact versus cost ratio, and is more expensive than the already very expensive Hybrid Option B.

14 Investment Prioritisation

The Investment Prioritisation Method (IPM) nationally prioritises investment activities and is used to give effect to the priorities in the GPS. The 2021-24 IPM uses three factors for assessing a project’s prioritisation:

- **GPS alignment** indicates the alignment of a project with a GPS strategic priority.
- **Scheduling** indicates the criticality of the project, where criticality is defined as the significance of the projects’ role as part of the network, and the degree of impact to users, particularly due to availability (or not) of alternatives.
- **Efficiency** indicates expected return on investment and considers the whole of life costs and benefits through cost-benefit analysis.

Results from the IPM assessment are provided in Table 14-1 below.

Table 14-1: Indicative project priority

Factor	Rating	Criteria
GPS alignment	High	<p>High alignment with climate change benefit</p> <p><i>Criteria: Project addresses a known climate change adaptation issue that is forecast to occur by 2040.</i></p> <p>Without investment, loss of access is anticipated to be imminent.</p>

³³ The year from which, even with interventions, a deteriorating quality of access would be experienced. For example, decreased level of service, increased coastal inundation, etc.

³⁴ How likely disruption is to occur even with the proposed interventions.

³⁵ Project base estimate plus approximately a 20% contingency. See Section 15.1 for more information.

³⁶ Based on present value of the project expected estimate



Factor	Rating	Criteria
Scheduling	High	<p>High criticality</p> <p>Criteria: <i>Significance of the activity as part of the network, where risk of unplanned loss of service (≥2 hours) requires use of alternative routes or modes taking >2 hours extra travel time for most users.</i></p> <p>There are no alternate routes</p>
Efficiency	Low	<p>Low efficiency</p> <p>Criteria: $1.0 \leq BCR < 3.0$</p> <p>BCR range of 1.78 (Option B)</p>
Priority	5	

While the project has a high rating for GPS alignment and scheduling, it has a low efficiency. This means the overall priority of the project is 5 out of 12 (Table 14-1). Based on the 2021/24 NLTP, projects within the local road activity class that achieve Priority 1-6 are considered 'Probable' for funding priority. This project achieves this threshold and is therefore expected to achieve probable funding priority.

Part D: Readiness and Assurance

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15 Financial Case

15.1 Cost of preferred option

A range of cost estimates for the preferred option, based on the risk level addressed, is detailed in Table 15-1 (refer to Appendix O for more detailed information on the cost estimates).

The project base estimate to address all risks is \$30.8M and the project expected estimate is \$37.2M.

At minimum the critical and high risks should be addressed as this option provides the best value for money based on the economic impact assessment (refer to Section 13) and is slightly less expensive than addressing all risks.

Table 15-1: Estimated project cost

Description	Option A: Critical Risks	Option B: Critical and High Risks	Option C: All risks
Property Costs	\$700,000	\$4,900,000	\$4,900,000
Pre-implementation	\$1,800,000	\$2,800,000	\$3,200,000
Implementation Fees	\$600,000	\$900,000	\$1,100,000
Physical Works	\$12,100,000	\$18,500,000	\$21,600,000
Project Base Estimate	\$15,200,000	\$27,100,000	\$30,800,000
Contingency ³⁷	\$3,100,000	\$5,700,000	\$6,400,000
Project Expected Estimate	\$18,300,000	\$32,800,000	\$37,200,000

15.2 Funding Risks

The main risks and uncertainties associated with the cost estimates are:

- The project expected estimate for all works is at least triple the funding that has been allocated by Council in the LTP.
- Cost estimates are based on preliminary data
- Knock on effects from potential issues with land acquisition
- Design and construction cost exceeded preliminary estimates due to structural or geotechnical complexity
- Inflation may continue to drive prices up further
- Tender values may vary due to limited or exceptional interest from tenderers
- Remote nature of the site will impact costs (limited interest from tenderers, cartage costs for materials, etc)
- Cost of implementation and ongoing maintenance
- Further events requiring emergency funding

15.3 Funding Sources

Discussions with the Waka Kotahi Investment Advisor have recommended breaking the project into discrete packages of work and funding these through low cost, low risk (LCLR) improvements. This approach has the benefit of being preferred by Waka Kotahi and allows for simpler or quick win remediations to be implemented now. However, there is also the risk that only some of the work will get completed as each package of work will be assessed on its own. There are also some individual items that have an estimate cost greater than the \$2M threshold. This includes:

³⁷ 25% of the property costs, and 20% of the pre-implementation, implantation, and physical works costs



- the high risk retreat at Sandy Bay has an estimated cost of \$6.2M. Approximately \$4.2M is property costs.
- the critical risk coastal protection work at the Middle Settlement totals \$2.9M. The high risk coastal protection work in the same area has an estimated cost of \$1.8M

Council's LTP includes \$11M for Mataikona Front Hill Upgrade between 2024/25 and 2025/26. This allocation assumes that 56% of the total cost will be funded by Waka Kotahi. Table 15-2 shows the assumed funding share for each investment option, and the additional funding that would be required.

Addressing the critical and high risks is likely the preferred way forward for Council and provides the highest BCR. However, the project expected estimate for this option is almost triple the allocation in the LTP, and would require an additional \$21.8M in funding. Assuming Waka Kotahi are willing to fund this additional requirement at Council's normal FAR of 56%, Council needs to find an additional \$9.6M. Options for funding this include:

- Private investment from the likes of iwi groups or forestry companies
 - Generally, iwi groups have not contributed to road infrastructure funding previously, but they have previously contributed to property development, primary industries and other infrastructure works.
 - Stratford District Council introduced a targeted rate for forestry companies in 2022 to help address road deterioration.
- Investment from other government agencies such as the Ministry for Transport or Ministry for the Environment.
 - The Government has recently created the Transport Resilience Fund to support local councils to develop and fund resilience upgrades on local roads. The fund will provide \$20 million in support to projects each year. The policy around this is still being developed.

Table 15-2: Funding breakdown

Description	Option A: Critical Risks	Option B: Critical and High Risks	Option C: All risks
Project expected estimate	\$18,300,000	\$32,800,000	\$37,200,000
Budget already in LTP	\$11,000,000	\$11,000,000	\$11,000,000
- Council share (44%)	\$4,840,000	\$4,840,000	\$4,840,000
- Waka Kotahi share (56%)	\$6,160,000	\$6,160,000	\$6,160,000
Additional funding required.	\$7,300,000	\$21,800,000	\$26,200,000
If split as per normal FAR rate:			
- Council share (44%)	\$3,200,000	\$9,600,000	\$11,500,000
- Waka Kotahi (56%)	\$4,100,000	\$12,200,000	\$14,700,000

Other government agencies are considered as potential funders because of the National Adaptation Plan. The plan sets out what the Government will do to enable better risk-informed decisions, drive climate-resilient development in the right locations, help communities assess adaptation options and embed climate resilience in all the Government's work. The long-term adaptation goals identified by the plan are to reduce vulnerability, enhance our ability to adapt, and strengthen our resilience. This is a very new document and is likely to generate funding opportunities, and potentially opportunities for communities to get support with managed retreat in the future. It is possible that the Ministry of Transport or the Ministry for the Environment could use Mataikona as a case study for long term resilience in the face of climate change for small coastal communities.

16 Commercial Case

The commercial case outlines the proposed procurement arrangements for the preferred option, as well as other key tasks that may impact on the commercial feasibility of the project.

16.1 Procurement Plan

The project will be procured in line with the Council's Procurement Policy, unless the project is part funded by Waka Kotahi whereby the procurement must follow Waka Kotahi guidelines. Waka Kotahi procurement guidance states that a staged (traditional) delivery model is most appropriate for this project and that competitive (open) tendering is required.

Should funding not be provided by Waka Kotahi, the Council's Procurement Policy states that for projects with a procurement value greater than \$1M, open competition is required unless approved by Council.

16.2 Consenting Plan

Consents will be required from Council for the construction of the various slip and coastal erosion protection structures. For detailed information regarding the consenting requirements refer to Appendix P.

Activities that will likely trigger the need for District Council resource consents include:

- o earthworks;
- o indigenous vegetation clearance within 20 m of a river or waterbody; and
- o modification, alteration, disturbance or destruction of any archaeological site, geological site, waahi tapu, or area of significance to tangata whenua

Regional Council resource consents are anticipated for most activities such as land disturbance, vegetation clearance (native or exotic) and structures within waterways and/or coastal environment and riparian margins. Activities within the coastal environment (or drainage improvements discharging to and disturbing the coastal environment) are likely to require consents as non-complying activities.

Although the degree of the effects from the proposed interventions cannot be fully understood at this stage, the preliminary findings through the SSBC process and planning review indicate some consenting constraints including:

- Activities/interventions along the coastline requiring specialists input to the proposed design solution(s) and consultation which may have a significant time impact to the project if not proactively managed;
- The road realignment through the Sandy Bay settlement which will have potentially significant consenting constraints depending on the ecological qualities and value of the vegetation required to be removed. The vegetation could be determined to be natural wetland which will result in a fairly complex consenting process. Negotiations with private property owners would also be necessary.

Due to heritage of the area and the uncertainty of uncovering archaeological artefacts, an archaeological assessment is recommended. The archaeological assessment will make recommendation(s) as to whether having an archaeological authority in place before works start would be appropriate and/or accidental discovery protocols.

In situations when work or access over private land is required, consultation with the affected landowners must be undertaken with a view of obtaining written approvals. The realignment through Sandy Bay will affect several landowners. Managed retreat is a highly emotive topic when it comes to people and their land. A robust Consultation and Engagement Plan will be essential to set out a clear process of engagement not only in relation to property matters but all interventions along this coastline.

Where works are proposed within the coastal environment, as defined under the WCDP, engagement and consultation with mana whenua must be undertaken. Rangitāne o Wairarapa and Ngāti Kahungunu ki Wairarapa have engaged with the SSBC providing feedback on the long list of packages. It is important to continue open, early and meaningful engagement with iwi partners.

16.3 Property Plan

The Property Group completed an initial assessment of the land required to allow for retreat of the road in four places (refer to Appendix Q). The proposed retreat alignment has changed slightly since this report was completed. At the time consideration was given to retreating the road behind the middle settlement. This is no longer the case and 887 and 863 Mataikona Road will no longer be impacted.



The report highlights 37 properties that would be affected by the proposed road retreat locations, 35 excluding the two at the Middle Settlement. Of these 35 properties, 28 are located at Sandy Bay, and 21 of these could be impacted by severance³⁸.

Under investment Option A (critical risks only), there is no retreat at Sandy Bay. This means only six properties (four landowners) would be impacted. Under investment Options B and C all four retreat locations would be addressed and all 35 properties will likely be affected.

The approach to managed retreat is being informed by the National Adaptation Plan and direction is expected from the government as this problem becomes more widespread. Currently there is no formal Council policy for the acquisition or disposal of land. Typically, each decision to purchase or sell land needs a council resolution. This requires a report to a full council forum seeking a decision.

There is strong support for this project and a lack of investment will result in severance and loss of road access for many properties within the next few years.

³⁸ Severance is where the acquisition of part of an owner's land for a public work (legal road is a public work), results in another part of that land being severed from the retained land so that it becomes more costly to retain or less useful to the landowner.



17 Management Case

17.1 Governance Arrangements

The proposed Project Team for the next phase is shown below, and will be agreed with Council and Waka Kotahi:

- **Project Sponsor:** Assets and Operations Manager, Masterton District Council
- **Client Project Lead:** Roading Manager, Masterton District Council
- **Investor Client:** Investment Advisor, Waka Kotahi

It is recommended Council remain the lead agency as they have strong relationships with residents and local boards. The Council will however need to seek external capability to oversee the delivery of detailed design.

17.2 Stakeholder Engagement Plan

Stakeholder and community engagement sessions were held during the business case process and the feedback received was used to inform the business case. This project is critical for the local community, and participation and the level of engagement from local residents and businesses was high. Further engagement and consultation will be required as the project moves forward, and some of this work has already started. Future engagement requirements include:

- Discussions with affected landowners and mana whenau where the road is proposed to be retreated.
- Consultation with the local community on project progress and updates
- Consultation with the wider community on changes to funding and budget (if relevant)
- Notification of road closures and disruption prior to construction.

17.3 Outline Activity Plan

The key milestones for the project going forward are detailed in Table 17-1. Land acquisition has not been included in this table. All interventions bar the four retreats should be able to progress as detailed in Table 17-1.

Land acquisition for the retreats, particularly the Sandy Bay retreat, has the potential to take years, Preliminary discussions have been had with the landowners affected by the critical risk retreats, but further work is needed in this area.

Table 17-1: Key milestones

Milestone	Estimated timing
Council approval of SSBC: all reporting to senior leadership two weeks prior to meeting	28 June 2023
Secure additional funding	Mid/ late 2023
Waka Kotahi approval of SSBC	Mid/ late 2023
Resource consenting	Late 2023/ early 2024
Complete detailed design based on the scope of the preferred option outlined under the economic case	2024
Procurement as per Waka Kotahi procurement guidance and contract award	2024
Construction	Early 2025

17.4 Benefits Realisation Management Plan

The investment objectives, measures, and baselines are identified in Section 4. More detailed baseline data needs to be gathered to accurately assess the number and duration of road closures for Mataikona Road.

All measures should be assessed every year once construction is complete, to see how the investment in this project is tracking towards the targets.



17.5 Risk Management

A Safety in Design register has been started for the project and this can be found in Appendix R. The key risks associated with the preferred option have been considered and assessed and are summarised in Table 17-2 below but should be monitored and revised as the project progresses. Additional risks are likely to be identified as the project progresses into design and implementation phases, and these should be captured in the risk register during the next phase of work.

Safety-in-design measures will be incorporated into the detailed design to minimise risks to health and safety during the construction and maintenance of the interventions where practicable for their design life. For new construction projects, a site risk assessment needs to be undertaken by the contractor prior to construction, with risks identified, discussed and recorded before the issue of the construction drawings.

Table 17-2: Identified risks

Category	Risk
Technical	<ul style="list-style-type: none"> • Resource consent process – unexpected issues identified during process that may lead to appeals and delayed timeframes • Geotechnical – detailed geotechnical investigation reveals unexpected or challenging ground conditions • General earthworks may impact on ground stability. • Construction costs and tender competition – the degree of interest from suppliers may be limited given the remote location. • Location and extent of services and utilities within and adjacent to the road corridor.
Operational	<ul style="list-style-type: none"> • Increased maintenance requirements following improvements
Financial	<ul style="list-style-type: none"> • Council is unable to fund the project • Design and construction cost exceed estimates due to structural or geotechnical complexity • Tender values vary due to limited or exceptional interest from tenderer • Cost of implementation and ongoing maintenance. • Construction occurring outside optimum time may result in further delays and additional costs.
Stakeholder/ Public	<ul style="list-style-type: none"> • Potential to affect sites of cultural, heritage or environmental significance. • Negative feedback from the community and stakeholders • Loss of access to properties during construction given that there are no alternative accesses. • Challenges with property acquisition
Environmental and Social	<ul style="list-style-type: none"> • Adverse environmental effects during construction • Long term impacts of climate change are felt faster than anticipated
Safety	<ul style="list-style-type: none"> • Funding/consent delays result in construction not occurring at optimum time will increase safety risk to construction workers.

18 Next Steps

The existing emergency maintenance and repair regime is not sustainable for Council, nor does it provide resilient access for residents. If funding partners agree that road access to Mataikona should be retained the preferred option will provide more resilient access to Mataikona and the surrounding areas. To complete the project the following tasks are required:

- Funding arrangements:
 - Council endorsement of the preferred way forward (Option B)
 - Confirm with Waka Kotahi that LCLR improvements is the recommended funding strategy for this project. If this is the case, group the work into discrete packages using Appendix N for guidance.
 - Seek SSBC approval from Waka Kotahi
 - Rationalise the cost estimates and see if any savings can be made.
 - Determine how to address the additional \$21.8M required funding. The new Transport Resilience Fund may be an option, although it would not be able to cover the full amount required.
 - Assessment of impact to Council loans and rates
- Design and long-term planning
 - Investigate and implement development restrictions along Mataikona Road as part of the District Plan.
 - Identify individual packages of work for LCLR funding
 - Development of detailed design tendering documentation.
- Consultation:
 - Identify and consult with iwi and other affected parties.
 - Inform community of the planned works
- Preliminary work:
 - Property procurement with landowners as required for the Preferred Option.
 - Tender and award of detailed design including resource consenting.
 - Begin collecting baseline data for missing benefit measures.
 - Develop construction tendering documentation.
 - Tender for construction.
- Construction

The main risks for delivery of the next stage of work are:

- Securing funding for the project
- Emergency and maintenance funding will still be required
- Time required for consenting and associated consultation (if required)
- Property acquisition

Should the additional funding be unable to be secured the current approach of emergency works following events should be utilised.



Appendices

We design with community in mind



Appendix A Significant Biodiversity Values

As per the GWRC Proposed Natural Resources Plan



Figure A-1: Ecosystems and habitats with significant indigenous biodiversity values

Table A-1: Ecosystems and habitats with significant indigenous biodiversity values

Location	Significant indigenous biodiversity values
Matakona River Mouth	<ul style="list-style-type: none"> The river provides habitat for nine migratory indigenous fish species, six of which are ‘at risk.’³⁹ The river mouth/ estuary provides seasonal or core habitat for five threatened indigenous fish species⁴⁰ The river mouth/ tidal area is an inanga (whitebait) spanning habitat The river mouth and foreshore are a significant habitat for ‘at risk’ indigenous birds⁴¹ Matakona River Mouth Swamp is an identified natural wetland The Matakona Reefs (as discussed in Section 2.3) to the north and south of the river mouth have an unusual morphology which provide supportive environments for a particularly rich algal flora.
Okau Stream	<ul style="list-style-type: none"> The stream mouth is an inanga spanning habitat The stream mouth provides seasonal or core habitat for three threatened indigenous fish species⁴²
Whakataki River Mouth	<ul style="list-style-type: none"> The river provides habitat for nine migratory indigenous fish species, six of which are ‘at risk’⁴³ The river mouth/ tidal area is an inanga spanning habitat Whakataki River Mouth is an identified natural wetland Whakataki Estuary has an intact saltmarsh vegetation sequence from margin through to terrestrial tussock land. It provides seasonal or core habitat for five threatened indigenous fish species.⁴⁴

³⁹ Common bully, common smelt, inanga, koaro, longfin eel, redfin bully, shortfin eel, torrentfish (‘at risk’ species are underlined)

⁴⁰ longfin eel, inanga, kōaro, redfin bully and torrentfish

⁴¹ black shag, pied stilt, banded dotterel, variable oystercatcher and red-billed gull

⁴² longfin eel, inanga and redfin bully

⁴³ Black flounder, common bully, inanga, koaro, longfin eel, redfin bully, shortfin eel and torrentfish

⁴⁴ longfin eel, inanga, kōaro, redfin bully and torrentfish



Appendix B Historic Weather Events

Table B1 provides a summary of all historic weather events containing the terms “Mataikona” or “Castlepoint” identified by NIWA’s Historic Weather Event Catalogue, unless otherwise stated. The NIWA information has been collated from newspaper reports, journals, books and databases provided by various organisations and individuals.

Table B1: Historic Weather Events

Date	Event description	Specific impacts
May 1929	A six-day storm brought heavy rain, flooding, gales and heavy seas to much of the North Island.	The river at the back of the Castlepoint County Office was in high flood on the morning of the 15 th and by noon a large area was under water. The office was inundated by flood waters and the clerk's dwelling house was also flooded. Other houses in the vicinity were also invaded by the rising waters.
February 1936	An ex-tropical cyclone brought high winds, heavy rain, flooding and rough seas to the whole North Island and Marlborough, which caused widespread damage. There were casualties at Kaitaia, near Thames, at New Plymouth, at Palmerston North, at Masterton, in the Tararua Range and at Tinui.	At Castlepoint, the sea washed away sand hills and invaded houses 100m inland.
March 1975	Ex-tropical Cyclone Alison caused high winds, heavy rain, flooding, slips and high seas around many parts of New Zealand. Much damage was done to roads, rail and both public and private property.	Castlepoint recorded winds of 40 knots (74 km/hr).
April 1991	Heavy rain in the Hawke's Bay caused damage to crops. Flooding in Wellington resulted in high damage costs and heavy stock losses.	Floodwaters and widespread slips isolated Castlepoint, Riversdale, Tinui and Mauriceville. There were electricity outages at Castlepoint, Makui, Tinui, Blairlogie, Eketahuna and Alfredton. There were telecommunication outages at Castlepoint, Makui, Tinui, Blairlogie, Eketahuna and Alfredton.
July 1992	High winds and flooding were experienced in the upper and lower North Island. A man drowned when a yacht capsized off Castlepoint during the storm.	A 62-year-old man drowned on the 22 nd after a yacht overturned off the Castlepoint lighthouse during a storm. Two other men aged 54 and 46 years old were missing. Rough seas had overturned the yacht in the bay off Castlepoint.
October 1992	Heavy rain and high winds battered the lower North Island for four days causing high stock losses in Hawke's Bay and landslides in the Wellington area.	Castlepoint recorded 103 mm (10.3 cm) of rain.
March 1998	Ex-tropical cyclone Yali brought high winds, heavy rain, high seas and some flooding to all regions in the South Island as well as Wellington.	Castlepoint recorded a peak wind gust of 156 km/hr
June 2003	A storm brought high winds, heavy rain and flooding to many areas of the North Island as well as Marlborough and Tasman-Nelson. Property damage and sheep losses occurred in Wellington.	Castlepoint recorded a peak wind speed of 131 km/hr on the 9 th
January 2004	The lower North Island was hit with heavy rain, flooding and high winds. High winds downed power lines causing power outages in parts of the North Island.	Castlepoint record 106 mm (10.6 cm) of rain from the 18th to the 21st (which is equivalent to the total average rainfall for January for that area).
February 2004	A storm brought high winds, heavy rain, flooding and slips to much of the North Island as well as the upper South Island. The lower North Island was severely affected, with 100-year floods in Manawatu-Wanganui and 50-year floods in Wellington causing millions of dollars of damage. Thousands of people were evacuated. Two people drowned in the sea at	Castlepoint recorded 123.4 mm (12.3 cm) of rain in the 24 hours to 9am on the 16th



Date	Event description	Specific impacts
	Wellington and one person was presumed drowned in the Marlborough Sounds. Trees felled on houses caused injuries to a girl in Wellington and a woman in Auckland.	
August 2004	A storm affected much of New Zealand with combinations of high winds, heavy rain, flooding, heavy seas and snow. Cold southerlies affected much of the South Island.	Castlepoint recorded 90.2 mm (9.0 cm) of rain in 24 hours. The winds at Castlepoint averaged 100 km/hr on the 17th.
November 2004	High winds across New Zealand caused damage to property and resulted in two casualties in Hawke's Bay after winds toppled a tree onto a moving car.	Castlepoint recorded wind gusts up to 141 km/hr.
March 2005	Torrential rain caused severe flooding in parts of the Wairarapa.	Castlepoint recorded 115 mm (11.5 cm) of rain in three hours to 9pm on the 30th (which has a return period of well over 150 years). Castlepoint recorded 92 mm (9.2 cm) of rain in two hours (which has a return period of over 150 years). Castlepoint recorded 57 mm (5.7 cm) of rain in one hour (which has a return period of over 150 years). In the coastal settlements of Mangatoetoe and Mataikona the residents were isolated for several days.
June 2007	High winds and snow were experienced in the southern South Island and southern North Island over a few days.	Wind gusts of up to 80 knots (148 km/hr) were recorded from west of Castlepoint on the 7th, and up to 71 knots (131 km/hr) on the 6th.
October 2007	Many parts of New Zealand experienced high winds, lightning, snow, hail and heavy rain. Roads, airports, ferries and power supplies were affected. A few properties were damaged.	Castlepoint recorded a gust of 78 knots (144 km/hr) on the 4th.
January 2008	The remnants of Tropical Cyclone Funa brought high winds and heavy rain to the North Island, particularly the lower North Island, and also the northern South Island. Power cuts occurred and the combination of gales and high temperatures caused multiple scrub fires in the lower North Island.	Castlepoint recorded a wind speed of 158 km/hr from the westerly quarter on the 22nd. This was the highest gust for the month.
July 2008	The second storm of three in a one-week period. A depression hit the upper North Island, bringing heavy rain and high winds, then it spread down the country.	Castlepoint recorded 123.5 mm (12.4 cm) of rain for July on an unofficial rainfall recorder. Flooding and slips threatened to close Mataikona Road on the afternoon of the 30th.
March 2010	Gales have hammered buildings, toppled trees and caused flight cancellations in Wellington and about 200 trampers in Fiordland National Park braced themselves as gales, heavy rain and flooding damaged bridges, tracks and huts.	Gusts of 125 km/hr were recorded at Kelburn.
May 2010	There was heavy rain, flooding and snow falls throughout New Zealand from the 24th of May to the 31st of May. There was several millions of dollars worth of damage caused by the storm.	Castlepoint recorded 91 mm (9.1 cm) of rain from 8pm on the 24th to 8am on the 25th of May.
25 March 2022	Mataikona Road was closed at Suicide Rock due to slips (refer to MDC Facebook post below).	
29 June 2021	Metservice issued a severe weather watch for heavy swells on the South and East Wairarapa Coast, included Mataikona and Mataikona Road (refer to MDC Facebook post below).	



Appendix C Aerial Photography

C.1 1963 Aerial Photography





C.2 2021 Aerial Photography





Appendix D Route Criticality Assessment



Corridor assessment

The corridor assessment requires good local knowledge and understanding of the corridor. Follow the guidance notes, and fill in each of the grey boxes below (some are drop down boxes). The yellow boxes at the top will provide the criticality score.

Route	Mataikona Road, Masterton District
Section	Entire road

Criticality Score	3
Criticality	Major

	Please select from drop down list	Guidance notes	Evidence / comments
ONRC			
One Network Road Classification	Local or access	https://www.nzta.govt.nz/roads-and-rail/road-efficiency-group/onrc	As per MegaMaps
ONRC score	1		

Access to Lifeline utilities, or a lifeline evacuation route		In order for a region to recover from any natural hazard event it is important for the various key utilities such as water, wastewater, power and telecoms to be able to access their assets to inspect and undertake repairs. This category includes physical utility assets such as sub-stations that require access to maintain continuity of service to the public and also access to critical transport hubs such as ports and airports. This also includes any routes which are considered themselves as essential for evacuation.	
Number of Locally-significant utility assets	0	Failure would cause loss of supply to more than 2,000 customers or reduction in service across part of the region or loss of supply to a locally significant customer.	Less than 2,000 people live with access reliant to this asset
Number of Regionally-significant utility assets	0	Failure would cause loss of supply to more than 20,000 customers or reduction in service across the region or loss of supply to a regionally significant site.	Less than 20,000 people live with access reliant to this asset
Number of Nationally-significant utility assets	0	Failure would have national significance or cause loss of utility supply to most of a region or loss of supply to another nationally significant site that depends on this service.	Failure would not have national significance, or cause the loss of supply to most of the region.
Number of essential evacuation routes	1 or more	Is the route nominated an an evacuation route?	The road is the only route available to exit Mataikona.
Lifeline score	3		

Access to essential services		This would explicitly cover routes which provide access to essential services as identified by a given community or region. These may include hospitals and large age-care facilities, ambulance, fire, police and emergency ops centres, major utility control centres, welfare centres, key retail outlets – hardware stores, construction resources and supermarkets, schools and sector posts and major industry.	
Hospitals and large aged care facilities	1	Enter the number of facilities that are directly accessed from your corridor, or where the corridor is an only viable alternative along some part of the journey to the facility.	No facilities are available in Mataikona, therefore to access this service residents must use Mataikona Road.
Ambulance, fire, police and emergency ops centres (& dialysis)	1	Note that most hospitals will be an essential service during or after an event, however, only schools that will act as a civil defence centre or provide alternative housing should be counted.	No facilities are available in Mataikona, therefore to access this service residents must use Mataikona Road.
Major utility control centres - Council, Telecom and Power	1		No facilities are available in Mataikona, therefore to access this service residents must use Mataikona Road.
Welfare centres	1	Consider whether buildings will be accessible during or after an event. For example many retail centres will close following a large earthquake event, and buildings in flood plains will close during a flooding event.	No facilities are available in Mataikona, therefore to access this service residents must use Mataikona Road.
Key retail outlets - hardware stores, construction resources (contractors) and supermarkets	1		No facilities are available in Mataikona, therefore to access this service residents must use Mataikona Road.
School and sector posts, major industry	1		No facilities are available in Mataikona, therefore to access this service residents must use Mataikona Road.
Essential services score	4		

Appendix E Resilience Risk Assessment

The table below provides a summary of the Overall Risk Resilience Rating as per the Waka Kotahi assessment of criticality spreadsheet.

Table E1: National Resilience Programme Business Case Risk Rating

Process	Current Rating	Comments
Likelihood	Occurs approximately every 5-50 years or more	Based on MDC data
Duration	12 – 48 hours	Based on MDC data
Combined likelihood measure	Very Likely	As per NRPBC metrics
Current ONRC	Access	As per Mega Maps
Criticality assessment ONRC	Regional/ Arterial	As per the Waka Kotahi criticality tool
Adopted ONRC	Regional/ Arterial	Officially rated as Access, however rated as Regional/Arterial as per criticality assessment
Detour	Long detour (>3hr), hard to manage AND no HPMV option	Local detour exists, however it is via private land and requires 4WD vehicles, therefore is not considered technically viable
Combined consequence	4	As per NRPBC metrics
Risk Rating	Major (4L)	As per NRPBC metrics

Appendix F Mana Whenua Meetings

F.1 Kahungunu ki Wairarapa



Hui with Kahungunu ki Wairarapa regarding the Mataikona Road project

Project/File: 310205311
Date/Time: 18 July 2022 / 11:00am
Location: Teams
Attendees: Kahungunu ki Wairarapa: Demetrius Potangaroa, Robin Potangaroa
Masterton District Council: Tia Tuuta, Kaine Jaquierey
Stantec: Ryan Abrey, Courtney McCrostie
Distribution: As per attendees

Introductions

Background and project description provided by Kaine
Introductions from everyone

Workshop material

Courtney and Ryan gave an overview of the content that would be covered in the upcoming workshop on Saturday 23 July. The following comments were made by Demetrius and Robin:

- Stantec/ Council to pinpoint where the most money is being spent
- Likely the road will have to be retreated up to 20m – what happens to the properties that are currently protected by the road?
- Conversations with the property owners will be key
- Stantec to use photos/ diagrams of potential solutions from NZ where possible (instead of overseas)
- Could use the Castlepoint seawall as an example
- Hapū worked with the local community and ratepayers to replant the Castlepoint scenic reserve/ sand dune area in natives and there have been improvements

Other comments

- Demetrius and Robin are most concerned with the start of the road (Whakataki) and family land at the Mataikona end.
- Pack Spur Road is not really a viable alternative
- Karaka trees were often planted to indicate boundaries, if you come across these there are likely to be other artefacts around
 - Something to keep in mind in locations where road retreat is an option
- Know that there are middens, etc in the sand dunes
- Taraoneone (Pa) located on the main ridge line near Mt Percy
- Recall stories of there being a road tax/ private land fee for use of the road in the early 1900s to assist with maintenance at the time.

The meeting adjourned at 11:50am.

The foregoing is considered to be a true and accurate record of all items discussed. If any discrepancies or inconsistencies are noted, please contact the writer immediately.

Ngā mihi,

STANTEC NEW ZEALAND



Courtney McCrostie

Transportation Engineer

Phone: +64 4 381 5776

courtney.mccrostie@stantec.com

Attachment: NA

F.2 Rangitāne o Wairarapa



Hui with Rangitāne o Wairarapa regarding the Mataikona Road project

Project/File: 310205311
 Date/Time: 5 August 2022 / 11:00am
 Location: Mataikona
 Attendees: Rangitāne o Wairarapa, Masterton District Council, Stantec
 Distribution: As per attendees

Item
<p>Introductions</p> <p>Introductions from everyone</p> <p>Background and project description</p>
<p>Drive over comments</p> <p>Front Hill</p> <ul style="list-style-type: none"> Some stability issues on the upwards slope <p>Sandy Bay</p> <ul style="list-style-type: none"> Sandy Bay Drive is a private road, but has been considered previously as an option for retreat and could be implemented pending agreement with landowners Unofficial beach accesses contributing to sand trap problem with vehicle paths broken through dune Alec said there were no issues with the bridge <p>Second Hill</p> <ul style="list-style-type: none"> Some stability issues on the upwards slope Was previously planted by MDC to stabilise the area but has since been harvested leading to slope instabilities. The area has been replanted, but it hasn't established yet <p>Second Hill to Te Rerenga o Te Aohuruhuru</p> <ul style="list-style-type: none"> Even though there is a reasonable buffer between the road and sea at most locations along here, it used to be bigger, and the coast is retreating <p>Te Rerenga o Te Aohuruhuru (Suicide Rock)</p> <ul style="list-style-type: none"> Slips below the road are getting worse Have retreated the road back into the hill previously, but that has opened up areas that are now constantly weeping water Plans have been made for terracing slopes but not implemented to date Pa site on hill directly above Suicide Rock <p>Middle Settlement</p> <ul style="list-style-type: none"> When first Castlepoint seawall was built they took rock from the beach in front of this location (know as the boulder field). Removing the natural breakwater apparently kicked off the erosion issues they are having now.

Item
<ul style="list-style-type: none">• Agar pickers used to lay their drying nets on the land between the road and the sea. No longer enough room to do this. The last of them left approx. 5 years ago• Karaka trees located behind these houses• Still works ongoing from Feb/ March 2022 storms
South Mataikona
<ul style="list-style-type: none">• Karaka trees along the base of the hill, will limit retreat options
Mataikona
<ul style="list-style-type: none">• Driftwood etc on the road used to be a rare occurrence, but now is more common
Mataikona River
<ul style="list-style-type: none">• Pa just opposite the swing bridge• Historically, when a big storm/ rain comes through the river mouth bursts through the sand bar at the south end of the river mouth (closest to settlement) to then gradually move north again, but the time between storms is decreasing keeping the river closer to the settlement• River is eroding the bank below the road• Slips are coming down from above the road• There are undocumented archaeological sites in the banks behind the road. Specific locations are known by the locals
Pack Spur Road
<ul style="list-style-type: none">• Very steep, not suitable for heavy vehicles• Development along Pack Spur Road is relatively recent due to farmers subdividing part of their land.• Locals use Pack Spur Road to get cellular signal• The plantation below the road is almost ready for harvest, risking increased erosion once carried out
Other comments
<ul style="list-style-type: none">• Importance of karaka trees as markers of old settlements highlighted. If you come across these there are likely to be other artefacts around. Likely to be issues with retreating the road due to this• Quarry in Tinui Valley is going through the process of getting consented by the owner. Still rock there and another resource above it that hasn't been explored yet. Owned by a forestry company• There is a discrepancy between the number of consented properties and the number of actual properties/ number of people who live on the road• If road is closed residents are usually able to get in/out as far up as Suicide Rock by driving along the beach. Does require a suitable vehicle (tractor/ 4WD/ quad bike).• <i>Stantec to send through details of high-level options to for discussion with wider iwi</i>

The meeting adjourned at 1:15pm.

The foregoing is considered to be a true and accurate record of all items discussed. If any discrepancies or inconsistencies are noted, please contact the writer immediately.

Ngā mihi,

STANTEC NEW ZEALAND



Courtney McCrostie

Transportation Engineer

Phone: +64 4 381 5776

courtney.mccrostie@stantec.com

Attachment: [Attachment]

Appendix G Long Listing Workshop

G.1 Workshop Notes



Mataikona Long Listing Workshop

Project/File: 310205311 Mataikona SSBC
 Date/Time: 23 July 2022 / 10:30am
 Location: Mataikona
 Next Meeting: Late August/ Early September
 Distribution: Workshop attendees

Item
<p>Introduction</p> <ul style="list-style-type: none"> • Purpose of workshop is to: <ul style="list-style-type: none"> ○ Outline the business case process ○ Outline the results of the desktop assessment ○ Confirm project scope, problems and benefits ○ Confirm that there is a case for change
<p>Context Summary</p> <p>Land Use</p> <ul style="list-style-type: none"> • The presented land use was agreed though there were two additions: <ul style="list-style-type: none"> ○ There is a firewood export business ○ Wakataki has a hotel with pub which the locals use <p>Transport</p> <ul style="list-style-type: none"> • The presented transport context was agreed with the following additions: <ul style="list-style-type: none"> ○ Calm weekend days can have significant numbers of day trippers pushing traffic volumes up, frequently parking on the side of the road ○ Pack Spur Road <ul style="list-style-type: none"> ▪ It is ok in dry, can get a car/ute through but is difficult. Was considered for a bus route ▪ However, unable to get a stock truck through. Very steep gradients at parts as well as very tough switchbacks ▪ It's currently in good condition but there is a lack of drainage maintenance which leads to a risk of the condition deteriorating quickly. Very steep so limited access to anything but 4x4's outside of prolonged good weather ▪ The top section of the road does not follow the paper road and veers into private land. Landowner doesn't seem to mind access <p>Social and Economic</p> <ul style="list-style-type: none"> • The presented social & economic context was agreed with the following additions <ul style="list-style-type: none"> ○ It was noted that the school bus driver lives in Mataikona, if the road is blocked, this means that kids don't get to school ○ Fire and Emergency has a ~20 strong volunteer unit, many don't have cell phones

Item

- When the weather closes the road, it typically is too bad to get a helicopter in. If there is a medical emergency, there is not a lot that can be done, does concern a few people with the aging population.
Some workshop attendees will try to get numbers on medical evacuations
- Residents' vs visitors
 - Workshop participants indicated 30-50% of people are permanent residents, the rest are weekenders/ bach owners / part time residents. This (permanent residents) has also grown recently with people moving out of the city
 - Confirmed the estimates of 10-15 AirBnB properties
 - It is estimated that there are often around 10 freedom campers dotted along the road parked on the seaside of the road (throughout the year)
 - Some new builds are happening. Suggested that we have underestimated the number of dwellings (80 on Mataikona, 15 on Pack Spur as per Council records). Suspect 20 lots currently just have a campervan with minor structures attached
 - Good weather can bring lots of divers doing day trips, estimate of up to 100 on a calm weekend day
- Economic Drivers
 - Farms are sheep and beef, dairy was specifically excluded
 - Beekeeping and Honey production was confirmed
 - No additional information relating to forestry (relevant people were not in attendance)
 - Firewood was identified as an export, informed that it goes to Wellington Restaurants
 - They also have hunting and fishing competitions which brings in large numbers of people from around the region.

Cultural

- No additional sites identified outside of the desktop exercise

Geological

- No additional notes outside of the presented evidence

Problems and evidence

The agreed problem statement, benefits and investment objectives were presented including the logic behind them.

Evidence

- Sea level rise and land subsidence
- Weather events
 - See comments below regarding road closures due to rainfall
 - Easterly brings rain and waves, but limited driftwood
- Coastal erosion

Item

- Mostly happens after easterly storm events, but considered both a drainage issue and coastal issue
- The North Settlement has been retreating at approximately 1m per year for the past 20 years. It was highlighted that it used to be possible to drive out to the sea from the houses
- Key problem areas were identified as per below
 - Sandy Bay
 - CH3600
 - CH8200
 - Middle settlement to Mataikona (CH 9,000 to CH 10,800)
 - Mataikona settlement
 - Road north of Mataikona (CH 11,500 to Pack Spur)
- Slips and drop outs
 - It was agreed that slips occur multiple times per year, though some attendees said slips happened about 4-6 times a year, others thought 3-4.
 - Problem areas:
 - Front Hill (CH 400-2,000)
 - CH 5,000
 - Approach to Suicide rock
 - Approach to Mataikona (CH 10,500)
 - North of Mataikona/ River area (CH 11,800)
 - Pack Spur Road (CH 12,500, CH 13,000)
- Road closures
 - When:
 - After rain, it was generally agreed that more than 100mm over 1-3 days was estimated the trigger point for slips, 100mm over 4-5 days can typically be accommodated by the stormwater system. It was discussed that there are lots of new culverts going in
 - Easterly Swells are noted as the risk conditions for erosion and washout. Overtopping noted at Sandy Bay and Mataikona (debris noted on the road)
 - Where:
 - At the ends of valleys, it was noted that there was a quite high water table. One resident claimed that at Sandy Bay the road was meant to run behind the settlement, but the ground was too swampy.
(*Ryan check with Alec about proposal*)
 - Middle settlement (CH 9km) at risk of road washout and previously had a slip run through the houses and block the road. Currently there are rocks being placed along the shoreline, but residents notice the high water table leading to undermining of road. Some culverts being installed. Some residents noted that they would be happy to give up some of their property to shift the road inland as they prefer the road to be in front rather than relocated behind their properties
 - Estuary at Sandy Bay prone to flooding and backing up road
 - Also road towards Pack Spur at risk of erosion due to meandering river

Item

- **How long:** It was discussed that many over slips that impact farmers will get cleared if they have the equipment to deal with it. Under slips wait for Council typically
- How do you get in/out if the road is blocked?
 - Typically don't as it's usually rain related
 - There is an issue with getting helicopter access as weather will impact access in an emergency
 - They have previously (during the slip at 9km) needed supplies to be helicoptered in
- Maintenance costs
 - Locals commented that their feeling was that there was insufficient preventative maintenance. It seemed to be an approach of waiting to see if the road falls apart then fix, rather than proactively try make sure the drains aren't blocked
 - Noted that an old quarry up towards Packs Spur could also be considered as there may still be material remaining for use
- Unsafe route
 - It was agreed that recorded crashes are significantly less than actual
 - Tourists aren't too bad as they are typically quite cautious
 - Locals coming back from the pub more of an issue
 - Agreed that anything minor is just accepted as part of living here and not reported
 - There are often vehicles stuck on the beach which need to be rescued
 - Some curves are of concern to locals due to size of vehicles going around them and visibility.

Possible Options

The identified issues and suggestions from the workshop have been summarised below. Within each intervention there is a sliding scale of light to heavy options. Lighter options accommodate occasional disruption (slope planting, monitoring, maintenance, etc), while heavy interventions try to prevent closures (slope reprofiling, rock anchors, retaining walls, etc)

- Front Hill (CH 0 – 2,000, hill section)
 - Over slip protection
 - Under slip protection
 - Drainage improvements
 - Road widening
 - Increased maintenance
 - Alternate route/ abandon road
- Sandy Bay (CH 2,200 – 4,000, settlement section)
 - Coastal erosion protection
 - Drainage improvements
 - Increased maintenance
 - Seal improvements/ lift road to prevent sand build up
 - Bridge improvements (flooding)
 - Retreat road
 - Alternate route/ abandon road

Item

- Sandy Bay to Un-named Creek (CH 4,000 – 5,600, hill section)
 - Over slip protection
 - Under slip protection
 - Drainage improvements
 - Road widening/ passing opportunities
 - Safety improvements
 - Surfacing improvements
 - Maintenance improvements
 - Alternate route/ abandon road
- Un-named Creek to Suicide Rock (CH 5,600 – 7,800, coastal section)
 - Drainage improvements
 - Road widening
 - Retreat Road
 - Alternate route/ abandon road
- Suicide Rock (CH 7,800 – 8,500, hill section)
 - Over slip protection
 - Under slip protection
 - Coastal erosion protection
 - Drainage improvements
 - Road widening
 - Retreat road into bank
 - Alternate route/ abandon road
- Middle settlement (CH 8,500 – 9,000, settlement section)
 - Over slip protection (prevent slips down the gully)
 - Coastal erosion protection
 - Drainage improvements
 - Alternate route/ abandon road
- South Mataikona (CH 9,000 – 10,900, coastal section)
 - Under slip protections
 - Coastal erosion protection
 - Drainage improvements
 - Surfacing improvements
 - Alternate route/ abandon road
- Mataikona (CH 10,900 – 11,500, settlement section)
 - Coastal protection
 - Alternate route
 - Maintenance improvements
 - Alternate route/ abandon road

Item
<ul style="list-style-type: none">• Mataikona River (CH 11,500 – 13,000, coastal/ river section)<ul style="list-style-type: none">○ River erosion protection○ Over slip protection○ Under slip protection○ Surfacing improvements○ Alternate route/ abandon road• Pack Spur Road<ul style="list-style-type: none">○ Ford improvements○ Under slip/ washout protection
Evaluation criteria <ul style="list-style-type: none">• Not all criteria will be used during the long list to short list process• There were no reactions to any criteria or any additional criteria suggested, the presented options were:<ul style="list-style-type: none">○ Investment Objectives<ul style="list-style-type: none">▪ Addressing a known climate change adaptation issue▪ Reduction in duration of unplanned road closures○ Four Well Beings<ul style="list-style-type: none">▪ Effects on Te Ao Māori▪ Environmental effects▪ Social and community▪ Economic development and growth○ Critical Success Factors<ul style="list-style-type: none">▪ Property impacts▪ Consentability▪ Climate change mitigation▪ Technical difficulty▪ Safety and design▪ Value for money
Other comments <ul style="list-style-type: none">• Maintaining beach access is critical, its why people live out here• General acceptance of rationalising access but want it to be maintained• Accept they don't need access to the whole coastline, but near the settlements would be unacceptable to remove

The meeting adjourned at 1:00pm.

The foregoing is considered to be a true and accurate record of all items discussed. If any discrepancies or inconsistencies are noted, please contact the writer immediately.

Ngā mihi,

STANTEC NEW ZEALAND



Courtney McCrostie

Transportation Engineer

Phone: +64 4 381 5776

courtney.mccrostie@stantec.com

Attachment: [Attachment]

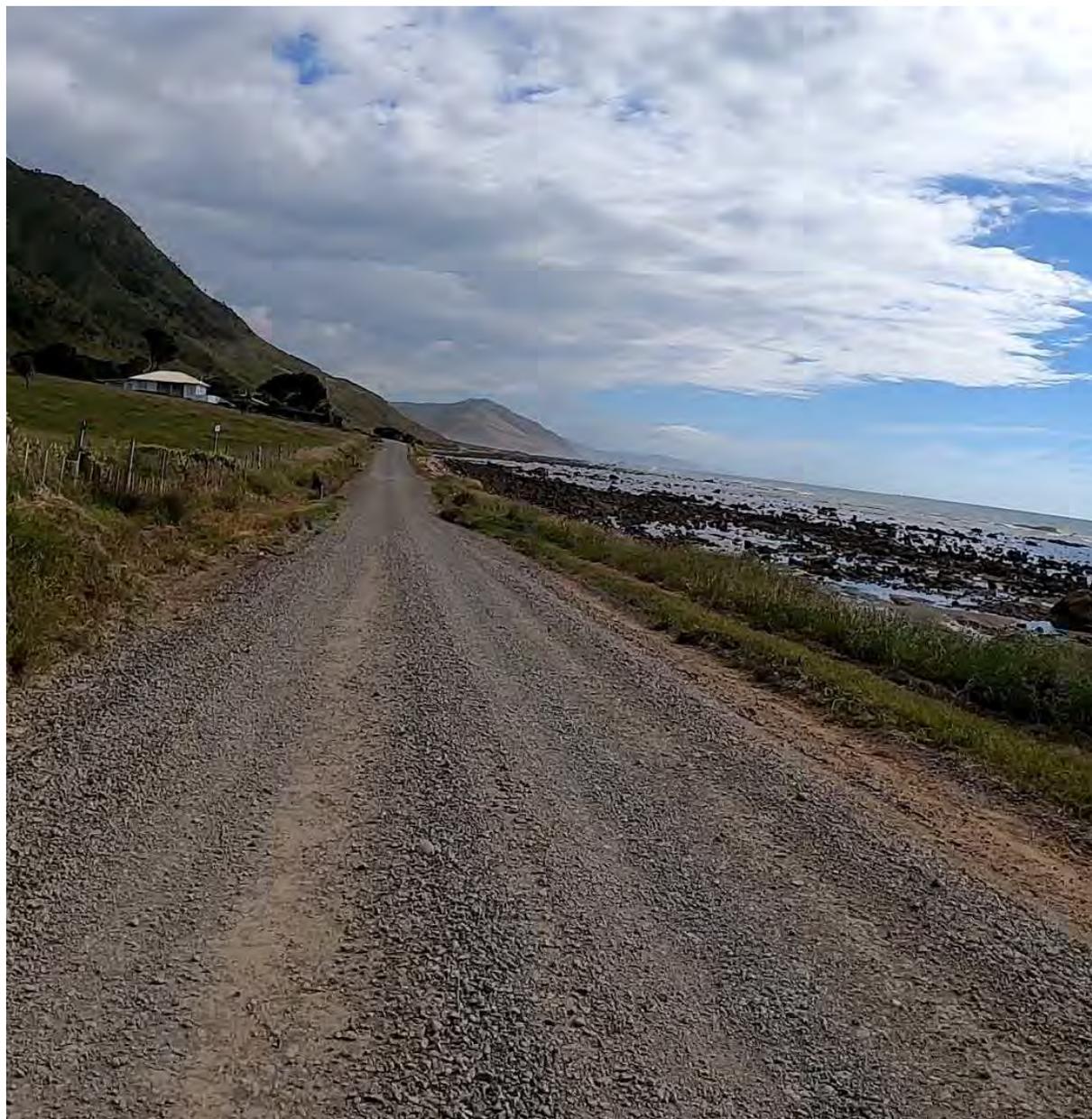
G.2 Workshop Slides





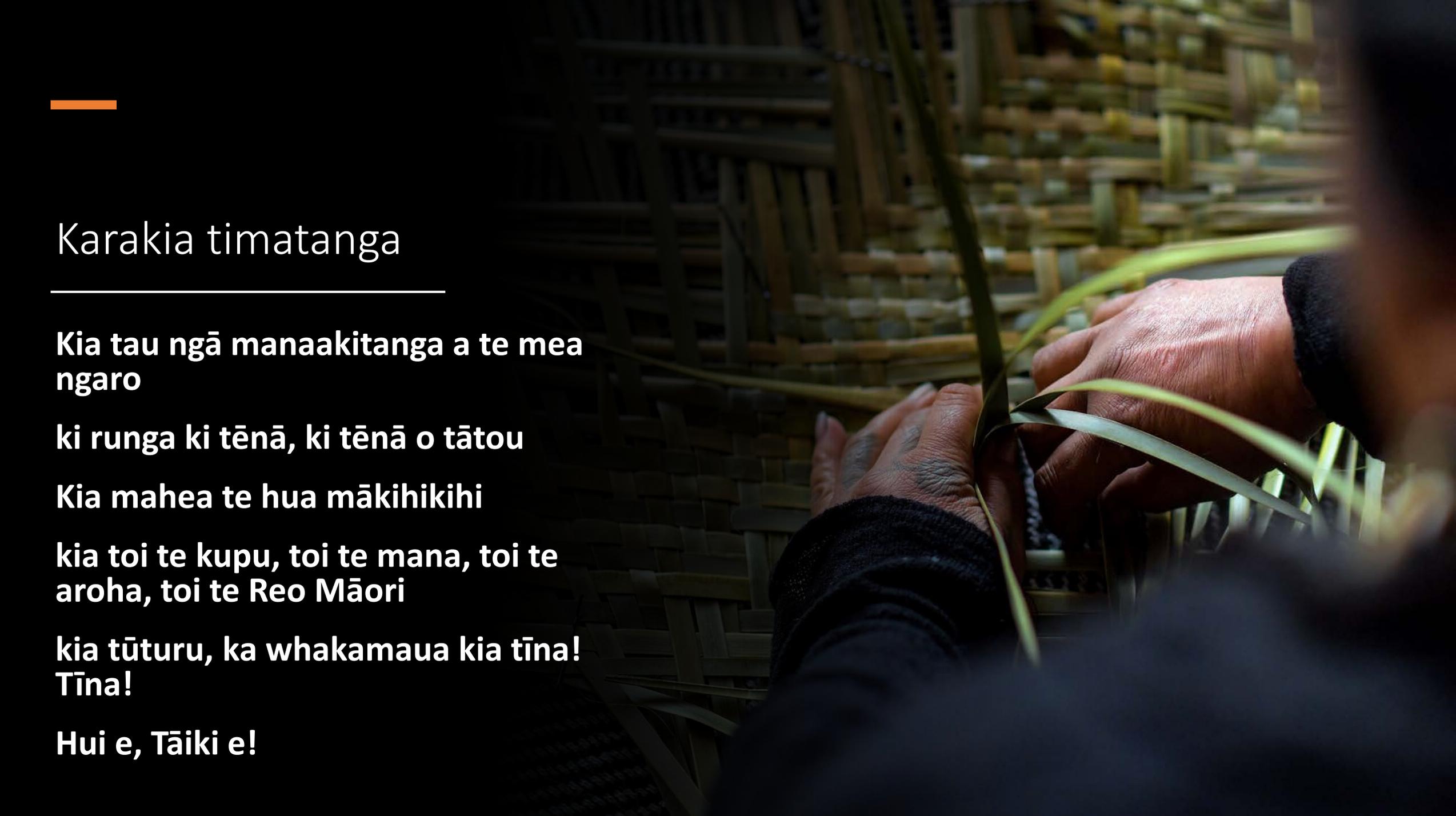
Mataikona Road

Long listing workshop – 23 July 2022



Agenda

Agenda	Time
Welcome/ Introductions	10:30am
Context	10:45am
Review issues / problems & evidence	11:00am
Long-listing of options	11:30am
Examples of coastal protection options	12:20pm
Next steps	12:50pm



Karakia timatanga

**Kia tau ngā manaakitanga a te mea
ngaro**

ki runga ki tēnā, ki tēnā o tātou

Kia mahea te hua mākihikihi

**kia toi te kupu, toi te mana, toi te
aroha, toi te Reo Māori**

**kia tūturu, ka whakamaua kia tīna!
Tīna!**

Hui e, Tāiki e!



Workshop Purpose

- Confirm project scope
- Confirm problems and benefits
- Seek evidence for business case
- Understand community aspirations and opportunities
- Discuss potential options to address problems
- Examples of coastal protection options
- Understand business case process and how to be involved



Business case process

- Agree on problems – Why are we doing this?
- Develop case for change – Why do we need to solve the problem? Why now?
- Develop options to solve problems – How could we solve the problem?
- Develop and refine preferred option – What is the optimal solution?
- Opportunities for funding and approvals
 - Who will fund it?
 - When will it be delivered?
 - How will it be delivered?



Context





Land Use Context

- Three main settlements
 - Sandy Bay ~ 40 properties
 - Mid settlement – 12 properties
 - Northern settlement – 26 properties
- Farming, forestry, apiary
- Castlepoint - general store and pub
- Masterton – closest main centre (60kms)





Transport Context

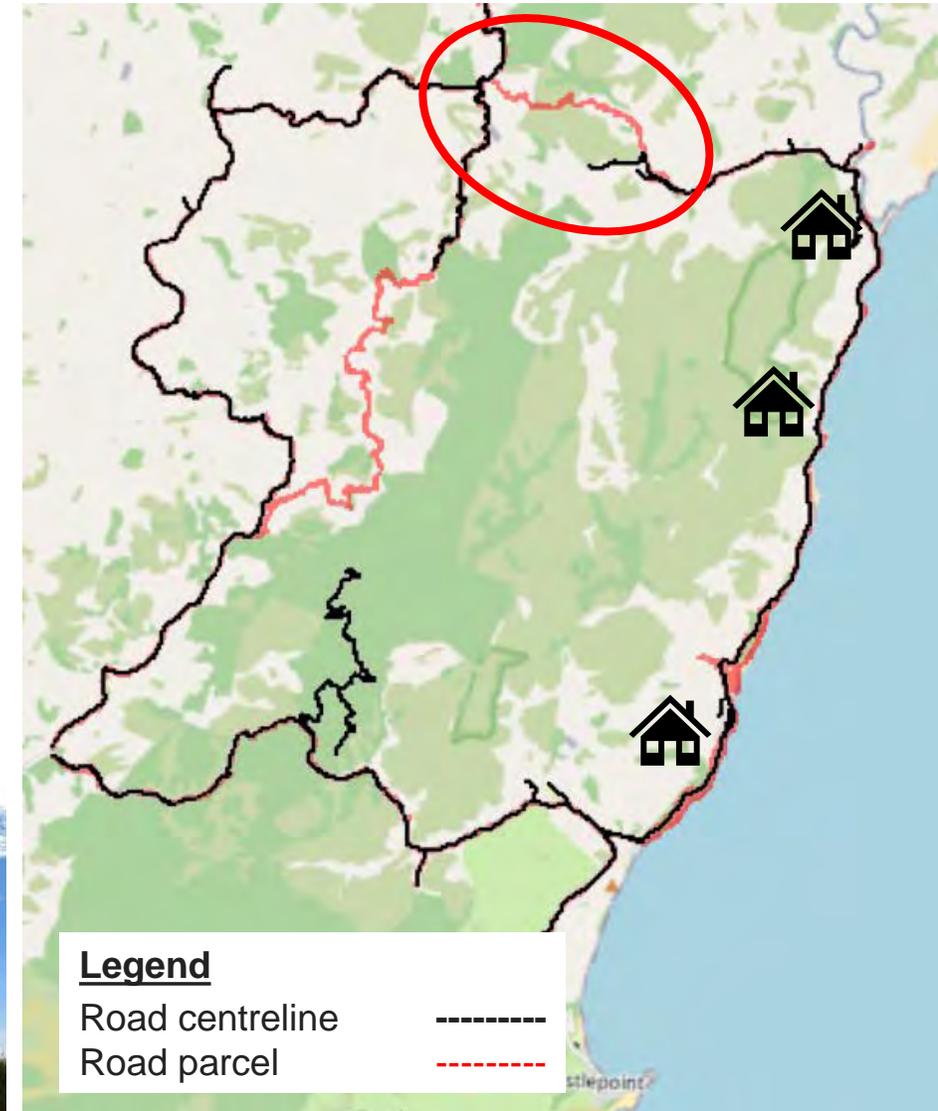
- Narrow road, no shoulder
- Posted speed limit -100km/h, operating speed limit ~ 30km/h
- Traffic volume
 - ranges from 40 - 100 vpd
 - ~10% HV – stock and logging trucks
- Alternative route via Pack Spur Road
 - 4WD, private land, not all-weather route



Sandy Bay: Heavy maintenance often required



RP ~8km (approach to Suicide Rock): narrow, prone to dropouts

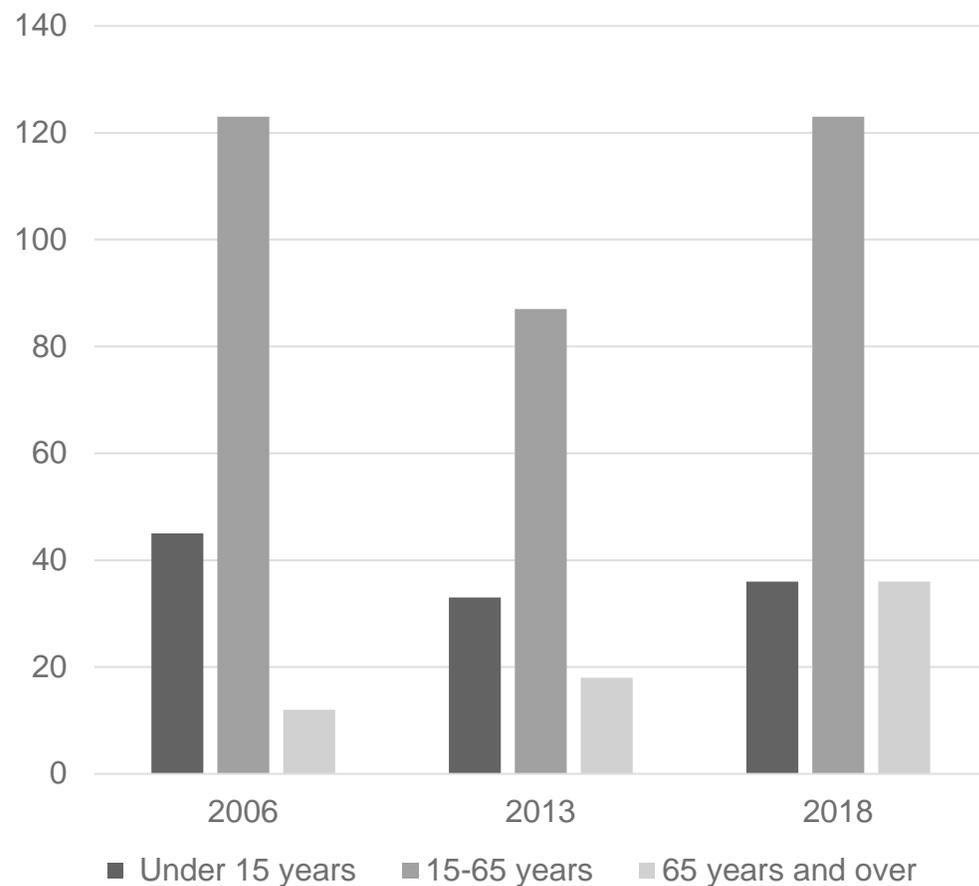




Social and Economic Context

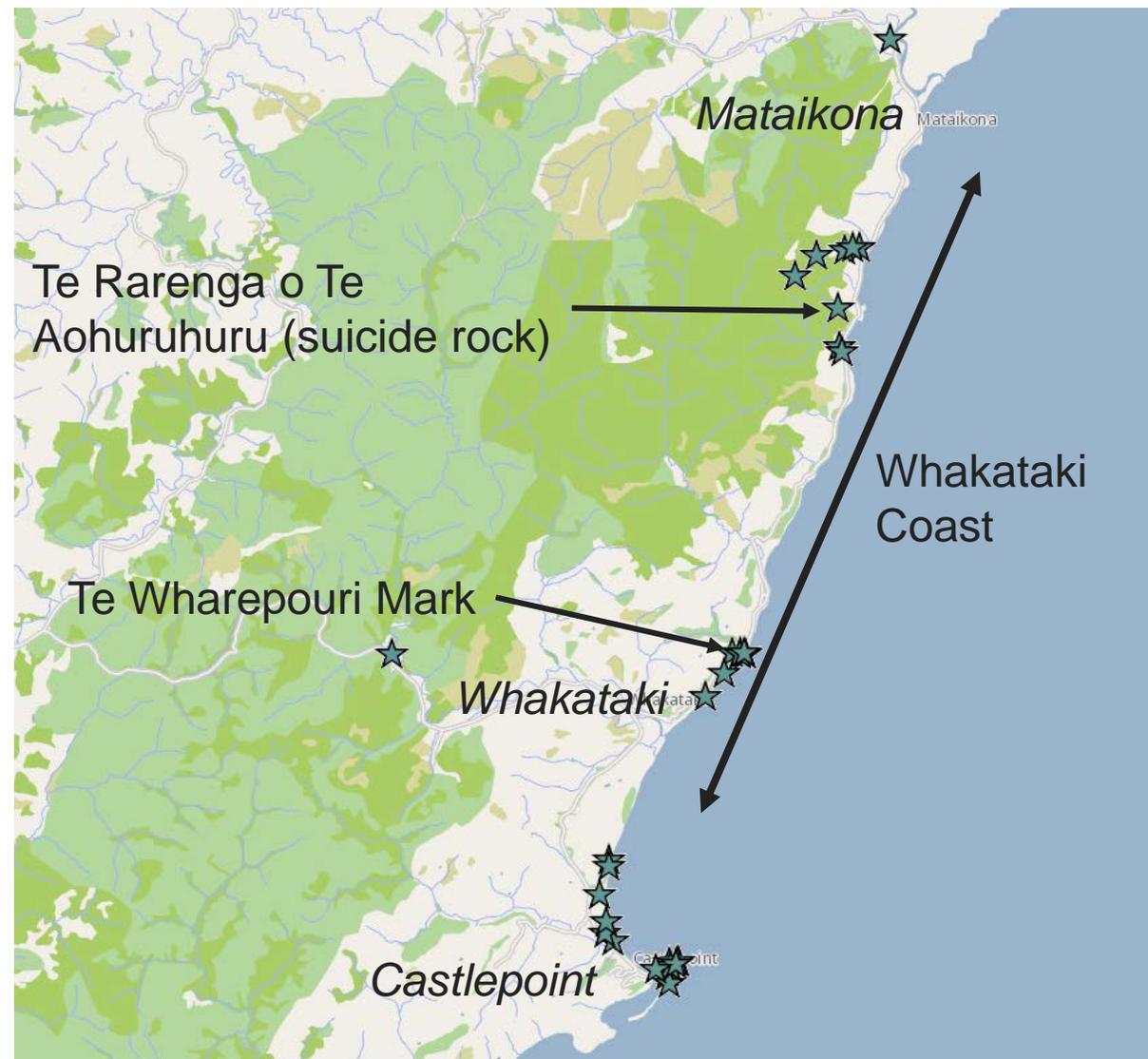


Population



Cultural Context

- >100 recorded archaeological sites
- District Plan -13 sites recorded
- Areas with significant mana whenua values
 - Mataikona reefs
 - Owahanga coast
 - Mataikona River mouth
 - Whakataki Coast

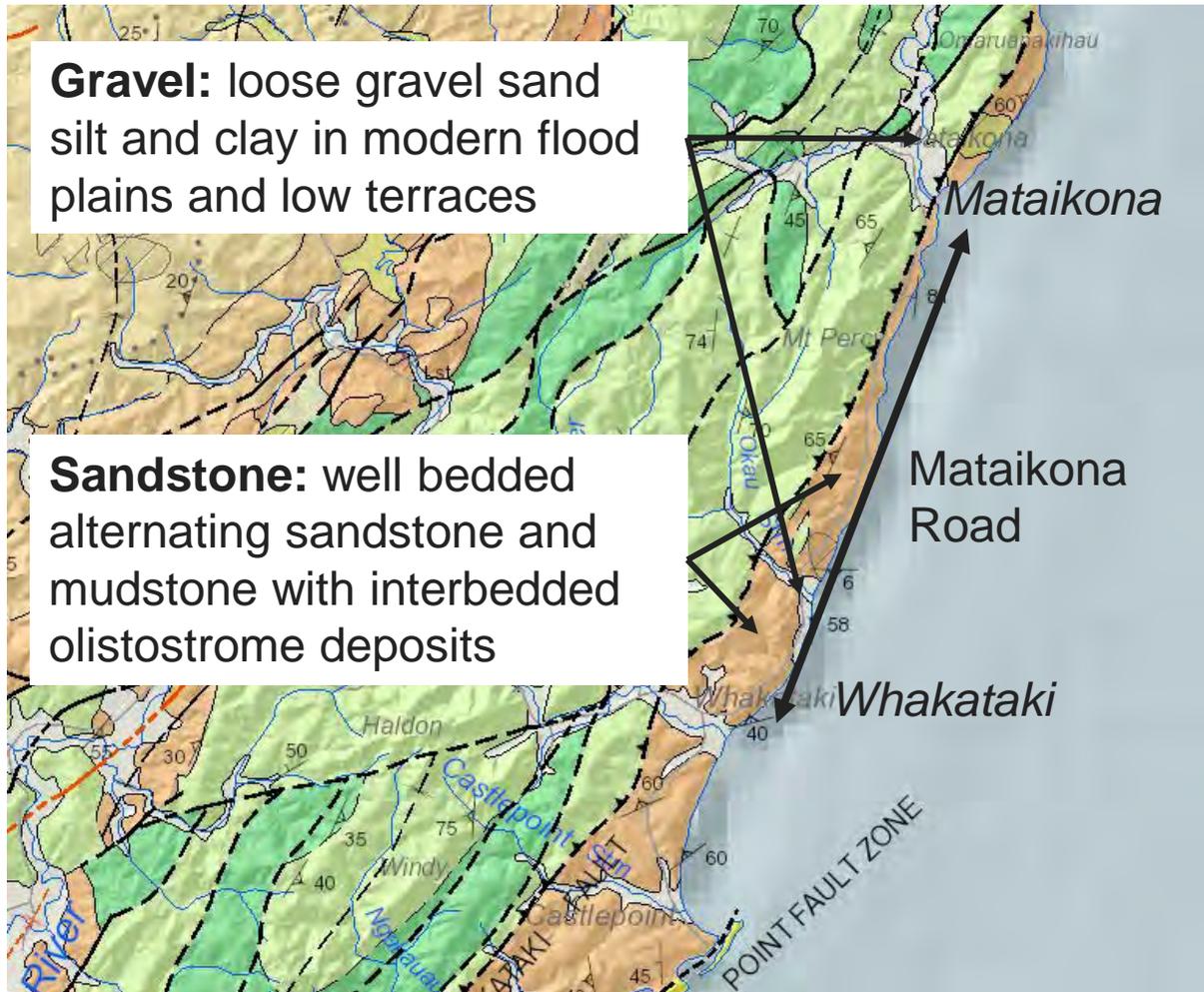




Geological Context

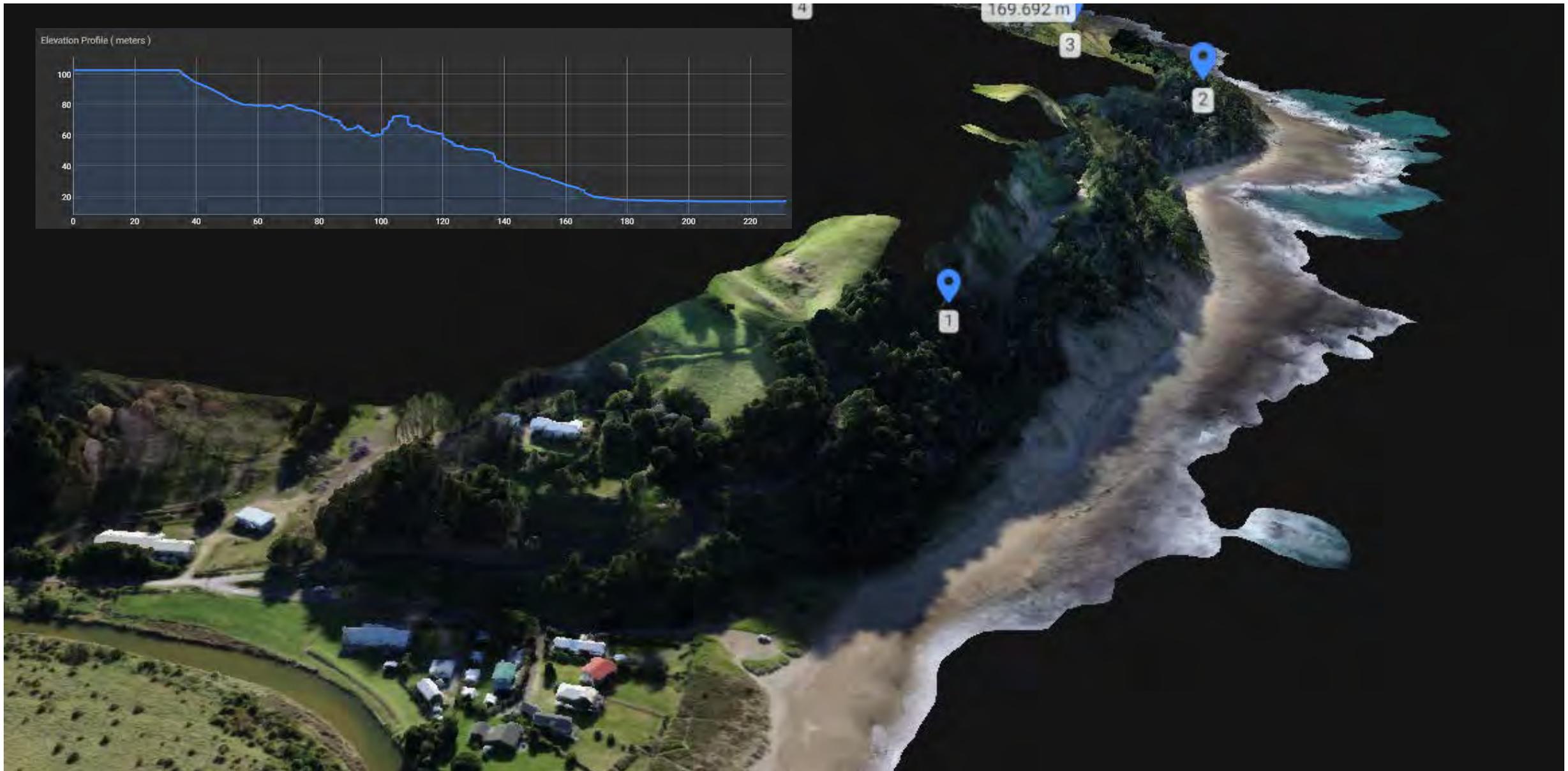
Gravel: loose gravel sand silt and clay in modern flood plains and low terraces

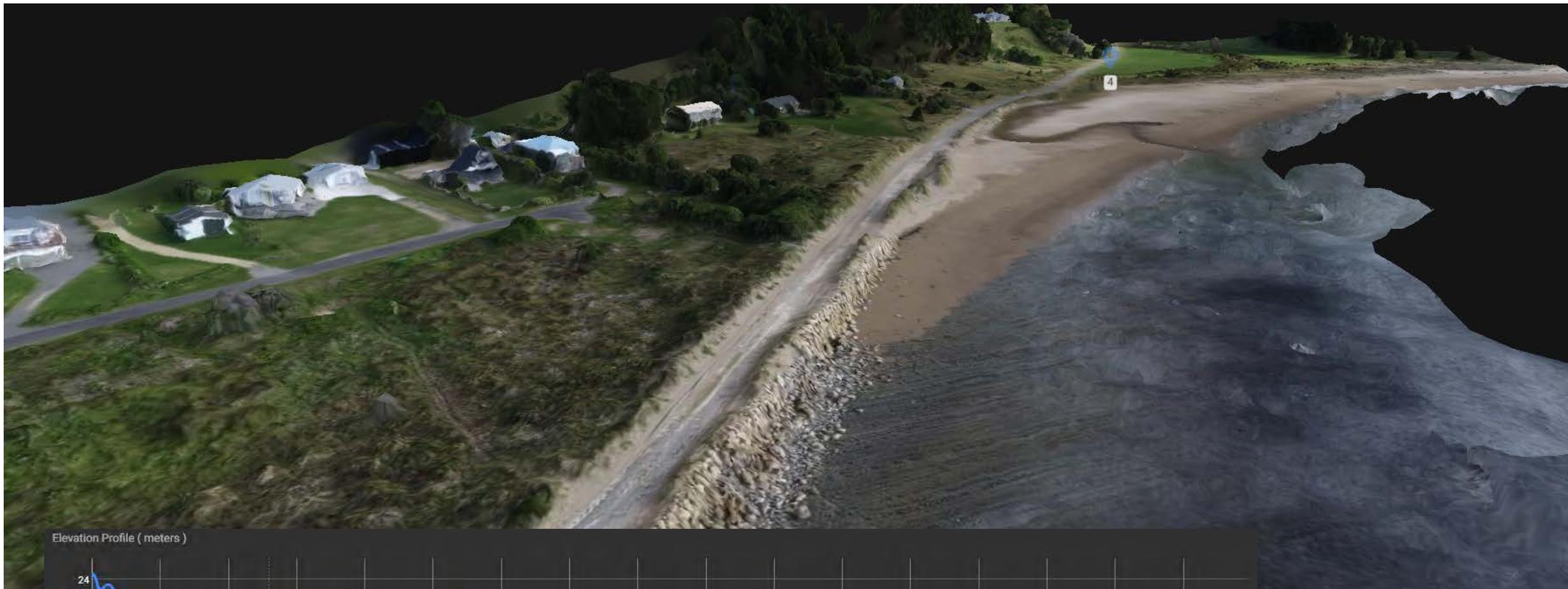
Sandstone: well bedded alternating sandstone and mudstone with interbedded olistostrome deposits



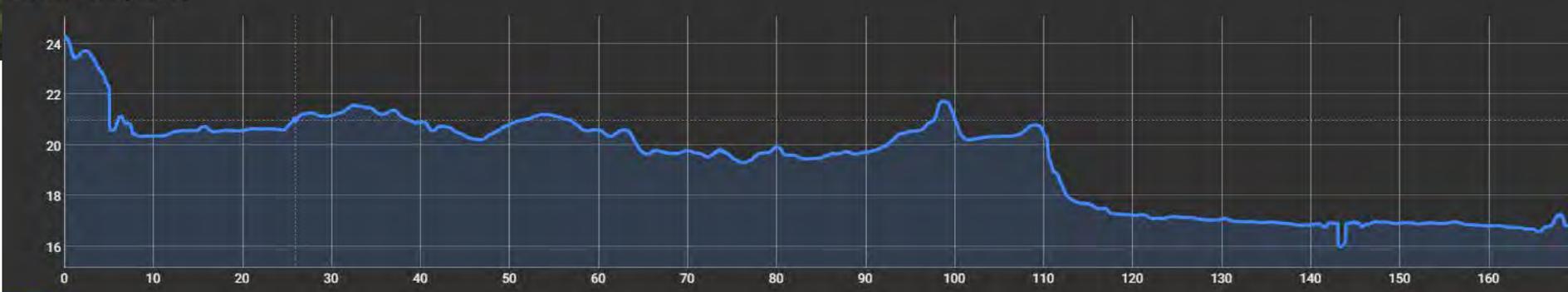


Drone footage





Elevation Profile (meters)

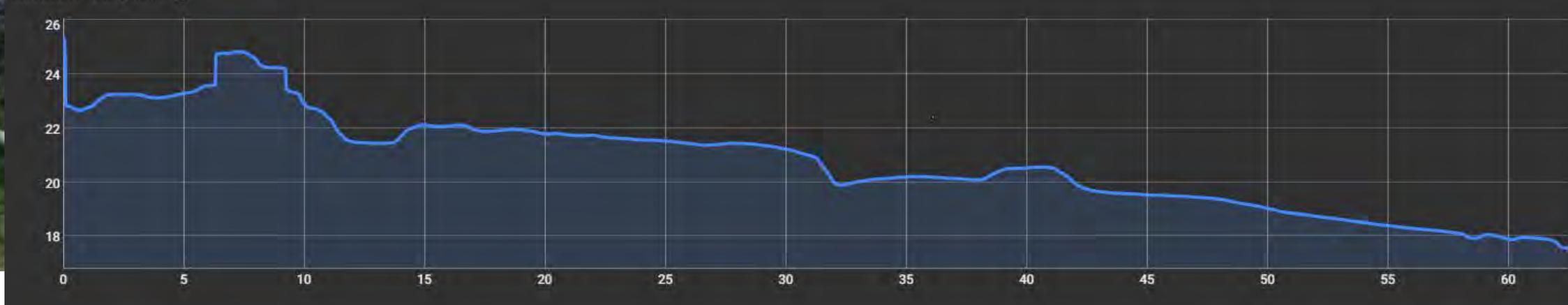








Elevation Profile (meters)





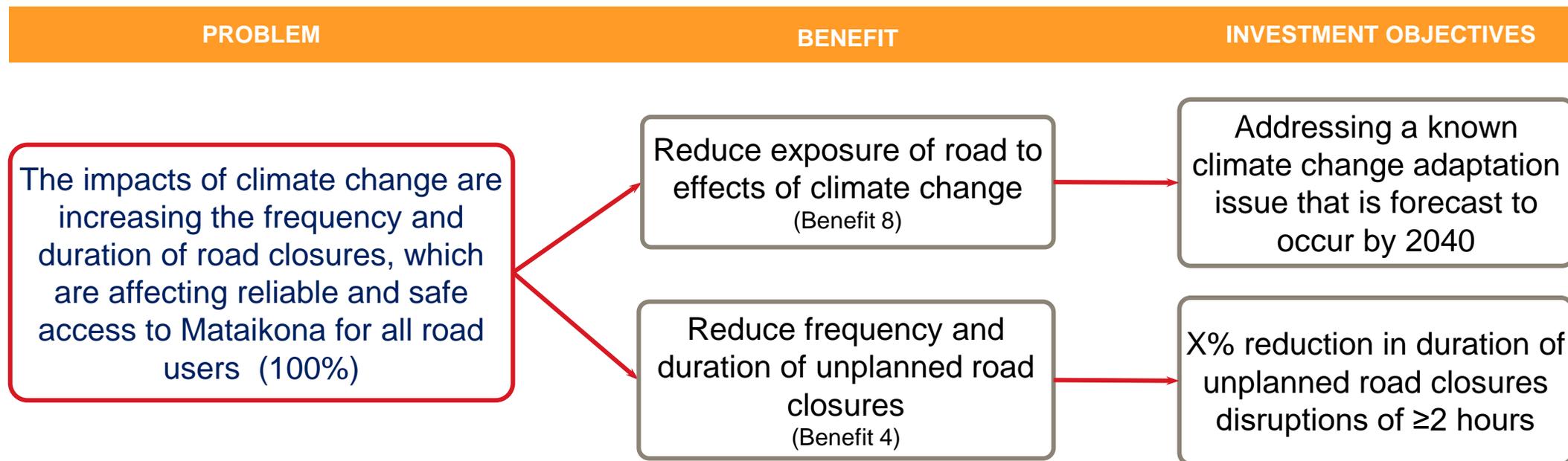
Investment Logic Map





Mataikona SSBC

Purpose Statement: Provide resilient and sustainable access to Mataikona



Opportunity

Improve road user safety on Mataikona Road

Note: Benefits are aligned with Waka Kotahi's Land Transport Benefits Framework. Benefit numbers refer to the relevant benefit within the framework.



Key Evidence





Sea level rise and land subsidence

- Sea level rising ~ 3mm/year
- Land subsiding ~ 7mm/year
- SSP2-4.5: “Middle of the road”

Climate Change Scenario.

- 2050 – 0.55m net SLR
- 2090 – 1m net SLR





Erosion

2013



2021





Slips and dropouts

Front Hill



Approach to Suicide Rock





No alternative routes

- Pack Spur Road
 - Over private land
 - 4WD only





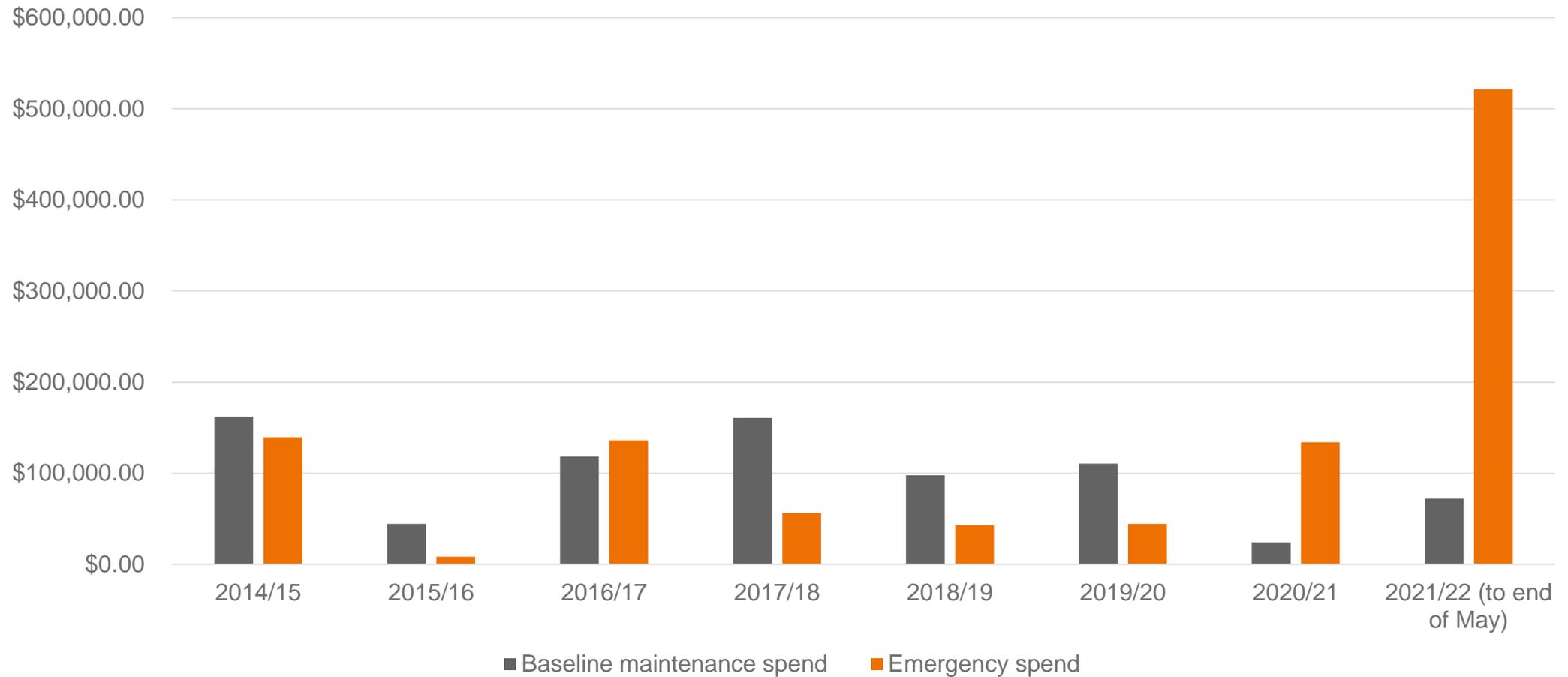
Road closures

- No alternative route for two southern settlements
- Data gap - Anecdotal evidence:
 - Most closures are max 1-2 days
 - In 2005 Front Hill closed for 10 days
 - In 2022 partial closure for 3 months
- Council Facebook page
 - 25 March 2022: road closed for slips at Suicide Rock
 - 13 February 2022: slips at Suicide Rock, passable with care
- Affects route reliability and certainty of access





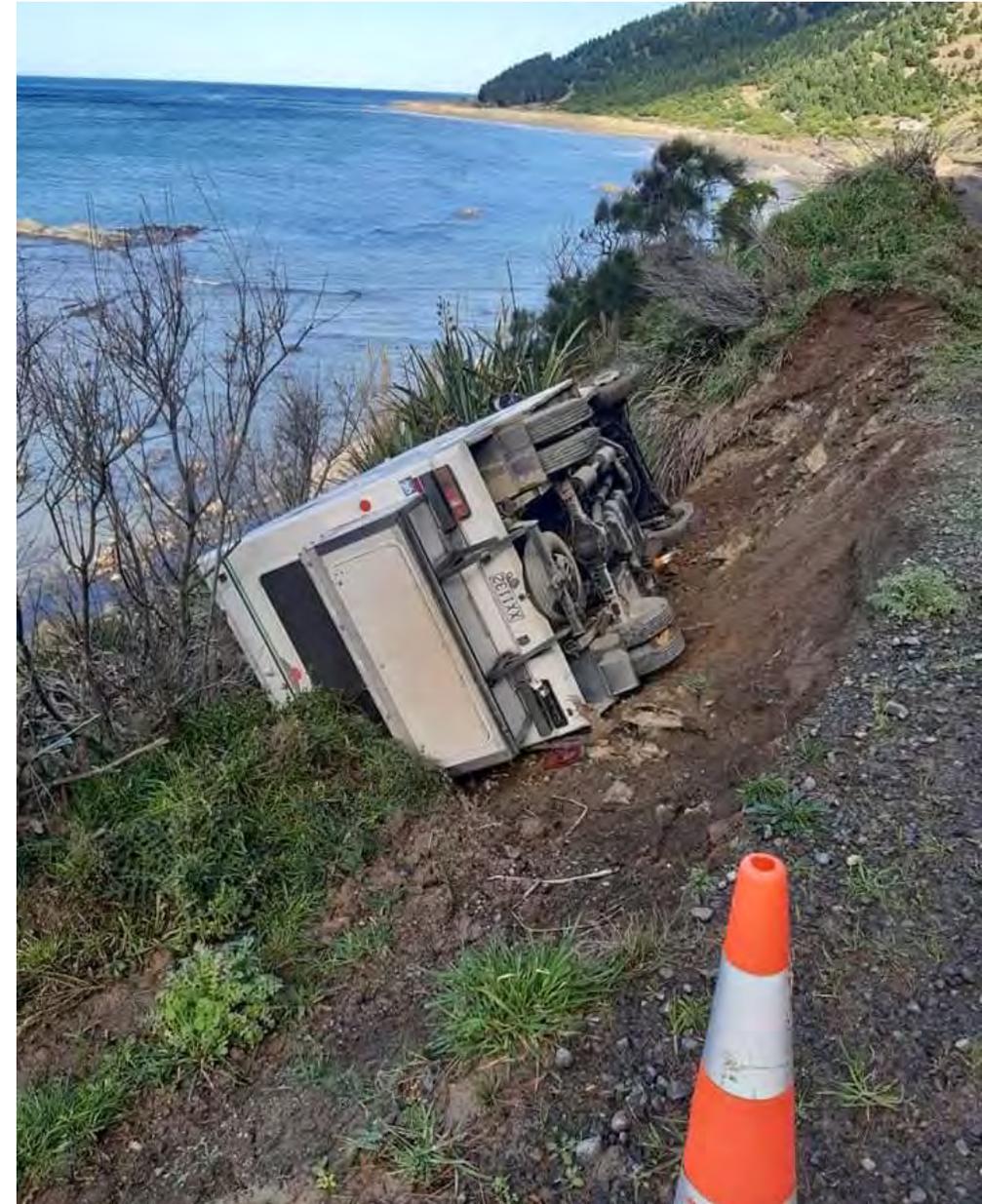
Emergency spend





Unsafe access

- Narrow road with torturous alignment
- Erosion and dropouts making this worse
- Not suitable for some vehicles or drivers:
 - Drivers not used to gravel roads
 - Stock trucks and five-axle trailer trucks have issues





Long List of Options

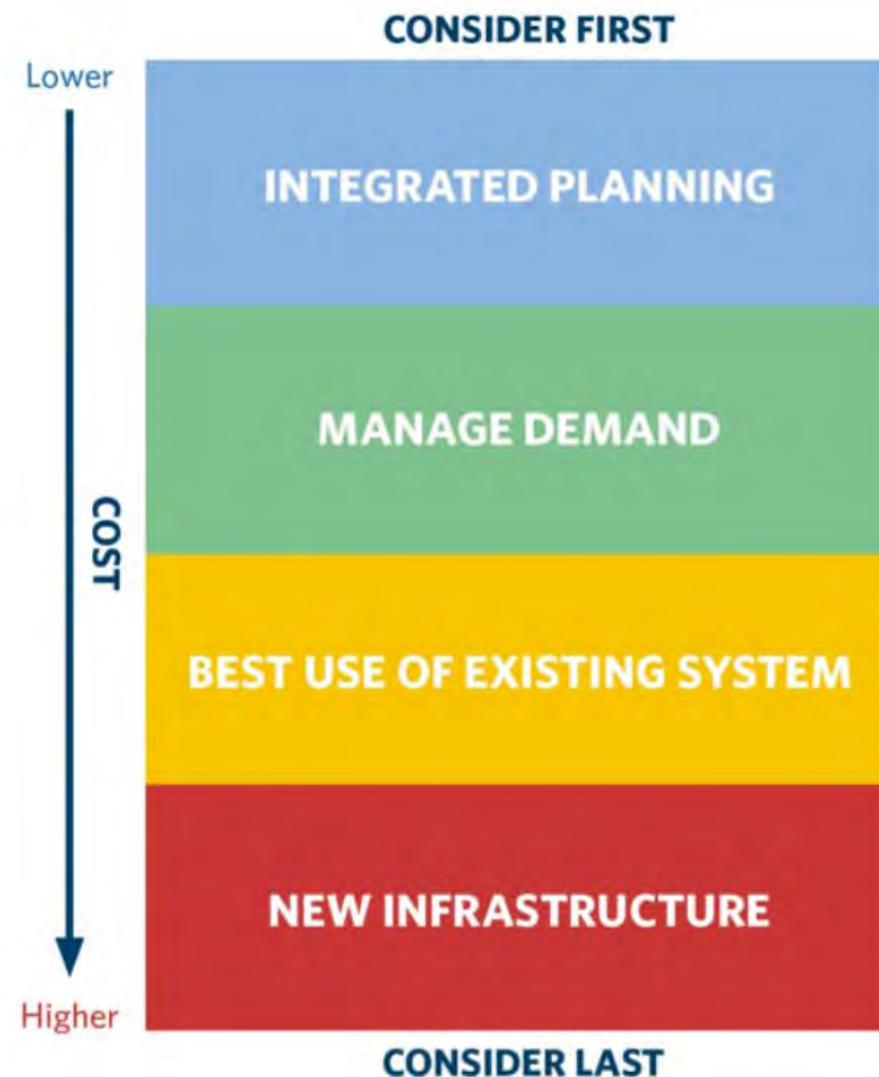




Long-listing

Potential options to address the problem resilience

- Accept and monitor risk
- Preparedness
- Reduce risk (maintain)
 - Reactive/ temporary repairs
- Reduce risk (improve)
 - Longer term repairs/ strengthening
- Prevent / remove / avoid risk
 - Alternative route
 - Alternative access
 - Retreat
- Consider options for different locations vs whole route





Examples of coastal protection options

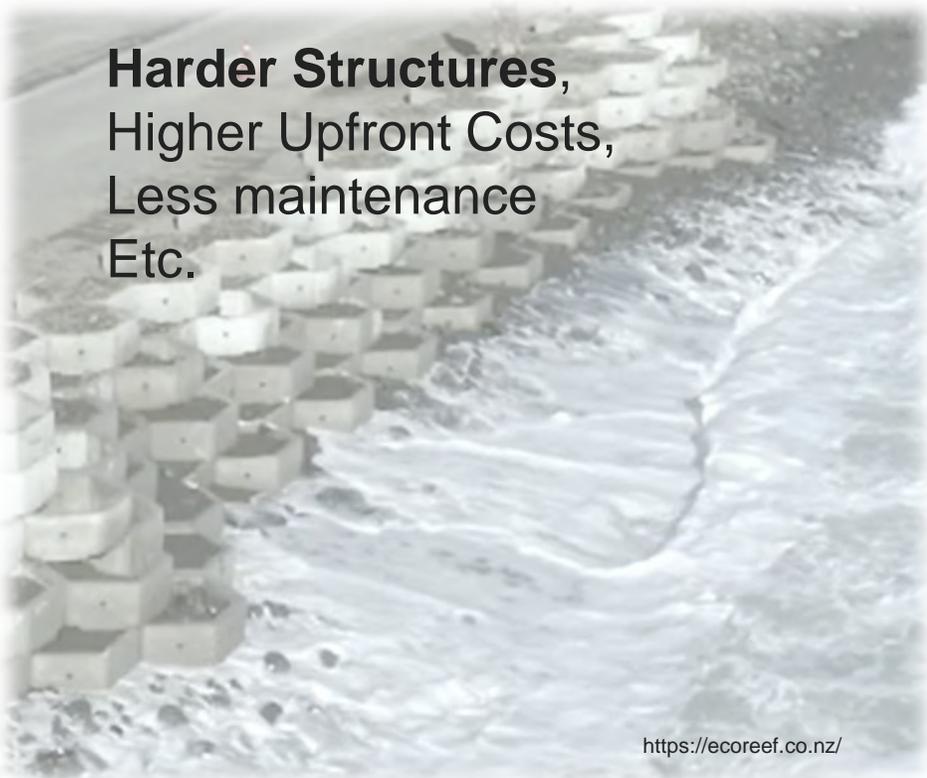




Possible Solutions



Harder Structures,
Higher Upfront Costs,
Less maintenance
Etc.



<https://ecoreef.co.nz/>

Working with nature,
Lower Upfront Costs,
Ongoing maintenance
Etc.



<https://www.coastalrestorationtrust.org.nz/dune-restoration/restoration-planning/>



Coastal Restoration Trust of New Zealand

Dune Planting

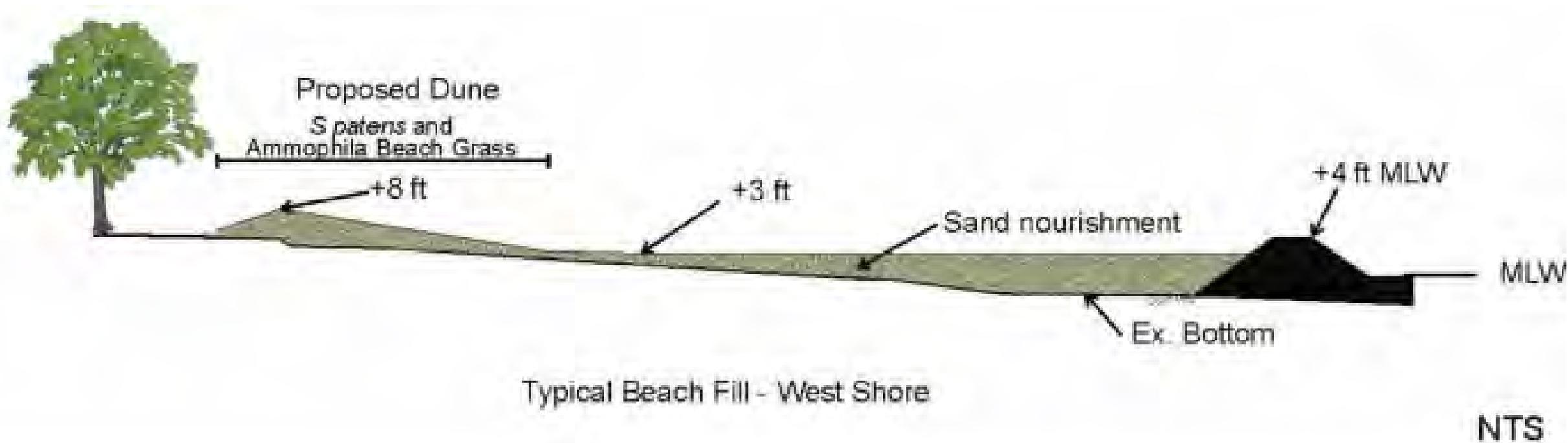
Grasses such as Pingao (*Ficinia spiralis*) & Kōwhangatara (*Spinifex*) holds together the sand on the beach building up the dune protection.



<https://www.nrc.govt.nz/environment/coast/coastcare/sand-dunes/>



Beach Nourishment





Submerged Breakwater/ Artificial Reef





CIRIA C685

Beach Stabilisation

Groynes to prevent longshore movement



©IRIA C685

Seawalls

Longevity vs Cost



Remedial work on the current seawall, 2021. Image: Mark Coote



Bruce Bay, NC

Revetment

Harden up the coastline.
Material Available?

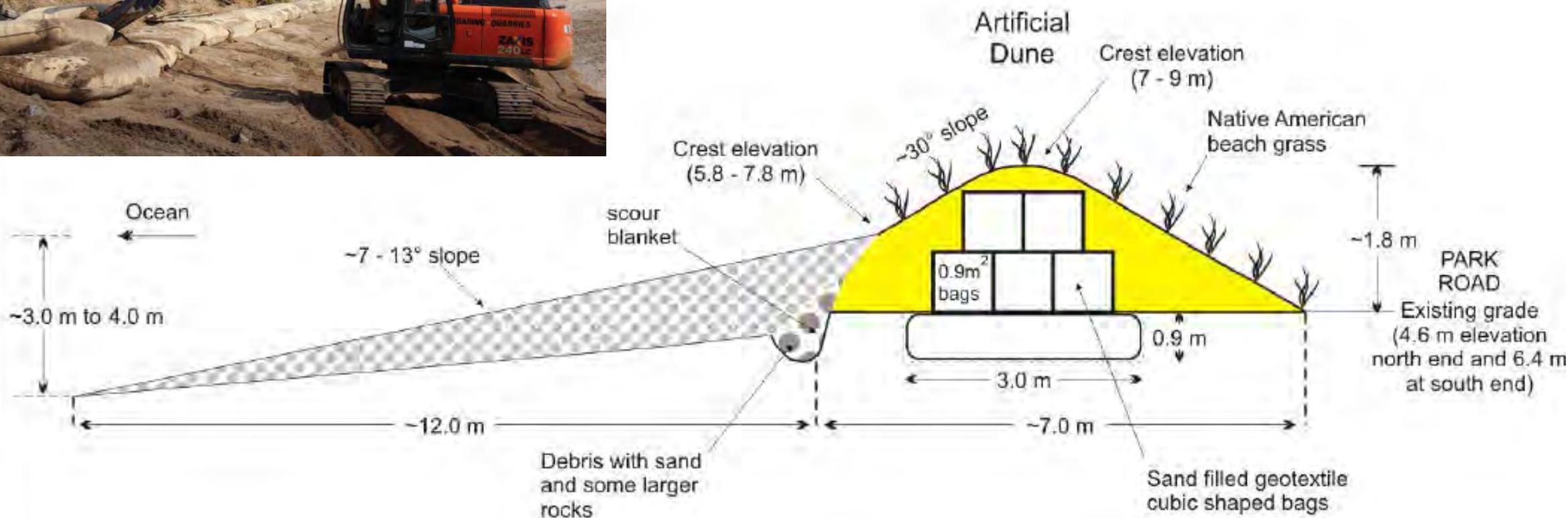


Concrete Armour Units



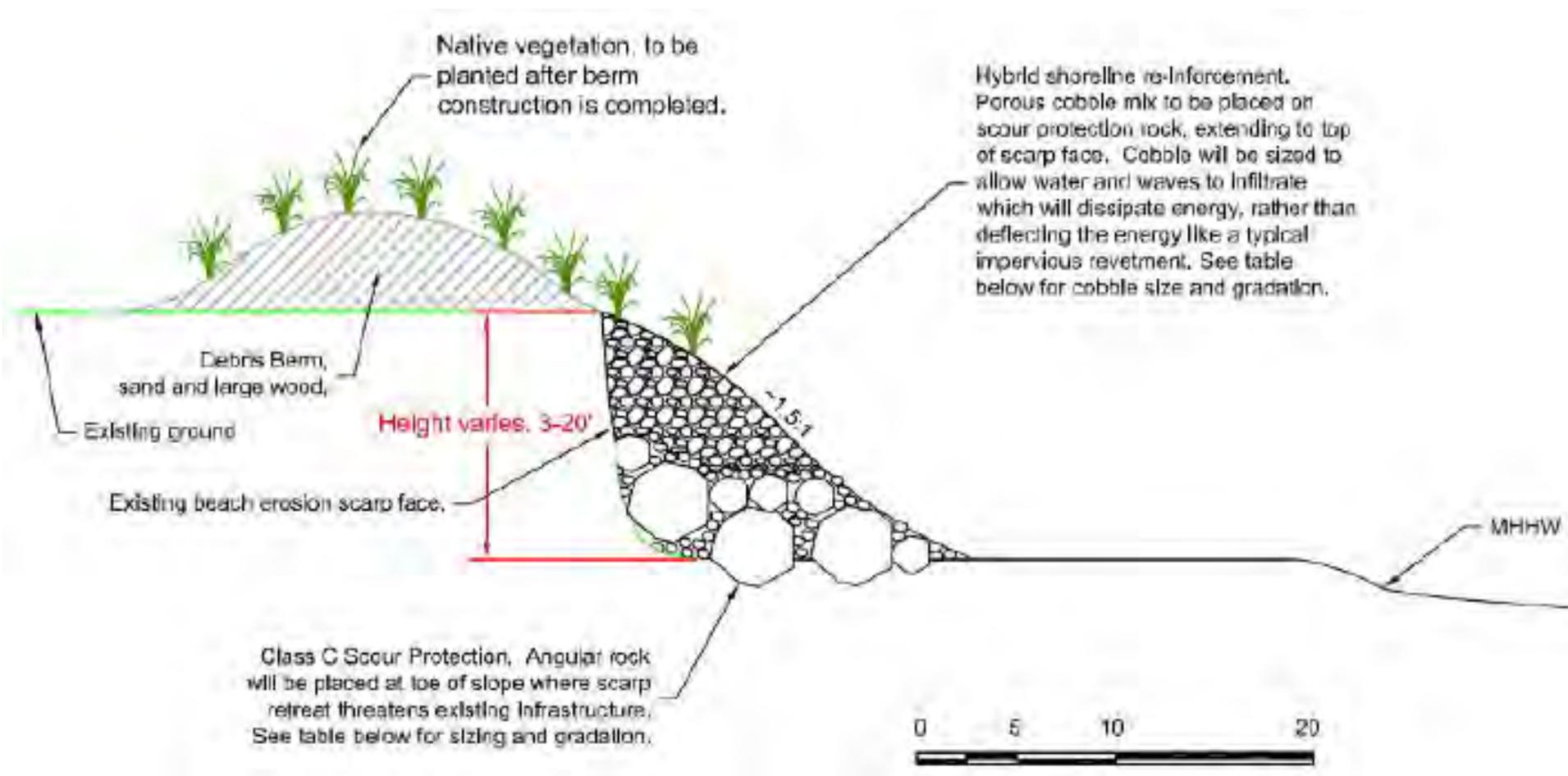


Artificial Dune

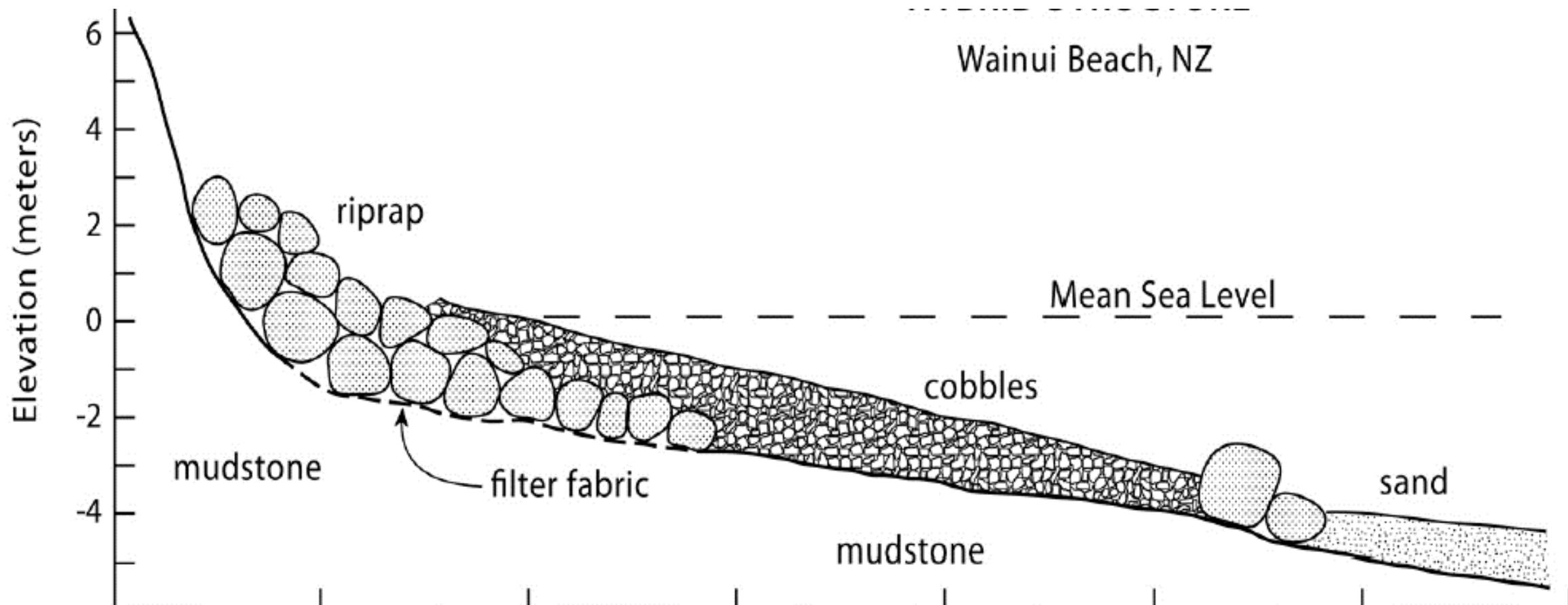




Hybrid Structure



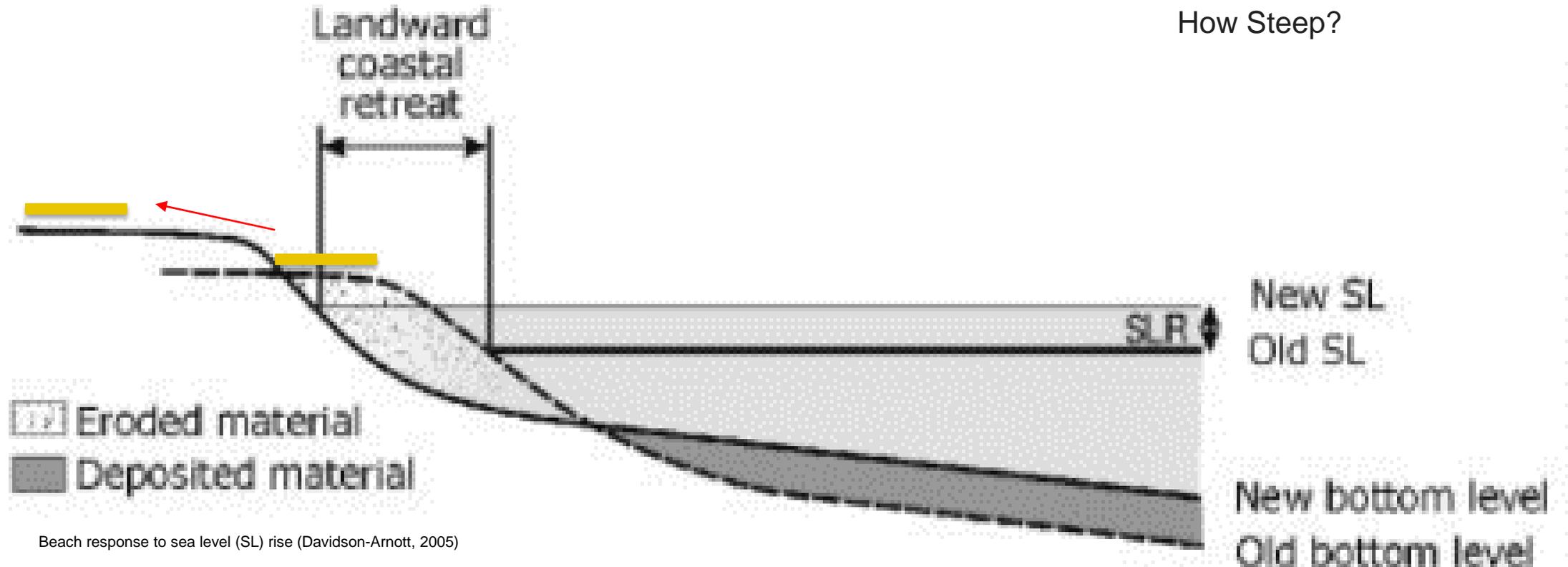
Hybrid Structure





Relocate Road Back (if possible)

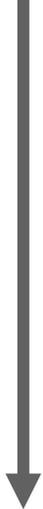
Is land available?
How Steep?



Beach response to sea level (SL) rise (Davidson-Arnott, 2005)

Stakeholder Preferences

- Preferred option? Why??
 - Different solutions for different locations?
-
- Do nothing (access is lost soon)
 - Do minimum (short term reactive repairs)
 - Strengthen existing route (longer term repairs)
 - Alternative route (e.g. improve Pack Spur Road)
 - Alternative access modes (e.g. sea, air, walking, cycling, etc)
 - Retreat





Next Steps

- Collate long list of options
- Define evaluation criteria
- Complete MCA evaluation → shortlist of options
- Undertake analysis of shortlisted options
- Undertake MCA of short list → emerging preferred option
- Confirm preferred option
- Complete preliminary design for preferred option
- Complete and submit business case document
- Target completion date – February 2023

Opportunities for future engagement / involvement



Evaluation criteria (MCA)

Investment objectives

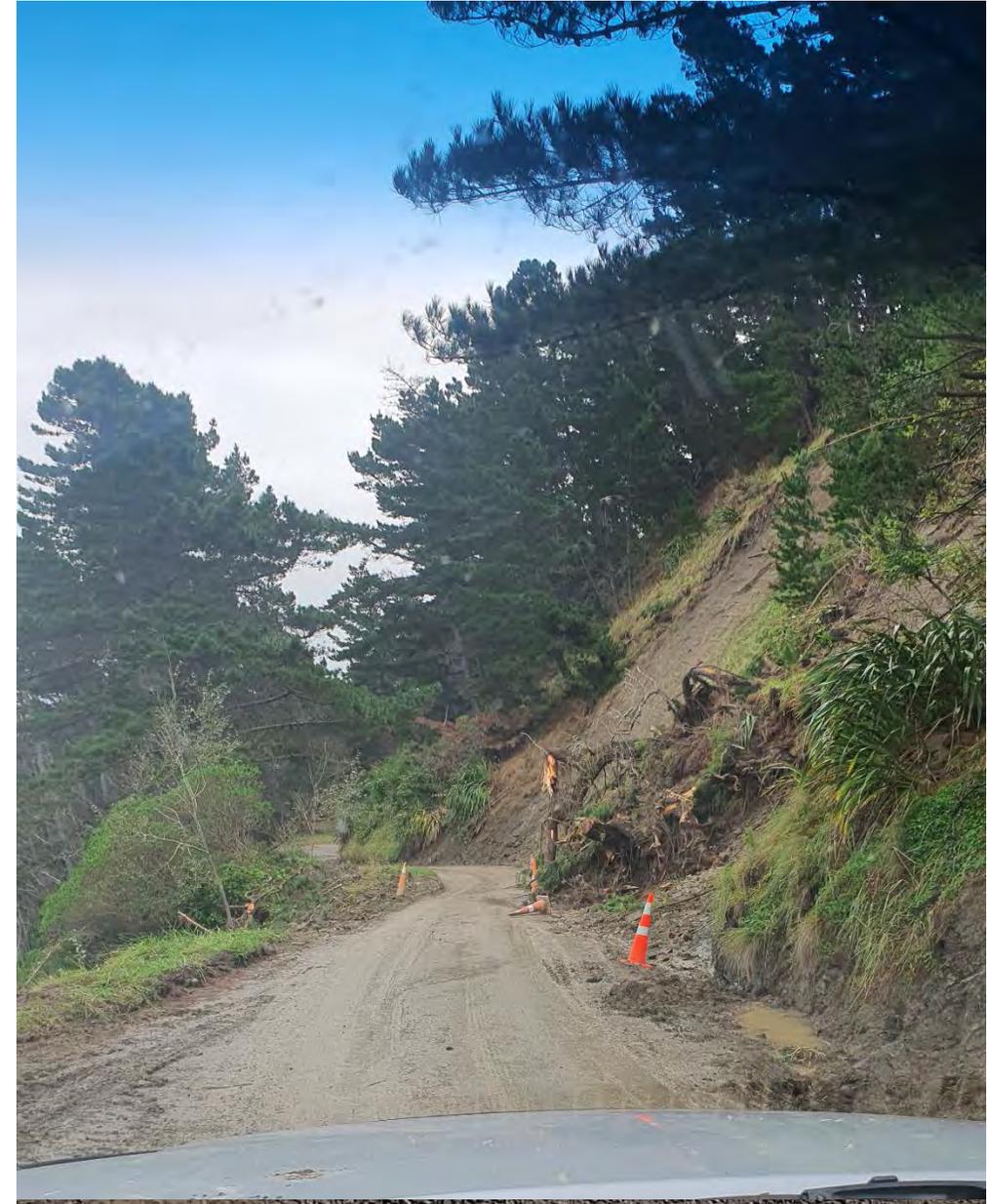
- Addressing a known climate change adaptation issue
- Reduction in duration of unplanned road closures

Four wellbeings

- Effects on Te Ao Māori
- Environmental effects
- Social and community
- Economic development and growth

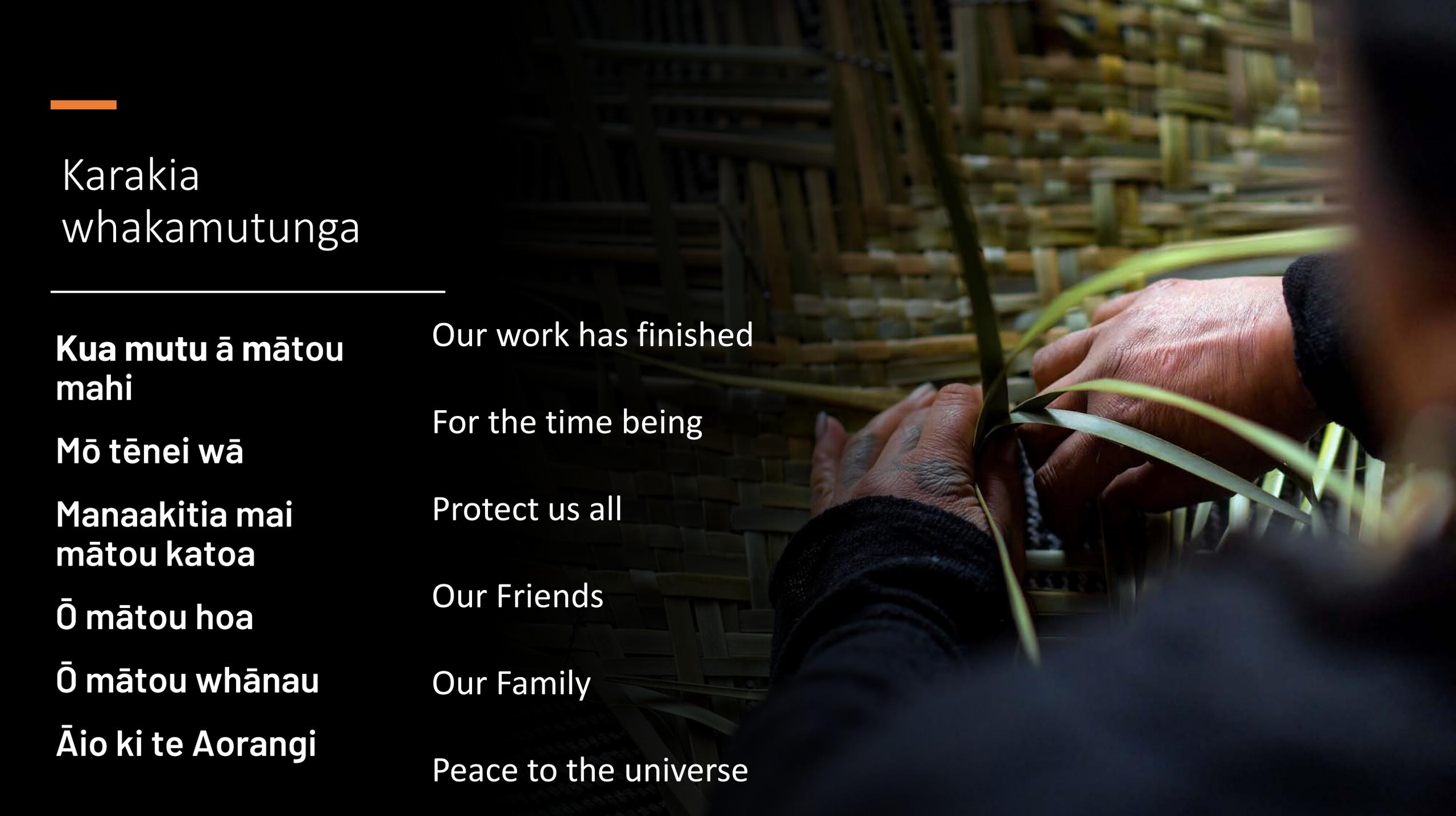
Critical Success Factors

- Property impacts
- Consentability
- Climate change mitigation
- Technical difficulty
- Safety and design
- Value for money





Questions?



**Karakia
whakamutunga**

**Kua mutu ā mātou
mahi**

Our work has finished

Mō tēnei wā

For the time being

**Manaakitia mai
mātou katoa**

Protect us all

Ō mātou hoa

Our Friends

Ō mātou whānau

Our Family

Āio ki te Aorangi

Peace to the universe



Providing resilient
and sustainable
access to
Mataikona

Appendix H Early Assessment Sifting Tool



Early Assessment Sifting Tool Template

Early Assessment Sifting Tool: Excel template

The Early Assessment Sifting Tool (EAST) supports an initial 'coarse screening' of alternatives and options. The EAST is designed to quickly and robustly rule out alternatives and options, allowing for a more manageable subsequent Multi Criteria Analysis exercise.

Project Overview

Date:	29/06/2020
Project name:	Mataikona Road

Business case phase:	Single stage business case
Problem/opportunity statement:	The impacts of climate change on Mataikona Road are increasing the frequency and duration of road closures, which are affecting reliable to safe access to Mataikona for all road users
Do minimum:	Continue with reactive maintenance

Investment objective:	Addressing a known climate change adaptation issue
Investment objective:	Reduction in duration of unplanned road closures

Alternative or option details			Investment objective		Practical Feasibility	Score		Summary of decision made	
Unique identifier	Name of alternative/option	Description of alternative/option	Addressing a known climate change adaptation issue	Reduction in duration of unplanned road closures	Technical	Average	Rank	Summary of decision made	Progress or discontinue this alternative/option?
1	Abandon road	walk away from road	4	1	1	3.33	9	taken through due to do nothing requirement	Progress
2	Alternate route	upgrade Pack Spur Road for light vehicles	4	3	4	3.00	14	score above 2.5	Progress
3	retreat road	move the road inland where physically possible, i.e. in front of Sandy Bay	4	4	2	4.00	1	score above 2.5	Progress
4	over slip protection (light)	eg slope planting, scaling, non-engineered protection barriers	3	2	1	3.33	9	score above 2.5	Progress
5	over slip protection (moderate)	surface drainage, partial re-profiling, moderate capacity protection barriers	4	4	2	4.00	1	score above 2.5	Progress
6	over slip protection (heavy)	slope re-profiling, engineered barrier and fences, rock anchors	5	5	5	3.67	3	score above 2.5	Progress
7	under slip protection (light)	pavement reconstruction, improved surface drainage, planting, monitoring	3	2	1	3.33	9	score above 2.5	Progress
8	under slip protection (moderate)	erosion protection mats, subsurface drainage	4	3	2	3.67	3	score above 2.5	Progress
9	under slip protection (heavy)	retreat/ realignment, engineered retaining walls	5	4	5	3.33	9	score above 2.5	Progress
10	coastal erosion protection (light)	planting artificial dunes, planting, restricted access	3	3	1	3.67	3	score above 2.5	Progress
11	coastal erosion protection (moderate)	beach stabilisation, beach nourishment, hybrid structures, wooden seawall	4	4	3	3.67	3	score above 2.5	Progress
12	coastal erosion protection (heavy)	rock/ concrete revetment, seawall, artificial reef	5	5	5	3.67	3	score above 2.5	Progress
13	Drainage improvements	subsoils, culverts, water channels	3	3	2	3.33	9	score above 2.5	Progress
14	Road widening		2	3	3	2.67	15	score above 2.5	Progress
15	Surfacing improvements	increase seal, increased maintenance outside sandy bay	1	1	1	2.33	16	Does not contribute to either investment objective, MDC has no budget to increase sealed network	Discontinue
16	safety improvements	road widening, barriers, rutting improvements	1	1	3	1.67	18	Does not contribute to either investment objective	Discontinue
17	increased maintenance		3	3	1	3.67	3	Score above 2.5, taken through as a do min/ minor improvements	Progress
18	Bridge improvements	just north of Sandy Bay	2	2	4	2.00	17	According to Alec, no issues with the bridge, not progressed	Discontinue

Appendix I Scoring Rational

ID	Package	Scoring rationale		
1	Do nothing	Criteria	Rationale	Score
		Climate change adaptation:	Does not address climate change	-3
		Reduction in road closures:	No, road is closed permanently	-3
		Natural environment:	No adverse effects or benefit for the environment by doing nothing	0
		Social and community:	Serious adverse effects for the community/ the community will be lost	-3
		Economic:	Seriously adverse to Mataikona economy	-3
		Property impacts:	At some point it will be not be feasible to provide access.	-3
		Technical difficulty:	Not palatable but would be easy to implement	+3
2	Do minimum	Criteria	Rationale	Score
		Climate change adaptation:	Addresses climate change slightly more than Do Nothing as problems are responded to as they occur. However, there is no long-term plan and this approach does not address long term climate change impacts.	-2
		Reduction in road closures:	No real improvement to road closures, but better than Do Nothing.	-2
		Natural environment:	Maintains the status quo – no change	0
		Social and community:	A little better than Do Nothing but will not address the long term and the feelings of uncertainty for the community will continue	-2
		Economic:	A little better than Do Nothing but will not address the long term uncertainty.	-2
		Property impacts:	A little better than Do Nothing but will not address the long term and impacts will be felt eventually.	-2
		Technical difficulty:	There are some material supply constraints, but generally very easy to implement.	+2
3	Minor improvements	Criteria	Rationale	Score
		Climate change adaptation:	Does not address long term climate change issues (sea level rise) but will be better than Do Nothing.	-2
		Reduction in road closures:	Slightly better than Do Minimum due to targeted rock armouring aspect.	-1
		Natural environment:	No improvement – no real change from existing	0
		Social and community:	This option will improve on the current feelings of uncertainty regarding access but will not be a significant improvement.	0
		Economic:	While the package doesn't provide certainty of access it does provide some improvement to the status quo, although providing opportunities for development and growth doesn't align with the new National Adaptation Plan in terms of limiting development in at risk areas.	-1
		Property impacts:	Impacts to property will be as they are currently, no property is required for this option.	0
		Technical difficulty:	Same as the Do Minimum as this is just a more structured approach	+2



ID	Package	Scoring rationale		
4	Retreat	Criteria	Rationale	Score
		Climate change adaptation:	Not all climate issues are reduced, but the package does increase the time before sea level rise becomes an issue again.	+1
		Reduction in road closures:	Some issues such as over slips will remain, but improvement on the status quo.	+1
		Natural environment:	While the road will take over current natural environment, it can be mitigated by re-planting/ improving the sections of road that are being retreated/ abandoned.	0
		Social and community:	Provides more longevity for the community.	+1
		Economic:	Allows for access for heavy vehicles (no improvement on hilly section) and longevity/ improved certainty of access for business operators.	+2
		Property impacts:	Some properties will be reduced in size by either erosion or land purchase for retreating the road and acquiring land may be complicated.	-2
		Technical difficulty:	Involves construction of new road sections, so while relatively simple slightly more complicated than just maintaining what is already there.	+1
5	Strengthen	Criteria	Rationale	Score
		Climate change adaptation:	Does the most to mitigate the impacts of climate change.	+3
		Reduction in road closures:	Reduces road closures the most due to including works that addresses over slips, under slips and coastal erosion.	+3
		Natural environment:	These are heavy engineering solutions and will have the most adverse effect on the environment.	-3
		Social and community:	Will do the most to promote feelings of community and retain access to key services (inc. emergency services).	+3
		Economic:	Will provide long term certainty for the Mataikona economy.	+3
		Property impacts:	There will be some small impacts due to space requirements for infrastructure, but this will be offset by long term longevity.	+3
		Technical difficulty:	Most technically difficult of these packages, but nothing that is ultimately impossible to implement.	-2
6	Optimised (low cost)	Criteria	Rationale	Score
		Climate change adaptation:	Addresses some of the impacts of climate change, but not as much as the Strengthen or Optimised (high cost) packages.	+1
		Reduction in road closures:	Addresses the whole road, but not as good as the Strengthen or Optimised (high cost) packages.	+2
		Natural environment:	Some heavy engineering solutions, so this will have a minor adverse effect on the environment, although not as much as the Strengthen or Optimised (high cost) packages.	-1
		Social and community:	Better improvement than just Retreat	+2
		Economic:	Improvement, but not as much as the Strengthen or Optimised (high cost) packages	+2



ID	Package	Scoring rationale		
		Property impacts:	Overall net good as properties will be protected from erosion by the road but there may be some minor reductions in property through land purchase to allow for retreat/ some coastal protections	+1
		Technical difficulty:	No anticipated to be technically difficult to implement.	+2
7	Optimised (high cost)	Criteria	Rationale	Score
		Climate change adaptation:	As per the Strengthen package, does the most to address climate change	+3
		Reduction in road closures:	As per the Strengthen package, does the most to reduce unplanned road closures	+3
		Natural environment:	Heavy engineering solutions, will have the adverse effect on the environment (not as much as Strengthen, but more than Low Cost Optimised)	-2
		Social and community:	As per Strengthen package, best for the community	+3
		Economic:	As per Strengthen package, best in the long term	+3
		Property impacts:	Would pick a less impact, positive for properties by addressing coastal erosion.	+2
		Technical difficulty:	Not as complex as Strengthen due to prioritised interventions, but still more difficult than Low Cost Optimised	-1
8	Alternate route 1	Criteria	Rationale	Score
		Climate change adaptation:	Needs to include some coastal protection at Mataikona, but still have an issue at the middle settlement	+1
		Reduction in road closures:	Most of the issues are along the section abandoned.	+1
		Natural environment:	Minor environmental impact compared to the Strengthen package due to work required at the Mataikona River section.	-1
		Social and community:	Fractures the community	-2
		Economic:	Cutting off easy access to the pub, shop, fuel, etc for the middle and Mataikona settlements. Commercial activity will be reduced due to lack of heavy vehicle access to the northern end.	-2
		Property impacts:	Access to the properties between Sandy Bay and the middle settlement will be lost. There are not many buildings along here and they appear to be temporary structures.	-1
		Technical difficulty:	Not as easy as maintaining the road, but upgrading Pack Spur not that difficult.	+1
9	Alternate route 2	Criteria	Rationale	Score
		Climate change adaptation:	Better than Alternate Route 1 by not having to worry about the section of Road between Sandy Bay and Mataikona, but still have some issues at Front Hill and Mataikona River.	+2
		Reduction in road closures:	Yes, due to reduction in road corridor	+2
		Natural environment:	Minor environmental impact compared to the Strengthen package due to work required at the Mataikona River section.	-1
		Social and community:	Fractures the community (more so than Alternate Route 1)	-3

ID	Package	Scoring rationale		
		Economic:	Cutting off easy access to the pub, shop, fuel, etc for the Mataikona settlement. Commercial activity will be reduced due to lack of heavy vehicle access to the northern end.	-2
		Property impacts:	Access to the properties between Sandy Bay and the Mataikona will be lost. This includes the middle settlement.	-2
		Technical difficulty:	Not as easy as maintaining the road, but upgrading Pack Spur not that difficult.	+1
10	Alternate route 3	Criteria	Rationale	Score
		Climate change adaptation:	Better than Alternate Route 1 by not having to worry about the majority of the road, but may still have some issues at the Mataikona River.	+2
		Reduction in road closures:	Yes, due to reduction in road corridor	+2
		Natural environment:	Minor environmental impact compared to the Strengthen package due to work required at the Mataikona River section.	-1
		Social and community:	Completely fractures the community	-3
		Economic:	Cutting off easy access to the pub, shop, fuel, etc for the Mataikona settlement. Commercial activity will be reduced due to lack of heavy vehicle access.	-3
		Property impacts:	Access to all properties will be lost, except those at Mataikona	-3
		Technical difficulty:	Not as easy as maintaining the road, but upgrading Pack Spur not that difficult.	+1

Appendix J Sensitivity Testing



MCA

Theme	Investment Objective 40%		Wellbeings 20%			Critical Success Factors 40%		Weighted Score	Rank
Criteria	Addressing a known climate change adaptation issue	Reduction in duration of unplanned road closures	Natural environment	Social and community	Economic growth and development	Property impacts	Technical difficulty		
	<i>Does the package reduce exposure to climate change risk or other natural hazards over time?</i>	<i>Does the package reduce the occurrence or duration of unplanned road closures?</i>	<i>How well does the option avoid or minimise adverse effects on the natural environment?</i>	<i>To what extent does the package effect social and community values, such as: feelings of community access to emergency services beach access</i>	<i>How well will the option support the population and economic growth?</i>	- What is the scale of property impacts? - Can the necessary property rights be obtained? - Does the option impact access?	- How difficult will the option be to design and construct? - Are there any material supply constraints that will impact this?		
	60%	40%	40%	40%	20%	50%	50%		
Total weighting	24%	16%	8%	8%	4%	20%	20%		
1 Do nothing	-3	-3	0	-3	-3	-3	3	-1.56	10
2 Do minimum	-2	-2	0	-2	-2	-2	2	-1.04	9
3 Minor Improvements	-2	-1	0	0	-1	0	2	-0.28	8
4 Retreat	1	1	0	1	2	-2	1	0.36	4
5 Strengthen	3	3	-3	3	3	2	-2	1.32	2
6 Optimised (low cost)	1	2	-1	2	2	1	2	1.32	2
7 Optimised (high cost)	3	3	-2	3	3	2	-1	1.6	1
8 Alternate Route 1	1	1	-1	-2	-2	-1	1	0.08	6
9 Alternate Route 2	2	2	-1	-3	-2	-2	1	0.2	5
10 Alternate Route 3	2	2	-1	-3	-3	-3	1	-0.04	7

Sensitivity: Theme Weightings

Theme weightings are changed as per the Scenario table below, but the ratio of weighting between the individual theme criteria stays the same.

Table: Scenario weightings

Scenarios	Investment Objectives	Wellbeings	Critical Success Factors
Original Weightings	40%	20%	40%
Equal Weightings	33%	33%	33%
Investment Objective Focus	60%	20%	20%
Wellbeing Focus	20%	60%	20%
Critical Success Factor Focus	20%	20%	60%

Table: Ranked options based on the different testing scenarios

ID	Option	Original Weightings	Equal Weightings	Investment Objective Focus	Wellbeing Focus	Critical Success Factor Focus
1	Do nothing	10	10	10	10	10
2	Do minimum	9	9	9	9	9
3	Minor Improvements	8	7	8	5	4
4	Retreat	4	4	5	4	5
5	Strengthen	2	3	2	3	3
6	Optimised (low cost)	2	2	3	2	1
7	Optimised (high cost)	1	1	1	1	2
8	Alternate Route 1	6	6	7	6	6
9	Alternate Route 2	5	5	4	7	7
10	Alternate Route 3	7	8	6	8	8

Table: Scores from testing scenarios

Theme	Investment Objective		Wellbeings			Critical Success Factors		Total Scores				
	<i>Weightings as per the Scenario table above</i>					Property impacts	Technical difficulty	Original Weightings	Equal Theme Weightings	Investment Objective Focus	Wellbeing Focus	Critical Success Factor Focus
Criteria	Climate change adaptation	Road closure reduction	Natural environment	Social and community	Economic growth and development							
Total weighting	60%	40%	40%	40%	20%	50%	50%					
1 Do nothing	-3	-3	0	-3	-3	-3	3	-1.56	-1.60	-2.16	-1.68	-0.96
2 Do minimum	-2	-2	0	-2	-2	-2	2	-1.04	-1.07	-1.44	-1.12	-0.64
3 Minor Improvements	-2	-1	0	0	-1	0	2	-0.28	-0.27	-0.80	-0.24	0.24
4 Retreat	1	1	0	1	2	-2	1	0.36	0.43	0.66	0.58	0.06
5 Strengthen	3	3	-3	3	3	2	-2	1.32	1.20	1.92	0.96	0.72
6 Optimised (low cost)	1	2	-1	2	2	1	2	1.32	1.23	1.30	1.06	1.34
7 Optimised (high cost)	3	3	-2	3	3	2	-1	1.60	1.50	2.10	1.30	1.10
8 Alternate Route 1	1	1	-1	-2	-2	-1	1	0.08	-0.20	0.28	-0.76	-0.12
9 Alternate Route 2	2	2	-1	-3	-2	-2	1	0.20	-0.17	0.70	-0.90	-0.30
10 Alternate Route 3	2	2	-1	-3	-3	-3	1	-0.04	-0.40	0.56	-1.12	-0.64

Sensitivity: Criteria Weightings 1 (theme weightings remain the same)

Theme weightings stay the same, but one of the individual criteria within the them is given a heavier weighting as per the table below.

Table: Scenario weightings

Scenarios	Climate Change Adaptation	Road Closure Reduction	Natural Environment	Social and Community	Economic Growth and Development	Property Impacts	Technical Difficulty
Original Weightings	24%	16%	8%	8%	4%	20%	20%
Climate Change adaptation focus	36%	4%	8%	8%	4%	20%	20%
Road closure reduction focus	4%	36%	8%	8%	4%	20%	20%
Natural environment focus	24%	16%	16%	2%	2%	20%	20%
Social and community focus	24%	16%	2%	16%	2%	20%	20%
Economic growth and development focus	24%	16%	2%	2%	16%	20%	20%
Property impacts focus	24%	16%	8%	8%	4%	36%	4%
Technical difficulty focus	24%	16%	8%	8%	4%	4%	36%

Table: Ranked options based on the different testing scenarios

ID	Option	Original Weightings	Climate Change Adaptation Focus	Road Closure Reduction Focus	Natural Environment Focus	Social and Community Focus	Economic Growth and Development Focus	Property Impacts Focus	Technical Difficulty Focus
1	Do nothing	10	10	10	10	10	10	10	10
2	Do minimum	9	9	9	9	9	9	9	9
3	Minor Improvements	8	8	8	8	8	8	7	8
4	Retreat	4	4	4	5	4	4	4	3
5	Strengthen	2	2	3	3	2	2	2	4
6	Optimised (low cost)	2	3	2	2	3	3	3	1
7	Optimised (high cost)	1	1	1	1	1	1	1	2
8	Alternate Route 1	6	6	6	6	6	6	5	7
9	Alternate Route 2	5	5	5	4	5	5	6	5
10	Alternate Route 3	7	7	7	7	7	7	8	6

Table: Socres from testing scenarios

Theme	Investment Objective		Wellbeings			Critical Success Factors		Total Scores							
	40%		20%			40%		Original Weightings	Climate Change Adaptation Focus	Road Closure Reduction Focus	Natural Environment Focus	Social and Community Focus	Economic Growth and Development Focus	Property Impacts Focus	Technical Difficulty Focus
Criteria	Climate change adaptation	Road closure reduction	Natural environment	Social and community	Economic growth and development	Property impacts	Technical difficulty								
Total weighting	<i>Weightings as per the Scenario table above</i>														
1 Do nothing	-3	-3	0	-3	-3	-3	3	-1.56	-1.56	-1.56	-1.32	-1.74	-1.74	-2.52	-0.60
2 Do minimum	-2	-2	0	-2	-2	-2	2	-1.04	-1.04	-1.04	-0.88	-1.16	-1.16	-1.68	-0.40
3 Minor Improvements	-2	-1	0	0	-1	0	2	-0.28	-0.40	-0.08	-0.26	-0.26	-0.40	-0.60	0.04
4 Retreat	1	1	0	1	2	-2	1	0.36	0.36	0.36	0.26	0.40	0.54	-0.12	0.84
5 Strengthen	3	3	-3	3	3	2	-2	1.32	1.32	1.32	0.84	1.68	1.68	1.96	0.68
6 Optimised (low cost)	1	2	-1	2	2	1	2	1.32	1.20	1.52	1.08	1.50	1.50	1.16	1.48
7 Optimised (high cost)	3	3	-2	3	3	2	-1	1.60	1.60	1.60	1.20	1.90	1.90	2.08	1.12
8 Alternate Route 1	1	1	-1	-2	-2	-1	1	0.08	0.08	0.08	0.16	0.02	0.02	-0.24	0.40
9 Alternate Route 2	2	2	-1	-3	-2	-2	1	0.20	0.20	0.20	0.34	0.06	0.20	-0.28	0.68
10 Alternate Route 3	2	2	-1	-3	-3	-3	1	-0.04	-0.04	-0.04	0.12	-0.16	-0.16	-0.68	0.60

Sensitivity: Criteria Weightings 2

Theme weightings are ignored, one criteria is given a heavy weighting and the remaining criteria have equal weighting as per the Scenario table below.

Table: Scenario weightings

Scenarios	Climate Change Adaptation	Road Closure Reduction	Natural Environment	Social and Community	Economic Growth and Development	Property Impacts	Technical Difficulty
Original Weightings	24%	16%	8%	8%	4%	20%	20%
Equal Criteria Weightings	14.3%	14.3%	14.3%	14.3%	14.3%	14.3%	14.3%
Climate Change adaptation focus	40%	10%	10%	10%	10%	10%	10%
Road closure reduction focus	10%	40%	10%	10%	10%	10%	10%
Natural environment focus	10%	10%	40%	10%	10%	10%	10%
Social and community focus	10%	10%	10%	40%	10%	10%	10%
Economic growth and development focus	10%	10%	10%	10%	40%	10%	10%
Property impacts focus	10%	10%	10%	10%	10%	40%	10%
Technical difficulty focus	10%	10%	10%	10%	10%	10%	40%

Table: Ranked options based on the different testing scenarios

ID	Option	Original Weightings	Equal Criteria Weightings	Climate Change Adaptation Focus	Road Closure Reduction Focus	Natural Environment Focus	Social and Community Focus	Economic Growth and Development Focus	Property Impacts Focus	Technical Difficulty Focus
1	Do nothing	10	10	10	10	10	10	10	10	10
2	Do minimum	9	9	9	9	8	8	8	8	8
3	Minor Improvements	8	5	8	8	5	5	5	4	4
4	Retreat	4	4	4	4	3	4	4	5	3
5	Strengthen	2	2	2	2	4	2	2	2	5
6	Optimised (low cost)	2	2	3	3	1	3	3	3	1
7	Optimised (high cost)	1	1	1	1	2	1	1	1	2
8	Alternate Route 1	6	6	7	7	7	6	6	6	6
9	Alternate Route 2	5	6	5	5	6	7	6	7	6
10	Alternate Route 3	7	8	6	6	9	8	8	8	9

Table: Scores from testing scenarios

Theme	Investment Objective		Wellbeings			Critical Success Factors		Total Scores								
	Climate change adaptation	Road closure reduction	Natural environment	Social and community	Economic growth and development	Property impacts	Technical difficulty	Original Weightings	Equal Criteria Weightings	Climate Change Adaptation Focus	Road Closure Reduction Focus	Natural Environment Focus	Social and Community Focus	Economic Growth and Development Focus	Property Impacts Focus	Technical Difficulty Focus
Total weighting	<i>Weightings as per the Scenario table above</i>															
1 Do nothing	-3	-3	0	-3	-3	-3	3	-1.56	-1.71	-2.10	-2.10	-1.20	-2.10	-2.10	-2.10	-0.30
2 Do minimum	-2	-2	0	-2	-2	-2	2	-1.04	-1.14	-1.40	-1.40	-0.80	-1.40	-1.40	-1.40	-0.20
3 Minor Improvements	-2	-1	0	0	-1	0	2	-0.28	-0.29	-0.80	-0.50	-0.20	-0.20	-0.50	-0.20	0.40
4 Retreat	1	1	0	1	2	-2	1	0.36	0.57	0.70	0.70	0.40	0.70	1.00	-0.20	0.70
5 Strengthen	3	3	-3	3	3	2	-2	1.32	1.29	1.80	1.80	0.00	1.80	1.80	1.50	0.30
6 Optimised (low cost)	1	2	-1	2	2	1	2	1.32	1.29	1.20	1.50	0.60	1.50	1.50	1.20	1.50
7 Optimised (high cost)	3	3	-2	3	3	2	-1	1.60	1.57	2.00	2.00	0.50	2.00	2.00	1.70	0.80
8 Alternate Route 1	1	1	-1	-2	-2	-1	1	0.08	-0.43	0.00	0.00	-0.60	-0.90	-0.90	-0.60	0.00
9 Alternate Route 2	2	2	-1	-3	-2	-2	1	0.20	-0.43	0.30	0.30	-0.60	-1.20	-0.90	-0.90	0.00
10 Alternate Route 3	2	2	-1	-3	-3	-3	1	-0.04	-0.71	0.10	0.10	-0.80	-1.40	-1.40	-1.40	-0.20

Appendix K Economic Assessment



Mataikona Road Economic Impact Assessment – High Level Technical Note

Masterson District Council (MDC) wishes to investigate, fully understand, and express the value of the Mataikona Road to support the single staged business case for capital investment in its upgrade. To achieve this, the road's 'value' should be expressed in relatable terms. This will ultimately form the narrative and investment decisions required to justify capital investment in the road and to minimize operational maintenance costs in the long-term. This high-level technical note sets out the roads estimated value and the related value for public sector investment in upgrading it.

A total of 10 options have been scoped, including abandoning the road all together (Option 1), or maintaining the status quo of continued maintenance work (Option 2). The latter is considered the counterfactual in this assessment, against which all other investment options are compared to.

Given the rural nature of the area and limited data availability to inform the assessment, a survey of residents and businesses was conducted to assess issues such as time of delays experienced and additional vehicle operating costs as a result of the roads conditions. Then, consistent with the Waka Kotahi's Monetised Benefits and Costs Manual (MBCM) (August 2021), the results of the survey were applied to monetise the following:

- **Cost of Disruption:** Several issues such as road dropouts, landslips, storm debris, and generally poor surface conditions cause delays to residents, businesses, and visitors. The cost is estimated using the MBCM Hourly Travel Time Cost/Person, multiplied by the additional travel time caused by disruption, plus estimated additional business costs incurred. The impact of each investment option is then measured by its effect on reducing disruption.
- **Vehicle Operating Costs:** The poor condition of the road results in additional costs to operate both personal and commercial vehicles. The cost is estimated using survey data collected on additional cost to both residents and businesses of operating their vehicles. The impact of each investment option is then measured by its effect on minimising additional vehicle operating costs.
- **Cost of Closure:** Closure of the road would result in multiple costs to society, including home demolition, home relocation, injurious affection, additional transport costs, and the potential for additional emergency services costs for those who remained. Given the effects of coastal erosion on the road and the lifespan associated with various upgrades, a series of assumptions have been made based on the estimated closing date of each option.
- **Reduced Maintenance Costs:** Each year the Council spends an increasing amount of money on regular maintenance and emergency works to make the road passable. Therefore, any upgrades should help reduce these works by a commensurate amount.

The cumulative impacts have been discounted at the standard MBCM discount rate of 4% over a 40-year period to assess the net present value of each option. The total impact of each option is then divided by the associated low and high capital cost of each option. This yields both a low and high benefit cost ratio (BCR), indicating the value for public sector investment. The results are presented in the table overleaf.

Table 1: Economic Impact Results

Option No.		Option 1	Option 2	Option 3	Option 4	Option 5	Option 6	Option 7	Option 8	Option 9	Option 10
Option Name		Do nothing	Do minimum	Minor improvements	Retreat	Strengthen	Optimised (low cost)	Optimised (high cost)	Alternative Route 1	Alternative Route 2	Alternative Route 3
MCA / Iwi Scoring	Rangitane o Wairarapa	6	5	4	5	1	1	2	3	3	3
	MCA Results				MCA 4	MCA 2 =	MCA 2 =	MCA 1	MCA 6	MCA 5	
Model Assumptions	Road Closure (Year)	2027	2032	2040	2050	2122	2080	2100	2080	2080	2100
	Disruption (%)	100%	100%	80%	60%	10%	30%	20%	40%	35%	30%
BCR Assessment	Total Impact	-\$10.7m	-	\$14.8m	\$29.8m	\$61.6m	\$60.1m	\$60.8m	\$59.2m	\$55.8m	\$38.4m
	Total Cost 10+ Years (High)	\$12.6m	-	\$31.1m	\$5.5m	\$264.1m	\$143.8m	\$258.4m	\$22.8m	\$25.3m	\$29.1m
	Total Cost 5 Years (Low)	\$2.6m	-	\$2.6m	\$3.6m	\$69.5m	\$33.7m	\$65.7m	\$11.9m	\$13.1m	\$15.0m
	BCR (High)	- 0.9		0.5	5.5	0.2	0.4	0.2	2.6	2.2	1.3
	BCR (Low)	- 4.2		5.8	8.2	0.9	1.8	0.9	5.0	4.3	2.6

Summary

The results in Table 1 can be summarised as follows:

- Option 1 – Do Nothing results in very poor value for money due to the high costs placed on the public sector and the community from abandoning the road.
- Option 2 – Do Minimum is considered as the counterfactual, against which each of the options are assessed.
- Option 3 – Minor Improvements indicate a high value for money on the lower cost estimate, stimulated by the short-term upgrades to extend the roads lifespan.
- Option 4 – Retreat returns the highest value for money across all elements. This is driven by a strong combination of extended road lifespan and minimised disruption over the period 28 years enabled by the investment in retreating the road. It should be noted that local Iwi considered this an unsatisfactory option.

- Option 5 – Strengthen scored the highest combined MCA / Iwi scoring. While it drove the greatest level of return on investment, the scale of capital costs resulted in a poor estimated value for money.
- Option 6 – Optimised (Low Cost) scores relatively high on the combined MCA / Iwi scoring. Like Option 5, it generates a significant level of benefit but returns a poor value for money due to the high capital cost associated with it.
- Option 7 – Optimised (High Cost) scores relatively high on the combined MCA / Iwi scoring. Like Option 5 and 6, it generates a significant level of benefit but returns a poor value for money due to the high capital cost associated with it.
- **Alternative Route Options 8, 9, 10** score relatively poorly on the combined MCA / Iwi scoring. However, due to the extended lifespan of various sections of the road and lower capital costs associated with the location-based investment, the resulting value for money across each of the Alternative Route options scores comparatively high. It should be noted that Options 9 and 10 result in the abandonment of settlements along the road corridor, and that these results do not yet consider the additional travel time for residents and businesses either side of the abandoned sections.

Each of the short-listed options will be subject to further economic analysis.

Appendix L Emerging Preferred Option Workshop

L.1 Workshop Notes



Emerging Preferred Option Workshop and Community Meeting

Project/File: 310205311 Mataikona SSBC
 Date/Time: 3 September 2022 / 10:30am
 Location: Mataikona
 Attendees: Robyn Habb, Anders Crofoot, George Walker, Todd McIlvride
 Alec Birch (MDC), Mike Burger (MDC), Steve Rundle (MDC), Andrew Maughan (Stantec), Ryan Abrey (Stantec)
 Distribution: Workshop Attendees

Item

Community Engagement

- There is a Community meeting on 17/09/2022, extend consultation period beyond this to 22/09/2022 so that the emerging option can be discussed at that meeting
- Remove mention of abandon from survey questionnaire and clarify that this is the point at which level of service will start to reduce
- *The team emphasized the value gained from the first survey and Council noted the high return rate of the Mataikona survey response compared to other Council surveys*

Presentation Feedback

Segmentation of road corridor:

- It was agreed the segments used by the team was appropriate for the option development.

Options overview:

- Agreed by attendees that a good range of options have been considered
- Questions / comments for specific options:
- Alternative routes:
 - What standard will Pack Spur Road be for the alternative options?
 - *It will be all weather two-wheel drive, summer standard.*
 - Will roads be closed?
 - *No, but level of service, standard of access will deteriorate significantly. The types of vehicles that can use these roads will become more restricted over time. These roads will probably be OK for locals but not trucks and visitors.*
 - Will Council legally stop the road?
 - *Council has not included legally stopping roads in these options.*
- Retreat:
 - Retreat option needs to also consider stability of retreat options. Also be aware of fault zones and retreat in hilly areas may also need consideration.

Assessment of options table:

- How do we read the indicative economics:

Item
<ul style="list-style-type: none">• <i>Benefits are not money in the bank. The numbers are used to gain an understanding of the relative merits of the different options. Economic analysis will be an input into Waka Kotahi and Council considerations of funding priorities and is an input into all business case proposals Waka Kotahi consider across the country.</i>• What does the date mean?• <i>The date is an indication for each option beyond which users should expect that the road will not be returned to its pre-damaged condition after a damaging event occurs.</i>• What does the disruption column mean?• <i>This is an estimate of how frequently road users should expect disruption compared to what happens now. Note that disruptions are likely to increase regardless of the options that are implemented because of (among other things) the expected increased frequency, duration and scale of events over the coming years.</i>• What is the best option?<ul style="list-style-type: none">○ Options 8, 9 and 10 are not equitable to all communities along the road, are expensive and are not considered acceptable to the whole community.○ Options 5, 6 and 7 are considered unaffordable.○ Do nothing and do minimum (or status quo) are considered insufficient to meet community need.○ Stakeholders express a blend of minor improvements, retreat and strengthen when it can be afforded as their preferred option.○ Concerned that the do nothing and do minimum may be optimistic in terms of how long the current level of service can be retained, even with increased disruption.○ Question raised requesting an indication when investment will be made, when funding will be available?○ <i>Council confirmed funding had been set aside in the LTP, however, had also assumed a certain amount of contribution from Waka Kotahi. This funding and timing will need to be worked through as part of the business case approval process in the New Year. Also noted that consenting for permanent works can take time and delay implementation of improvements, which would not typically hold up emergency works.</i>
<p>Next Steps</p> <p>What are next steps for funding?</p> <p>Determine a preferred option, analyse and optimize this, seek direction from Waka Kotahi what they would be likely to fund, finalise business case with recommendation to Council (Elected Representatives) around March / April 2023, for a decision on what will be funded. Affordability is expected to strongly influence this.</p>

The meeting adjourned at 12:00.

The foregoing is considered to be a true and accurate record of all items discussed. If any discrepancies or inconsistencies are noted, please contact the writer immediately.

Ngā mihi,

STANTEC NEW ZEALAND



Courtney McCrostie

Transportation Engineer

Phone: +64 4 381 5776

courtney.mccrostie@stantec.com

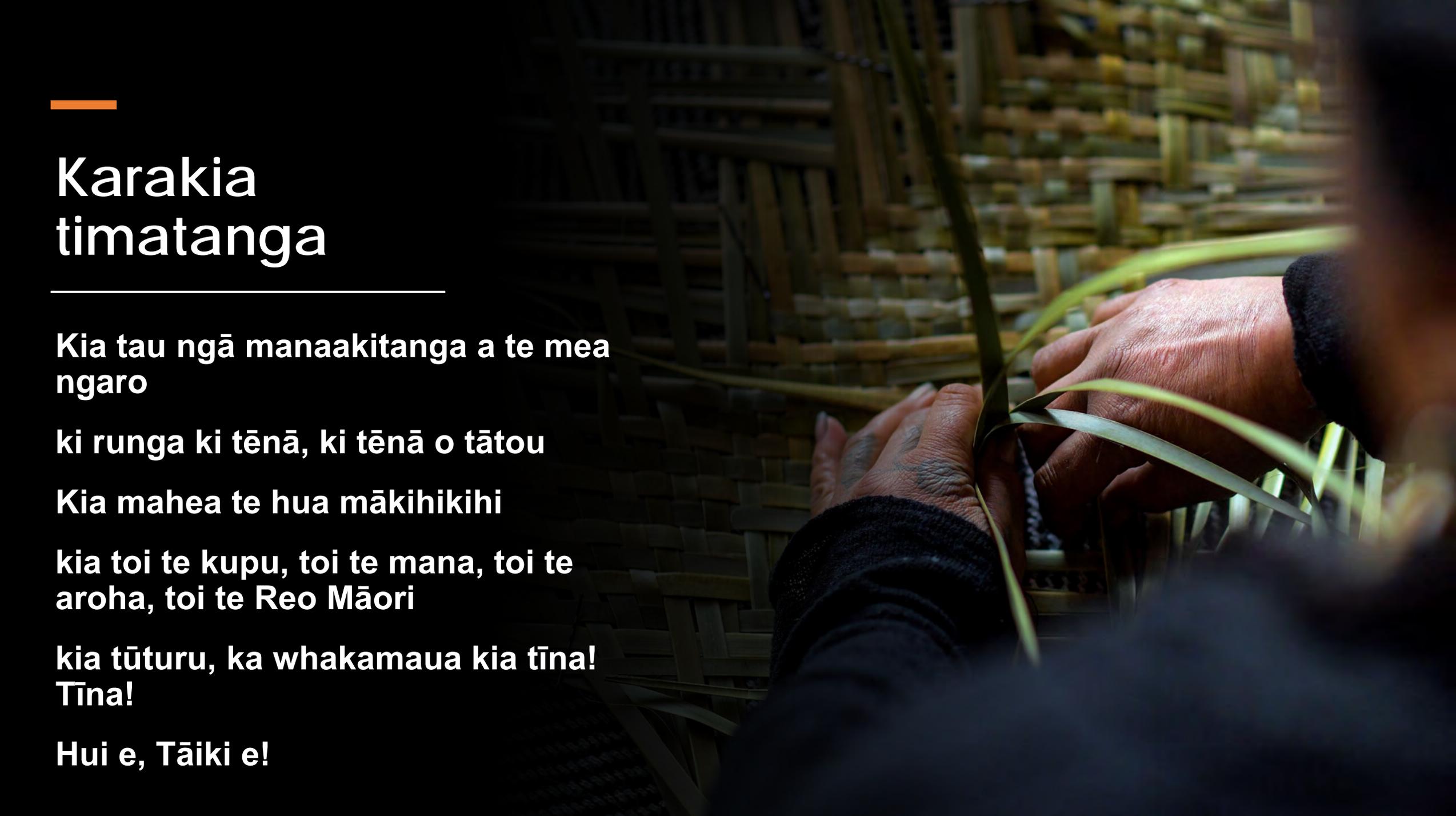
Attachment: Workshop slides

L.2 Workshop Slides





Mataikona Road: Emerging Preferred Option



Karakia timatanga

**Kia tau ngā manaakitanga a te mea
ngaro**

ki runga ki tēnā, ki tēnā o tātou

Kia mahea te hua mākihikihi

**kia toi te kupu, toi te mana, toi te
aroha, toi te Reo Māori**

**kia tūturu, ka whakamaua kia tīna!
Tīna!**

Hui e, Tāiki e!



Agenda

Welcome/ Introductions

Background

- ILM
- Community feedback
- Assessment process
- Option descriptions

Options Assessment

- MCA Criteria
- MCA Scoring
- Indicative economics

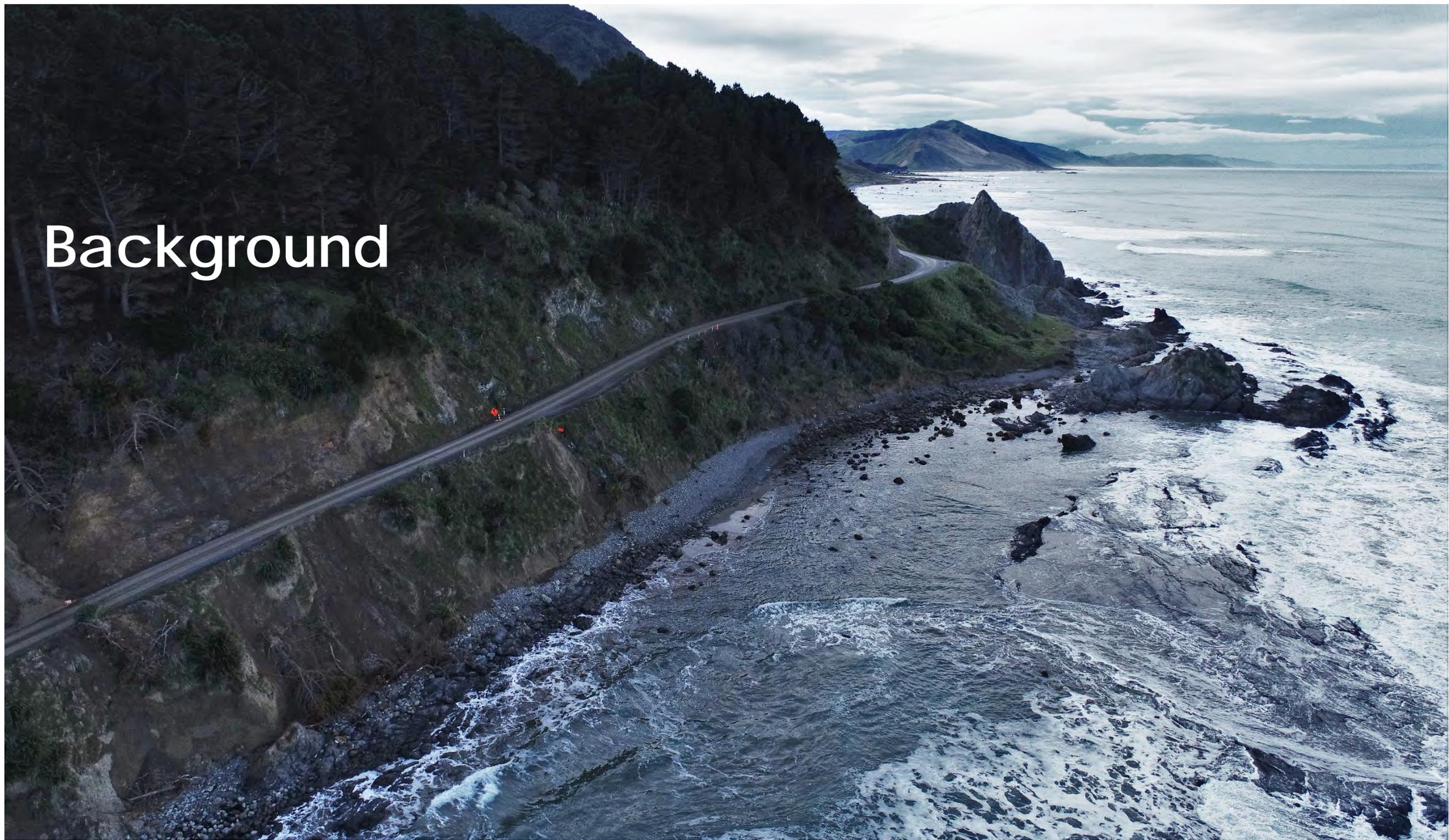
Your feedback

- Risks
- Preferences

Next Steps

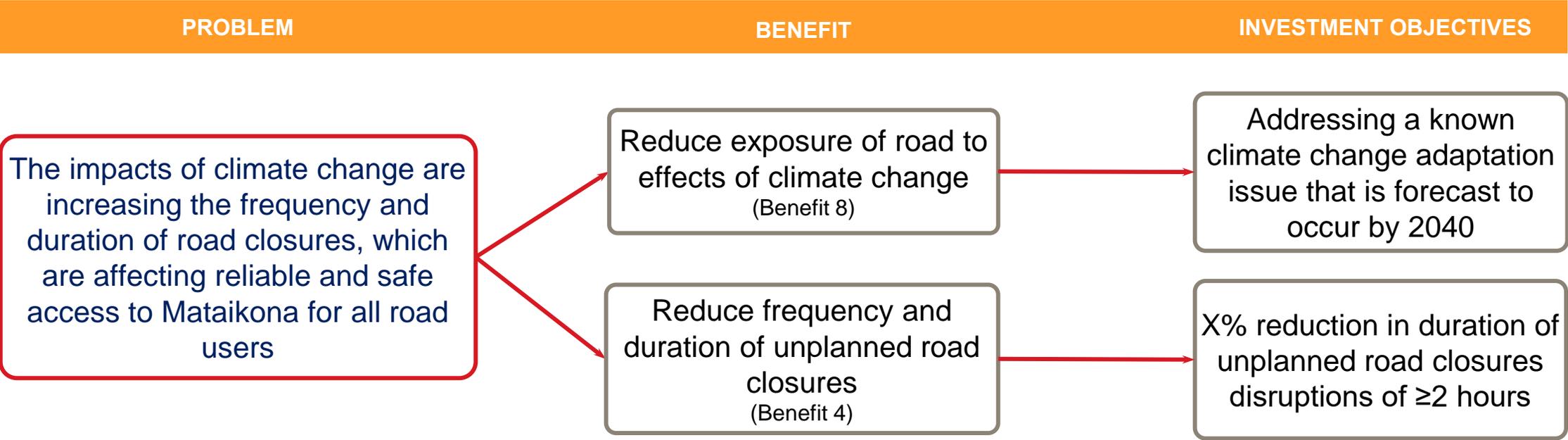


Background





Investment Logic Map



Opportunity
Improve road user safety on Mataikona Road

Note: Benefits are aligned with Waka Kotahi's Land Transport Benefits Framework. Benefit numbers refer to the relevant benefit within the framework.



Community feedback

31 feedback forms received

65 survey responses received

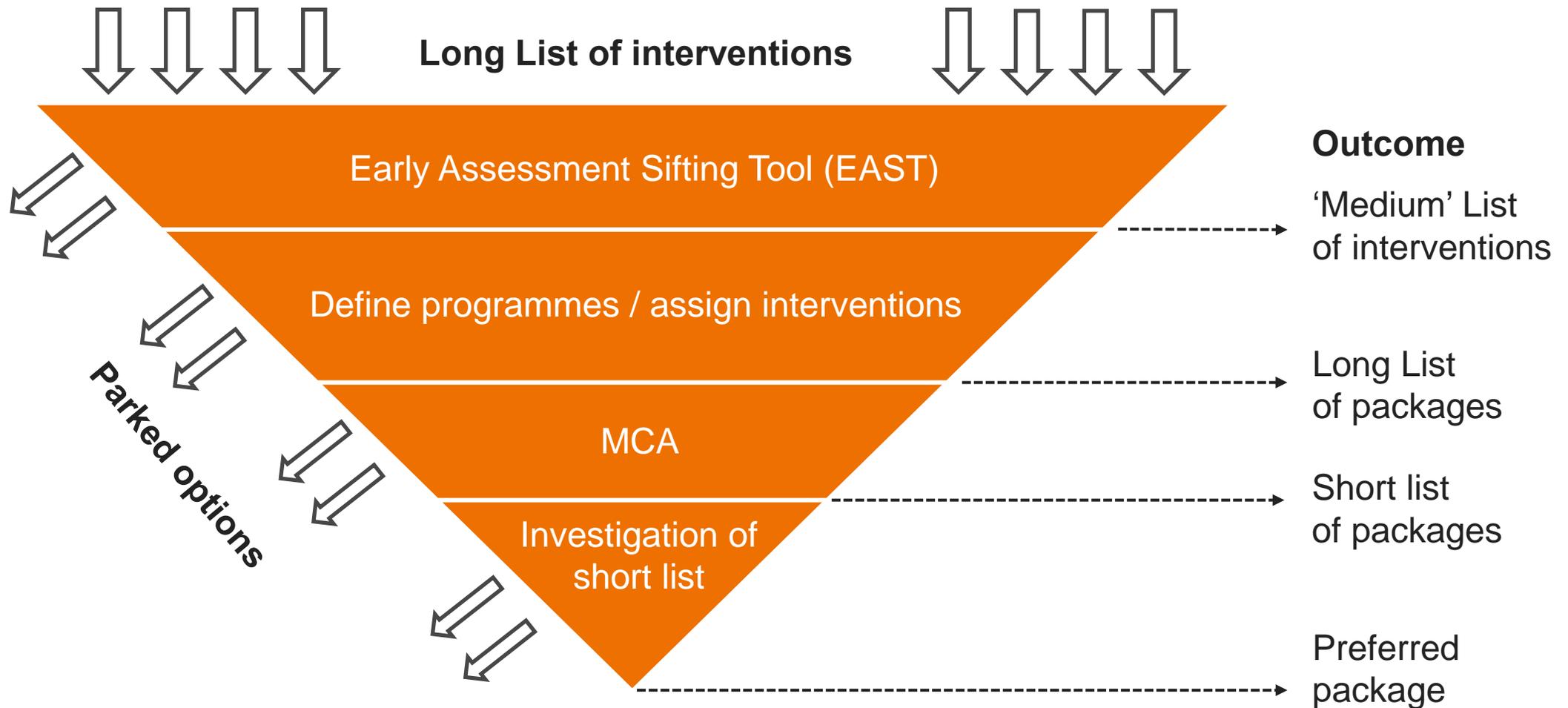
Topics of concern included:

- Seal level rise
- Coastal erosion
- Weather events
- Slips and dropouts
- Road closures
- Waio Hill
- Pack Spur Road
- Emergency response access
- Maintenance costs
- Safety





Assessment Process





Road Sections

1. Front Hill
2. Sandy Bay settlement
3. Second Hill
4. Second Hill to Suicide Rock
5. Suicide Rock
6. Middle settlement
7. South Mataikona
8. Mataikona
9. Mataikona River





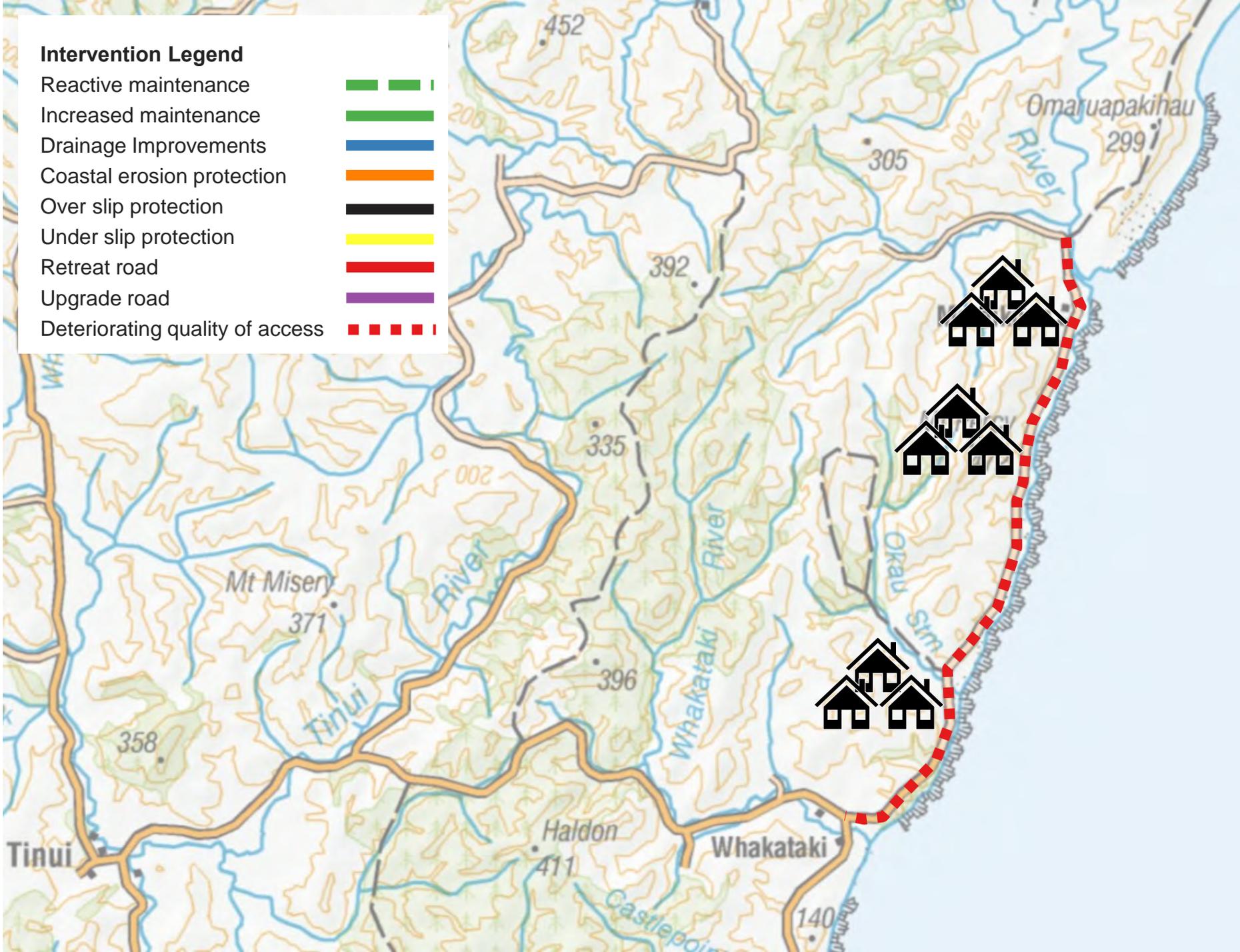
Option Descriptions

Package	Description
1. Do Nothing	Continue with reactive maintenance, but not necessarily restoring road to pre-damaged standard.
2. Do Minimum	Continue with reactive maintenance, but not necessarily restoring road to pre-damaged standard after 2032.
3. Minor Improvements	Preventative maintenance, and proactively rock armor a small number of key sites.
4. Retreat	Retreat the road inland where there is space to do so. Maintain the remainder of the road with reactive maintenance.
5. Strengthen	Address all problem areas along Mataikona Road with long term solutions
6. Optimised (low cost)	A tailored programme of low-cost interventions that best address the problems in each section of Mataikona Road in the medium term.
7. Optimised (high cost)	A tailored programme of high-cost interventions that best address the problems in each section of Mataikona Road in the long term.
8. Alternate Route One	Upgrade Pack Spur Road and strengthen the Mataikona River section. Mataikona Road between Sandy Bay and the middle settlement will continue with reactive maintenance, but not necessarily restoring road to pre-damaged standard.
9. Alternate Route Two	Upgrade Pack Spur Road and strengthen the Mataikona River section. Mataikona Road between Sandy Bay and Mataikona will continue with reactive maintenance, but not necessarily restoring road to pre-damaged standard.
10. Alternate Route Three	Upgrade Pack Spur Road and strengthen the Mataikona River section. Mataikona Road south of Mataikona will continue with reactive maintenance, but not necessarily restoring road to pre-damaged standard.



Do Nothing

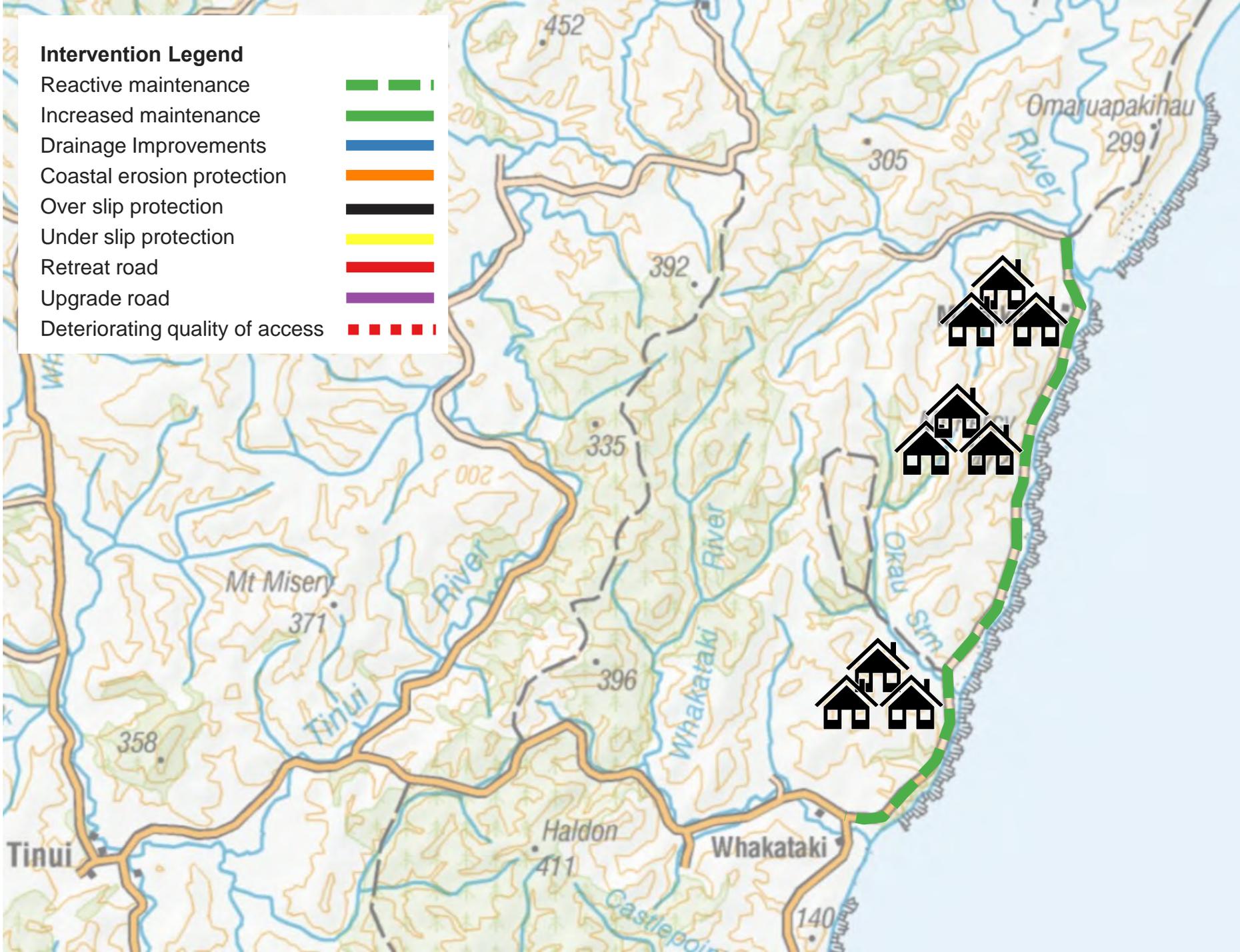
Acceptance that key sections of the corridor cannot be protected against natural hazards, and access can no longer be guaranteed. Continue with reactive maintenance, but not necessarily restoring road to pre-damaged standard.





Do Minimum

Plan for periodic disruption and trigger reactive response to natural hazards through emergency spend funding to maintain access along the corridor, but not necessarily restoring road to pre-damaged standard after 2032.

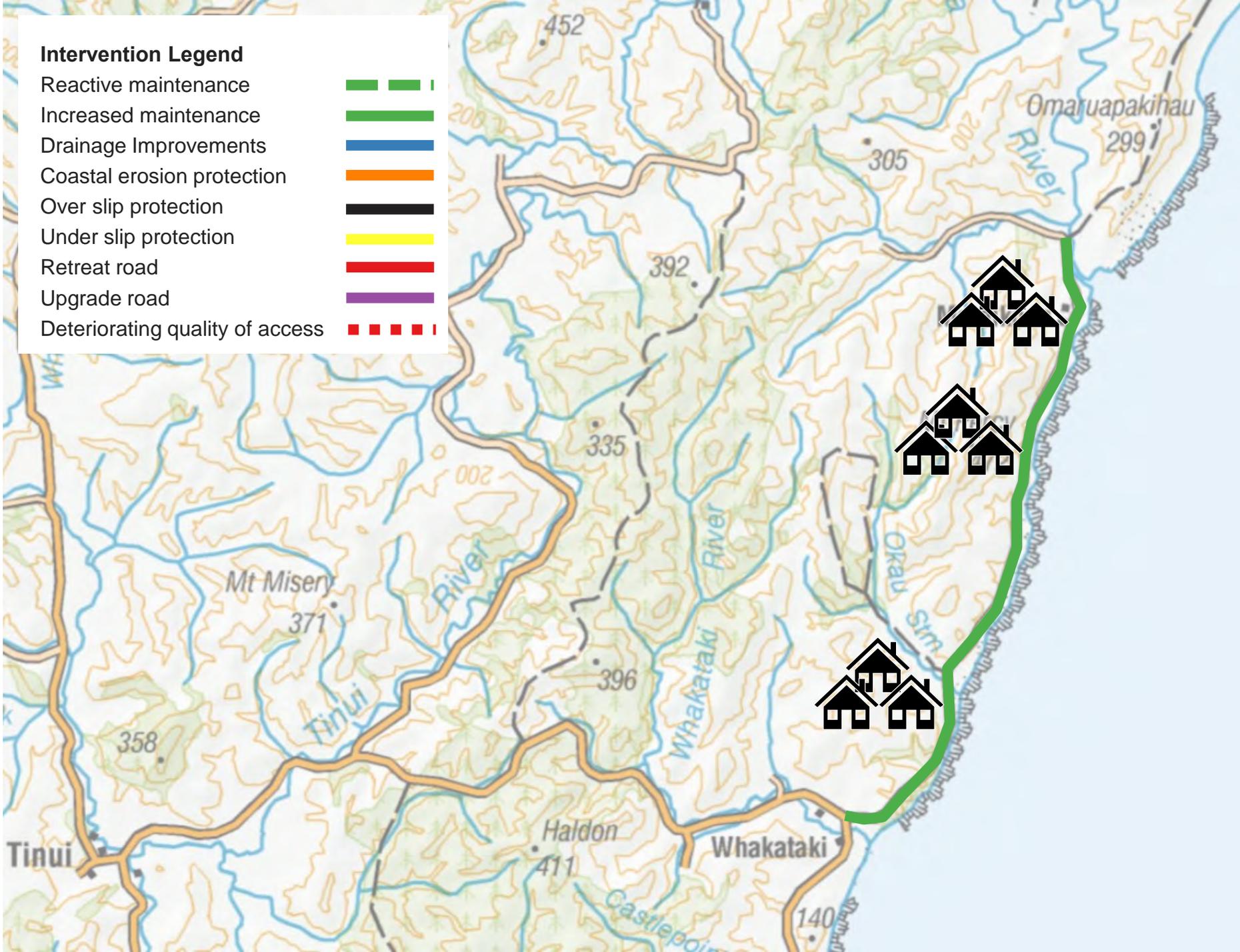




Minor Improvements

Increase preventative maintenance along Mataikona Road (drainage improvements, clean out culverts prior to storm events, etc).

Small fund for targeted rock armoring (or other appropriate strengthening works)



Intervention Legend

- Reactive maintenance
- Increased maintenance
- Drainage Improvements
- Coastal erosion protection
- Over slip protection
- Under slip protection
- Retreat road
- Upgrade road
- Deteriorating quality of access

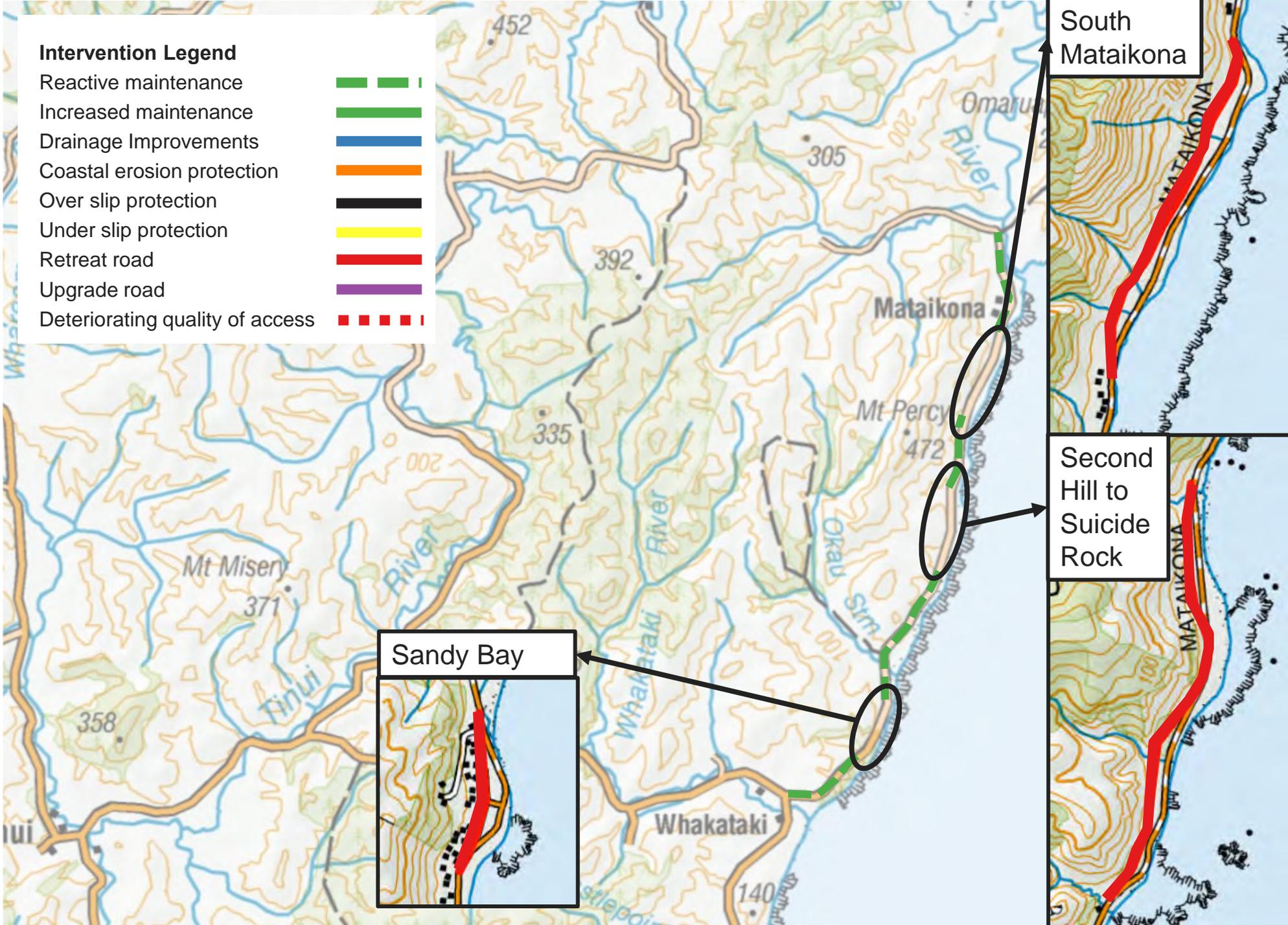


Retreat

Retreat the road inland where there is space to do so but maintain the alignment in front of the three settlements. Maintain the remainder of the road as per the Do Minimum.

Retreat Road at:

- Sandy Bay,
- Second Hill to Suicide Rock and
- South Mataikona





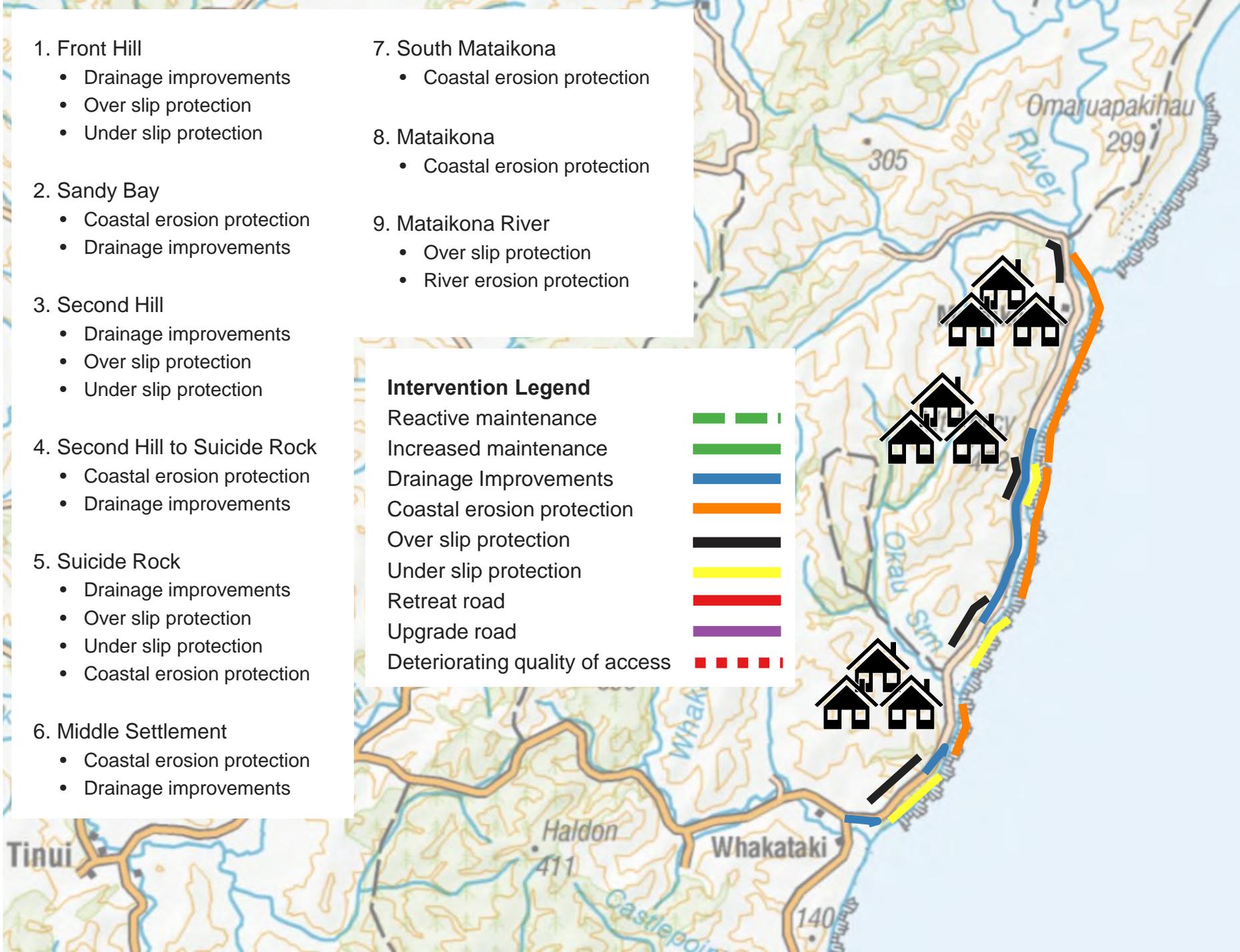
Strengthen

Complete longer-term repairs for over slips, under slips and coastal erosion in all areas of concern along the length of Mataikona Road.

- 1. Front Hill
 - Drainage improvements
 - Over slip protection
 - Under slip protection
- 2. Sandy Bay
 - Coastal erosion protection
 - Drainage improvements
- 3. Second Hill
 - Drainage improvements
 - Over slip protection
 - Under slip protection
- 4. Second Hill to Suicide Rock
 - Coastal erosion protection
 - Drainage improvements
- 5. Suicide Rock
 - Drainage improvements
 - Over slip protection
 - Under slip protection
 - Coastal erosion protection
- 6. Middle Settlement
 - Coastal erosion protection
 - Drainage improvements
- 7. South Mataikona
 - Coastal erosion protection
- 8. Mataikona
 - Coastal erosion protection
- 9. Mataikona River
 - Over slip protection
 - River erosion protection

Intervention Legend

- Reactive maintenance
- Increased maintenance
- Drainage Improvements
- Coastal erosion protection
- Over slip protection
- Under slip protection
- Retreat road
- Upgrade road
- Deteriorating quality of access



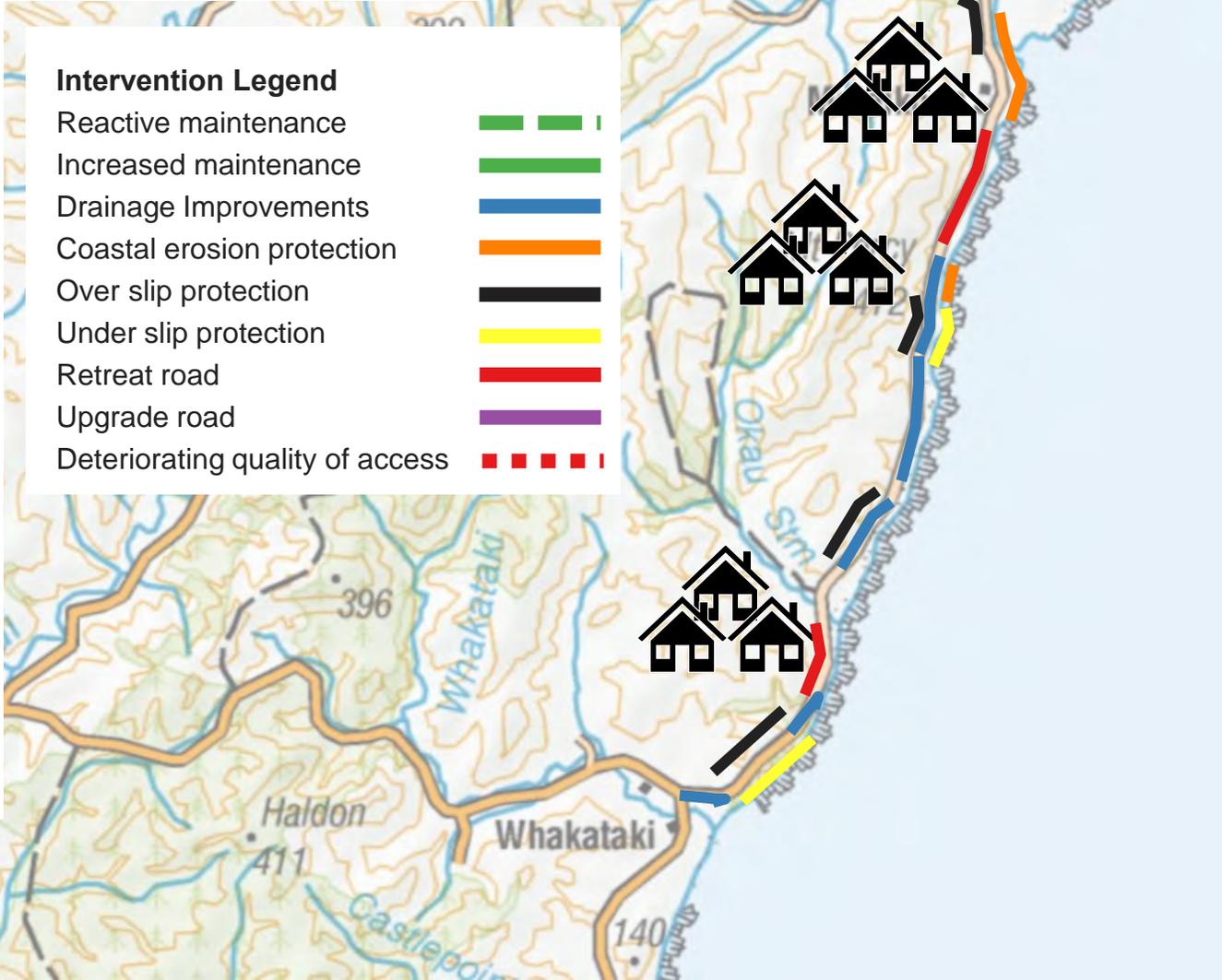


Optimised (low cost)

A tailored programme of low-cost interventions that best address the problems in each section of Mataikona Road in the medium term

1. Front Hill
 - Drainage improvements
 - Over slip protection
 - Under slip protection
2. Sandy Bay
 - Retreat road
 - Drainage improvements
3. Second Hill
 - Drainage improvements
 - Over slip protection
4. Second Hill to Suicide Rock
 - Drainage improvements
5. Suicide Rock
 - Drainage improvements
 - Over slip protection
 - Under slip protection/ Coastal erosion protection
6. Middle Settlement
 - Coastal erosion protection
 - Drainage improvements
7. South Mataikona
 - Retreat road

8. Mataikona
 - Coastal erosion protection
9. Mataikona River
 - Over slip protection
 - Under slip/ river erosion protection



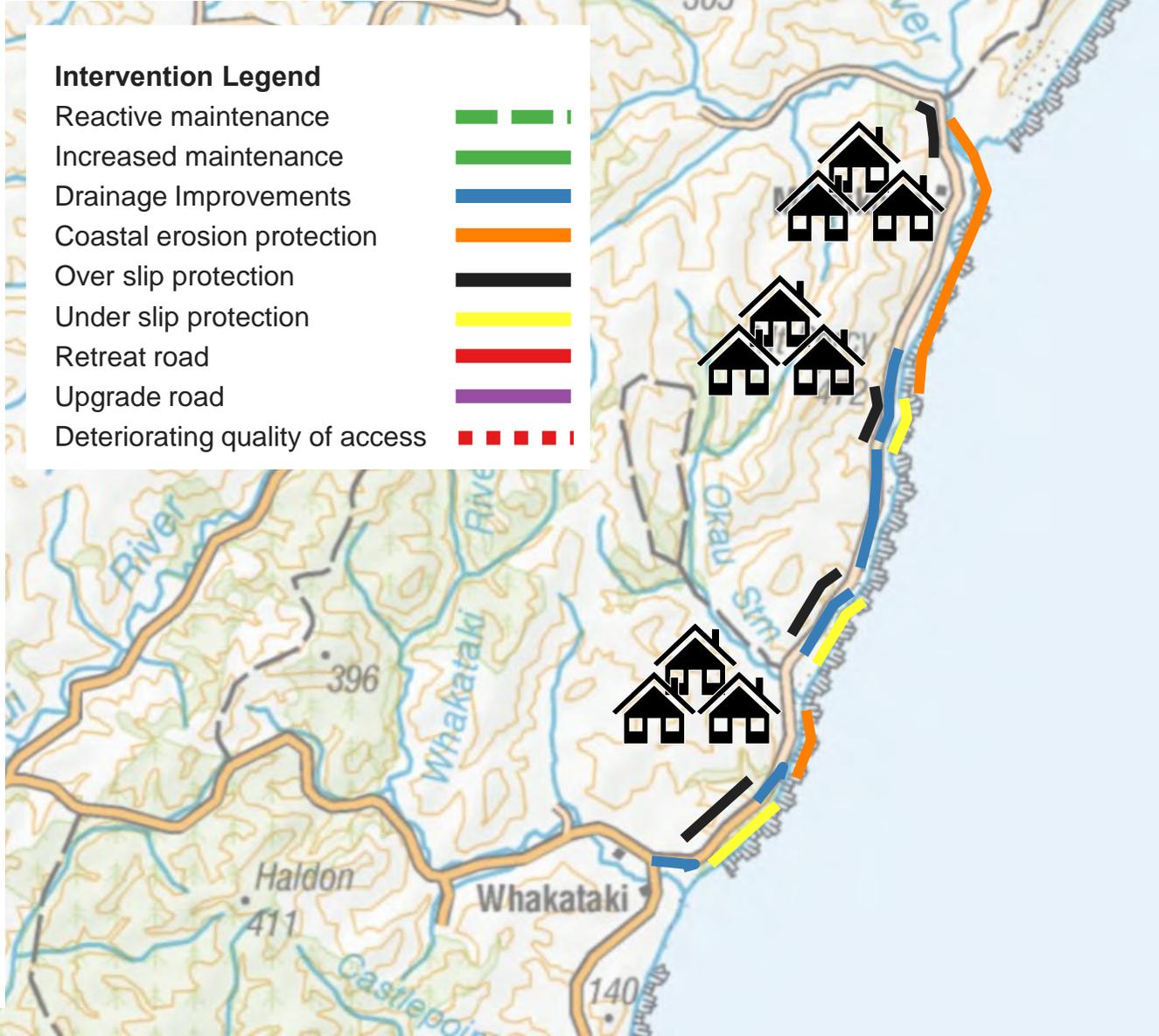


Optimised (high cost)

A tailored programme of high-cost interventions that best address the problems in each section of Mataikona Road in the long term.

1. Front Hill
 - Drainage improvements
 - Over slip protection
 - Under slip protection
2. Sandy Bay
 - Coastal erosion protection
3. Second Hill
 - Drainage improvements
 - Over slip protection
 - Under slip protection
4. Second Hill to Suicide Rock
 - Drainage improvements
5. Suicide Rock
 - Drainage improvements
 - Over slip protection
 - Under slip protection/ Coastal erosion protection
6. Middle Settlement
 - Coastal erosion protection
 - Drainage improvements
7. South Mataikona
 - Coastal erosion protection
8. Mataikona
 - Coastal erosion protection

9. Mataikona River
 - Over slip protection
 - Under slip/ river erosion protection



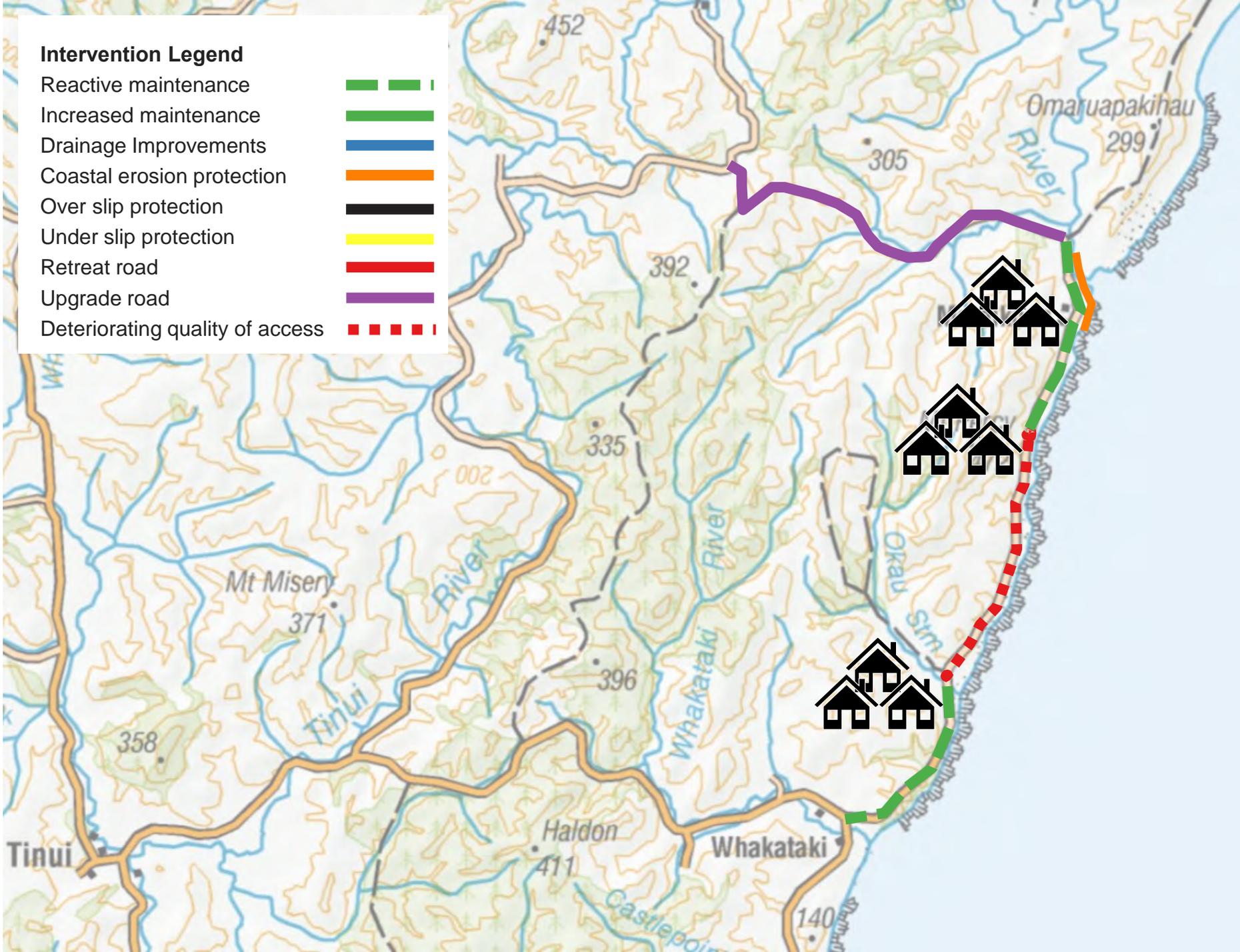


Alternative Route 1

Upgrade Pack Spur Road so it is accessible for light vehicles in most weather conditions. Protect the Mataikona River section from erosion.

Mataikona Road between Whakataki and Sandy Bay, and Mataokona and the middle settlement will receive reactive maintenance, but not necessarily restoring the road to the pre-damaged standard after 2023.

Mataikona Road between Sandy Bay and the middle settlement will continue with reactive maintenance, but not necessarily restoring road to pre-damaged standard.



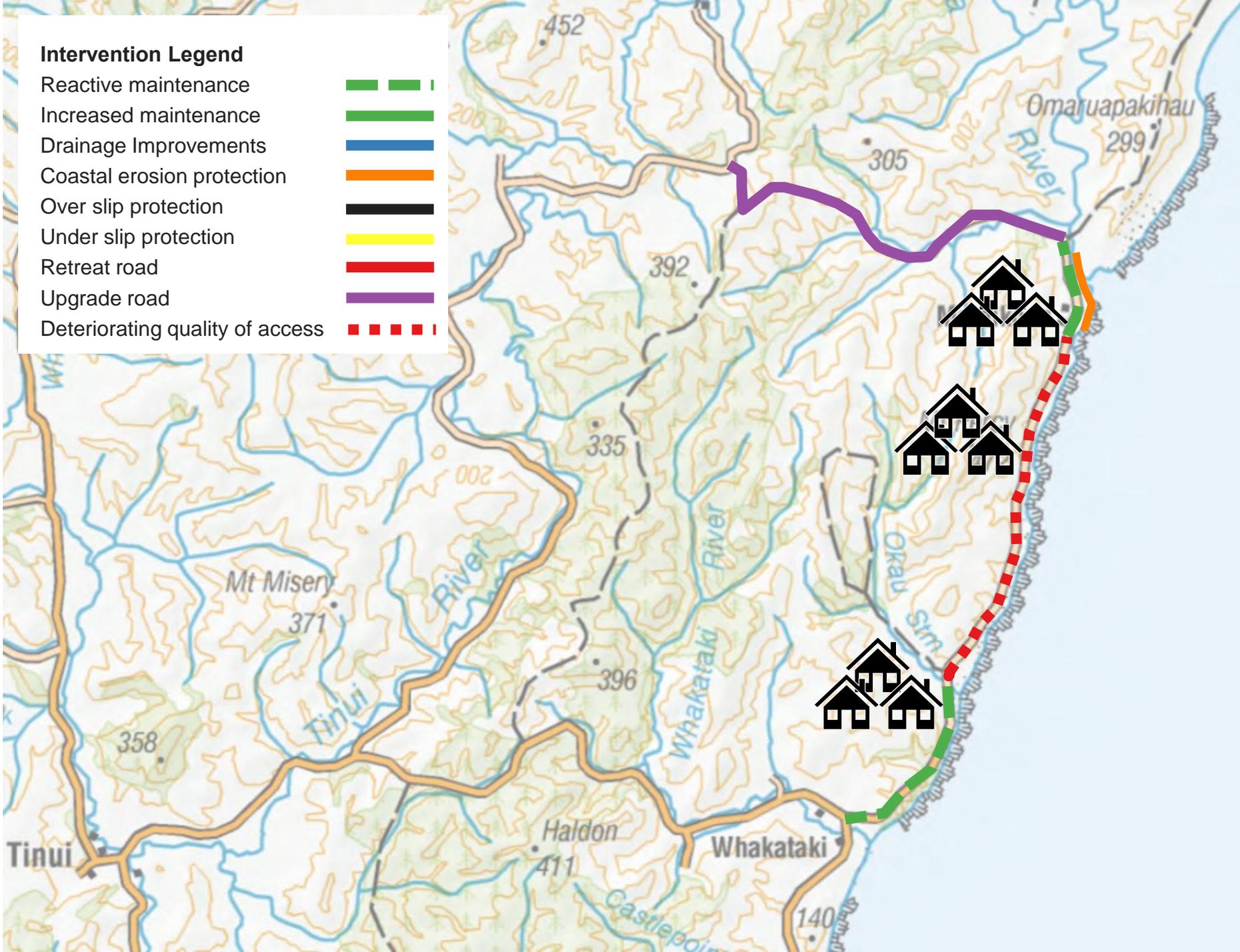


Alternative Route 2

Upgrade Pack Spur Road so it is accessible for light vehicles in most weather conditions. Protect the Mataikona River section from erosion.

Mataikona Road between Whakataki and Sandy Bay will receive reactive maintenance, but not necessarily restoring the road to the pre-damaged standard after 2023.

Mataikona Road between Sandy Bay and Mataikona will continue with reactive maintenance, but not necessarily restoring road to pre-damaged standard.

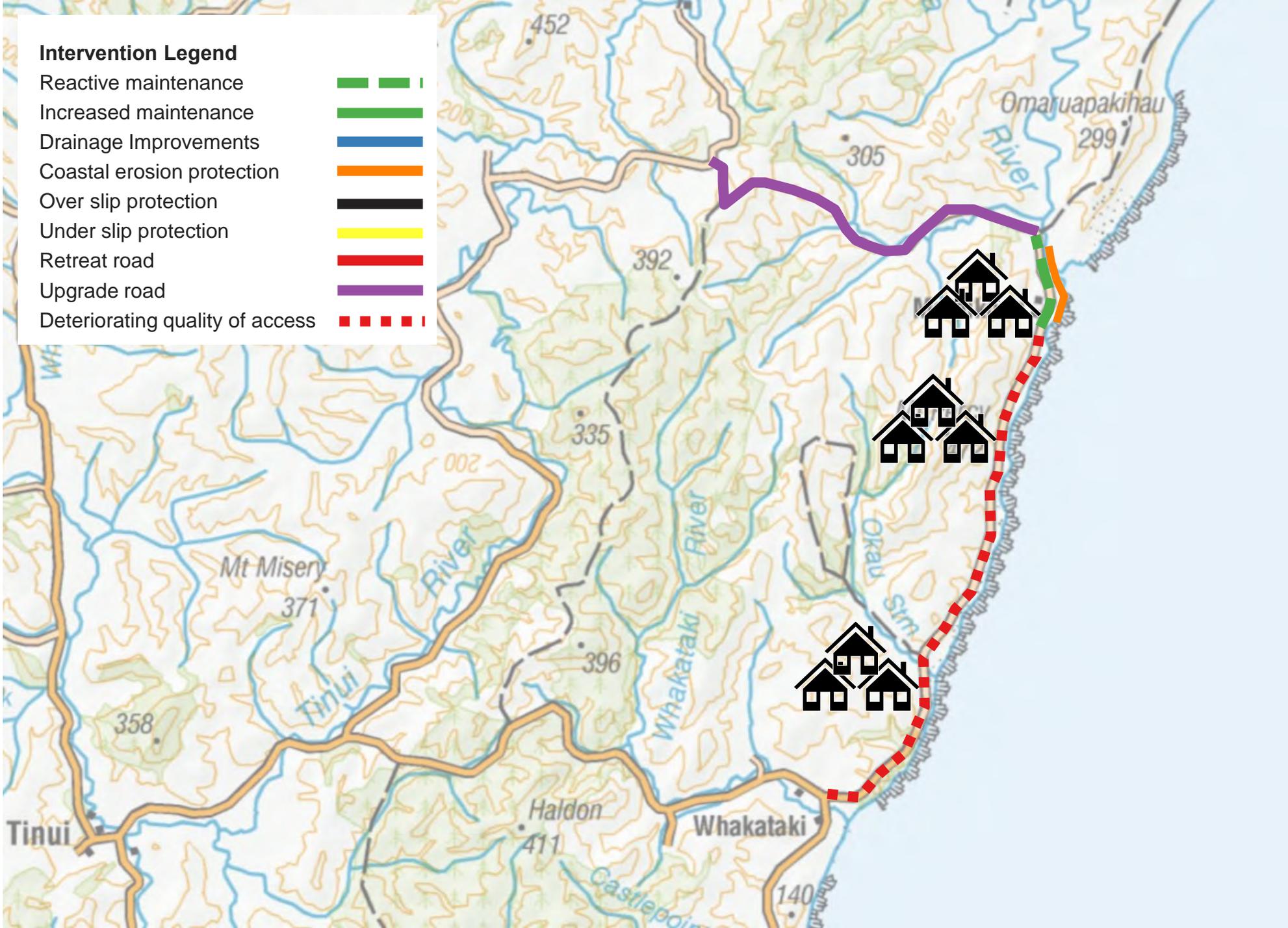




Alternative Route 3

Upgrade Pack Spur Road so it is accessible for light vehicles in most weather conditions. Protect the Mataikona River section from erosion.

Mataikona Road between Whakataki and Mataikona will continue with reactive maintenance, but not necessarily restoring road to pre-damaged standard.





Options Assessment





MCA Criteria

Theme	Criteria	Description
Investment Objectives (40%)	Addresses a known climate change adaptation issue (60%)	Does the option reduce exposure to climate change risk or other natural hazards over time?
	Reduction in duration of unplanned road closures (40%)	Does the option reduce the occurrence of unplanned road closures, or reduce the duration of unplanned road closures?
Wellbeings (20%)	Natural environment (40%)	How well does the option avoid or minimize adverse effects on the natural environment?
	Social and community (40%)	To what extent does the scheme effect social and community values, such as feelings of community and access to emergency services?
	Economic development and growth (20%)	How well will the option support the population and economic growth?
Critical Success Factors (40%)	Property impacts (50%)	What is the scale of property impacts? Can the necessary property rights be obtained? Does the option impact access?
	Technical difficulty (50%)	How difficult will the option be to design and construct? Are there any material supply constraints that will impact this?



Scoring

Option	Climate Change	Road Closures	Environment	Community	Economic	Property impacts	Technical difficulty	Rank
Do nothing	Red	Red	Yellow	Red	Red	Red	Green	10
Do minimum	Orange	Orange	Yellow	Orange	Orange	Orange	Green	9
Minor improvements	Orange	Light Orange	Yellow	Yellow	Light Orange	Yellow	Green	8
Retreat	Light Green	Light Green	Yellow	Light Green	Light Green	Orange	Light Green	4
Strengthen	Green	Green	Red	Green	Green	Green	Orange	2
Optimised (low cost)	Light Green	Light Green	Light Orange	Light Green	Light Green	Light Green	Light Green	2
Optimised (high cost)	Green	Green	Orange	Green	Green	Green	Light Orange	1
Alternate Route 1	Light Green	Light Green	Light Orange	Orange	Orange	Light Orange	Light Green	6
Alternate Route 2	Light Green	Light Green	Light Orange	Red	Orange	Orange	Light Green	5
Alternate Route 3	Light Green	Light Green	Light Orange	Red	Red	Red	Light Green	7



Indicative Economics

Package	Scoring			Assumptions		Benefit vs Cost Assessment				
	Kahungunu ki Wairarapa	Rangitane o Wairarapa	MCA	Deteriorating access	Disruption	Benefit	Capital Cost		Ratio	
							Low \$	High \$	High \$	Low \$
Do nothing	10	Yes	10	2027	Every year	\$12m				
Do minimum	8	Yes	9	2032	Every year	\$12m	?	\$2m	-	6.5
Minor improvements	7	No	8	2040	8/10 years	\$14m	\$3m	\$30m	0.4	5.3
Retreat	8	Yes	4	2050	6/10 years	\$28m	\$3m	\$6m	5.1	7.7
Strengthen	1	Yes	2	2122	1/10 years	\$60m	\$70m	\$270m	0.2	0.9
Optimised (low cost)	1	No	2	2080	3/10 years	\$60m	\$30m	\$150m	0.4	1.7
Optimised (high cost)	3	Yes	1	2100	2/10 years	\$60m	\$70m	\$250m	0.2	0.9
Alternate Route 1	4	No	6	2080	4/10 years	\$60m	\$12m	\$25m	2.5	4.8
Alternate Route 2	4	No	5	2080	3 or 4/10 years	\$55m	\$13m	\$25m	2.1	4.1
Alternate Route 3	4	No	7	2100	3/10 years	\$35m	\$15m	\$30m	1.3	2.4

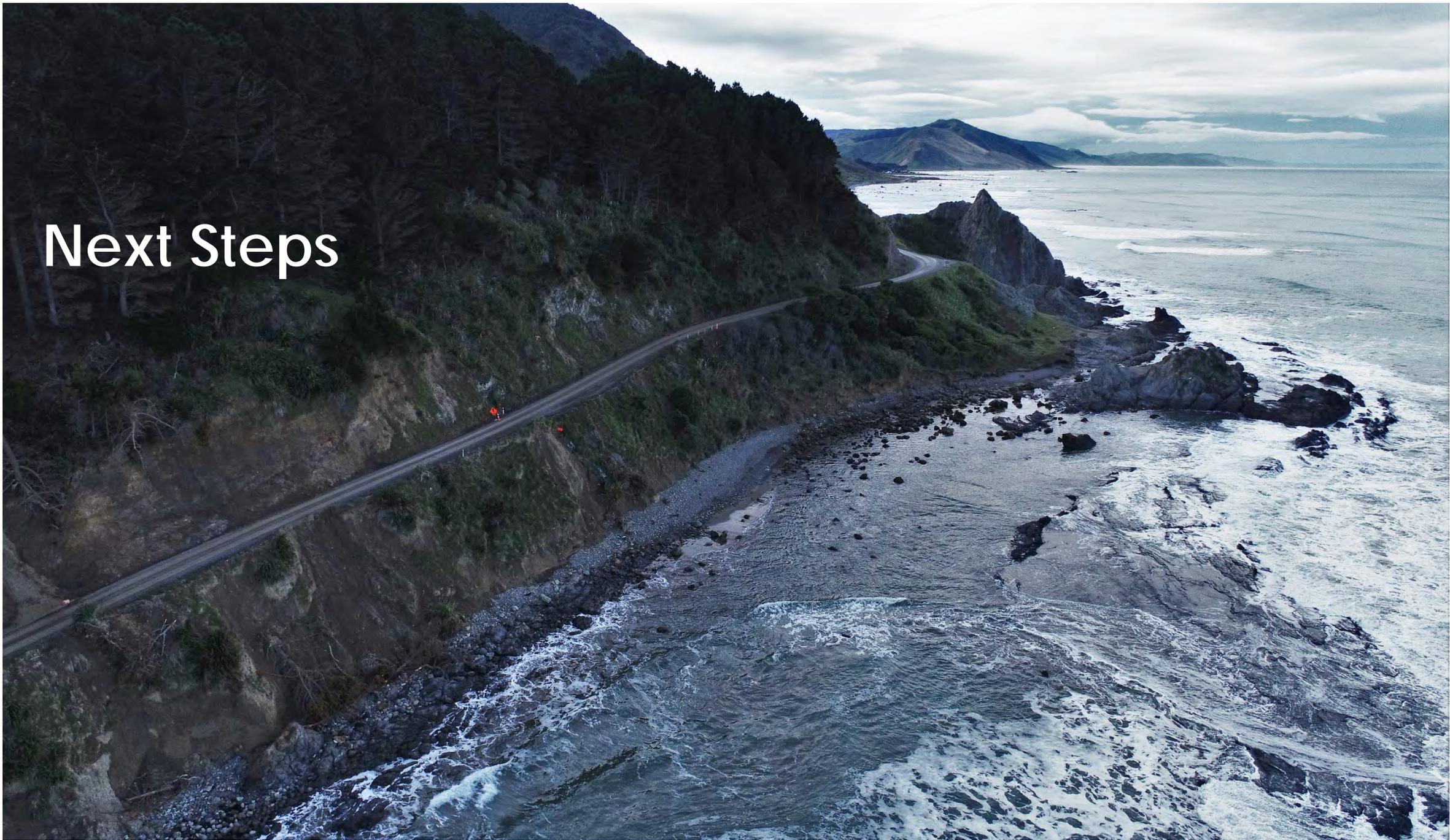


Feedback





Next Steps





Questions?



Karakia whakamutunga

Kua mutu ā mātou mahi Our work has finished

Mō tēnei wā For the time being

Manaakitia mai mātou katoa Protect us all

Ō mātou hoa Our Friends

Ō mātou whānau Our Family

Āio ki te Aorangi Peace to the universe



Providing resilient
and sustainable
access to
Mataikona

Appendix M Hybrid Option Technical Note





**MATAIKONA SSBC PREFERRED OPTION
CONCEPT DESIGN**

13 June 2023

Prepared for:
Masterton District Council

Prepared by:
Ryan Abrey

Project Number:
310205311

Mataikona SSBC PREFERRED Option Concept Design

Revision	Description	Author	Date	Quality Check	Date
A	Draft	RA, JF	03/05/2023	CK, CS	11/05/2023
0	For Council Approval	RA	13/06/2023	CK, CS	13/06/2023

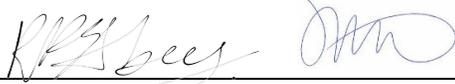


Mataikona SSBC PREFERRED Option Concept Design

The conclusions in the Report titled Mataikona SSBC Preferred Option Concept Design are Stantec's professional opinion, as of the time of the Report, and concerning the scope described in the Report. The opinions in the document are based on conditions and information existing at the time the scope of work was conducted and do not take into account any subsequent changes. The Report relates solely to the specific project for which Stantec was retained and the stated purpose for which the Report was prepared. The Report is not to be used or relied on for any variation or extension of the project, or for any other project or purpose, and any unauthorized use or reliance is at the recipient's own risk.

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Prepared by: 
Signature

Ryan Abrey, Jarrod Forde

Printed Name

Reviewed by: 
Signature

Chris Calef, Cory Smith

Printed Name

Approved by: 
Signature

Andrew Maughan

Printed Name



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Mataikona SSBC PREFERRED Option Concept Design

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APPENDIX B CONCEPT SKETCHES.....1
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1 INTRODUCTION

This concept design note outlines the key assumptions, exclusions and future considerations associated with the preferred design of the Mataikona project. The purpose of the note is to document the Preliminary Geotech Appraisal, geometric layout and high-level coastal protection design for costing which will feed into the Mataikona Single Stage Business Case (SSBC) Part C.

2 PROJECT OUTCOMES / OBJECTIVES

The key objective of the Mataikona project is to provide resilient and sustainable access to Mataikona. Mataikona Road provides the only access to three beach front settlements and farming and forestry areas. It is now becoming a significant maintenance problem and sections of the route are at real risk of undermine, washing out entirely, or blocked by debris, isolating the community. Identifying a preferred option will provide residents with certainty around future access to their properties, and Council with a way forward.

3 OPTIONS

At the previous stages of the project, a short list of options was developed from a long list of options. Technical assessments were undertaken in identifying the short list of options.

3.1 OVERVIEW

The outputs of the MCA, mana whenua rankings and economics assessments were presented to a stakeholder workshop and community meeting to get feedback on which option or combination of options is preferred. The stakeholders and mana whenua prefer the strengthen option. However, they recognised that due to cost and other trade- offs they proposed a hybrid package if this can be funded. The hybrid option combines elements of the retreat package where the road can be realigned (where possible and feasible), with increased maintenance and priority strengthening (when and where it this can be afforded).

4 PREFERRED OPTION

The selected preferred option is a hybrid between the retreat and strengthen and increased maintenance options. This hybrid option will include the key elements that provide the highest benefits within the available budget and other constraints. This option will be optimised to align with the anticipated Low-Cost Low-Risk Waka Kotahi funding model.



**Mataikona SSBC PREFERRED Option Concept Design
5 CONCEPT DESIGN ASSUMPTIONS/EXCLUSIONS**



Figure 4-1: High Level Hybrid Option Intervention Breakdown

5 CONCEPT DESIGN ASSUMPTIONS/EXCLUSIONS

In preparation of concept design drawings following assumptions and exclusions have been made:

5.1 Design Standards

The concept designs have been undertaken generally in accordance with the principles outlined in the following standards and guidelines:

- CIRIA C683 2017 – The Rock Manual (2nd Edition)
- WakaKotahi SM014 2023 – Cost Estimation Manual
- Waka Kotahi Bridge Manual (SP/M/022) Third Edition Amendment 4
- Waka Kotahi Minimum Standard Z/44
- MfE 2017 – Coastal Hazards and Climate Change
- MfE 2022 – Urutau, ka taurikura: Kia tū pakari a Aotearoa i ngā huringa āhuarangi Adapt and thrive: Building a climate-resilient New Zealand
- Geometric Design: Austroads, Guide to Road Design Part 3



6 Concept Interventions

6.1 Geometric Design

6.1.1 ALIGNMENT

The geometric design of the road focussed on three locations of retreat/realignment where protection and accommodation are not feasible to be considered:

- Sandy Bay,
- Before Te Rerenga o Te Aohuruhuru (Suicide Rock), and
- After the Middle Settlement.

This was to increase the buffer zone between the coastline and the road allowing for the beach to reform at a shallower slope and the coastline to level out spreading the wave energy more evenly.

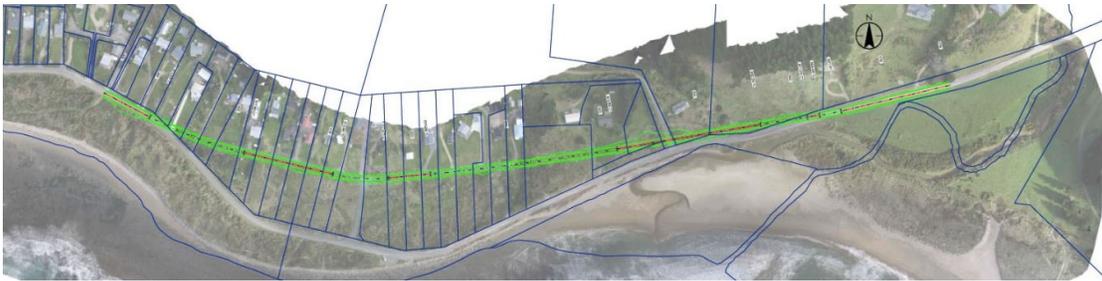


Figure 6-1: Sandy Bay Realignment (RP 2859-3764)



Figure 6-2: Before Suicide Hill Realignment (RP 5775-7777)

The southern realignment in this figure spans RP 5775-6353 while the northern realignment in this figure spans RP 7090-7777.



Figure 6-3: After Middle Settlement Realignment (RP 8911-10230)



**Mataikona SSBC PREFERRED Option Concept Design
6 Concept Interventions**

The Geometric assessment indicated that the proposed realignments above would require:

Location	Length (m)	Cut/Fill (m ³)	Comments
Sandy Bay	0.910	2200	Considered High Risk Pavement is made up of AP40 stabilized and AP65 subbase and chip seal
Before Te Rerenga o Te Aohuruhuru – Southern Section	0.580	3000	Considered Critical Pavement is made up of AP40 stabilized and AP65 subbase
Before Te Rerenga o Te Aohuruhuru – Northern Section	0.870	3000	Considered High Risk Pavement is made up of AP40 stabilized and AP65
After Middle Settlement	1.350	7800	Considered High Risk Pavement is made up AP40 stabilized and AP65 sub-base

General Assumptions:

- Earthworks is an average between haulage off site and importing
- Drainage assumption is that the existing culverts will be updated if required
- The traffic management rate for all sections is based on \$2000 a day for one month to do the earthworks based on feedback from Corridor Manager.

6.1.2 REALIGNMENT ADAPTATION PATHWAY

Figure 6-4 provides an example climate adaptation pathway for the realignment works. This plots the pathway that decision making would take place for a section where realignment is considered. Currently the section is maintained reactively when damage occurs. Once funding is procured preventative maintenance can take place while the design and consenting of the realignment is undertaken. Once this is complete then at a time where it is no longer feasible to repair due to severity and frequency of damage, the road can be realigned as per the consented design. At a future stage, once the impacts of climate change become more severe even the realignment may not fully provide resiliency to events and at this stage it may be considered to accept a diminishing level of service.

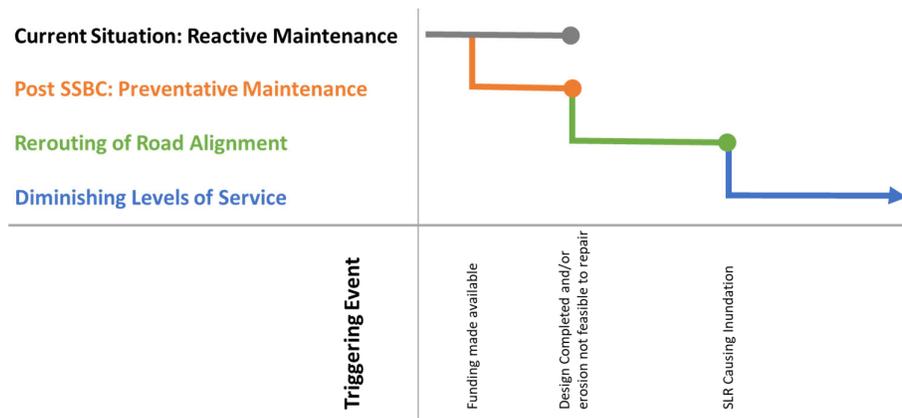


Figure 6-4: Typical Realignment Pathway



6.2 Coastal Protection

Coastal protection is proposed to mitigate coastal erosion and inundation of the of the foreshore adjacent to the proposed Maitakona Road realignment. fronting Middle and Maitakona settlements. The extent of proposed coastal protection includes the foreshore fronting Middle Settlement, and a small area of foreshore fronting Maitiakona Settlement (See Figure 6-5 and Figure 6-6 below). It is noted that some coastal protection may also be required adjacent First Hill and Te Rerenga o Te Aohuruhuru (Suicide Hill).



Figure 6-5: Middle Settlement (red areas of top-up to current fix , cyan indicates full coastal protection installation)



Figure 6-6: Mataikona Settlement (cyan indicates full coastal protection installation)

A high-level appraisal of coastal protection options has been undertaken. This included an assessment of advantages and disadvantages between three coastal protection options, with all of which serving as a last line of defence against coastal erosion and inundation. Following the appraisal of options, a high-level concept design of the preferred option has been prepared.

6.2.1 OPTIONS APPRAISAL

Option 1 Rock Armoured Revetment

A rock armoured revetment is an embankment formed using armour rock, typically constructed in layers. They can comprise armour layers, underlayers, filter layers (such as geotextiles) and a core. When constructed on hard substrate, such as that along the proposed Mataikona Road foreshore, the toe of the revetment is typically keyed in to maintain structural integrity under wave loading. The underlayers are provided to prevent leaching of any fine material through the voids of the armour layer. The underlayer is typically placed on a geotextile fabric, particularly with the



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existing subgrade behind the revetment is comprised of fine material. Suitable rock can be sourced from nearby quarries. An example of a rock armoured revetment is shown in Figure 6-7, below. Some advantages and disadvantages associated with the use of rock armour for revetment construction are detailed below.

Advantages

- Rock armour has been proven to be a robust protection mechanism in the coastal environment. It can tolerate a significant degree of displacement and shifting, as well as some degree of settlement, whilst maintaining functionality and not requiring significant maintenance. Typically, a design permits the movement of some 10% of the armour units and 2% damage during the design event;
- The voids between adjacent armour units and revetment slope help to dissipate wave energy, reducing wave run up and overtopping, compare to smooth protective treatments;
- As a result of the relatively gentle armour slope, wave reflection is minimised, thereby reducing potential scour at the toe of the structure;
- Rock armoured structures typically have a design life in the order of 40 years, making them a relatively durable solution;
- Good resilience to climate change, as they can be raised, repaired, retrofitted relatively easily. Care however needs to be taken to ensure the size of armour units are appropriate to respond to any increases in wave climate and water level.
- The use of natural rock is considered aesthetically pleasing to many stakeholders, when compared to more “industrial” protection treatments (e.g. concrete); and
- Rock as a material has a relatively low “embedded carbon” value, for example compared to concrete and steel. If a quarry exists nearby, the carbon footprint associated with rock protection structures is relatively low.

Disadvantages

- The nature of a gentle sloped rock armoured seawall requires a large structural footprint, potentially reducing beach amenity by narrowing the area of beach in front of the structure;
- The use of rock armour is often limited to the local availability of rock. A consequence of this is a variable construction costs from site to site. It is understood that there is adequate quarry rock available in the vicinity of the site, placing less weighting on this shortfall;
- Visual amenity considerations. Rock armour is a hard protection solution which may lower the natural visual amenity of the beach;
- Large rocks create voids and uneven surfaces and can pose a safety risk to patrons if they walk on the structures;





Figure 6-7: Example of a rock armoured revetment at Tauranga (Cirtex, accessed 2023)

Option 2 Geotextile Sand Container Revetment

Geotextile Sand Containers (GSC) have a long history around the world as an alternative to rock armoured coastal protection options. GSC revetments are composed of a series of stacked, sand filled geotextile containers built to form a stabilising, defensive barrier against coastal erosion.

The applicability and cost-effectiveness of GSC structures compared to typical rock armoured structures will vary based on a number of local site-specific factors such as wave climate, geotechnical conditions and local foreshore uses and amenity requirements. An example of a GSC revetment is shown in Figure 6-8, below. Some advantages and disadvantages associated with the use of GSC for revetments are provided below.

Advantages

- Total construction and life cycle costs for a GSC structure can be less than rock armoured structures due to reduction in work volume, non-sophisticated equipment and plant requirement, low-skilled labour requirement and the possibility of using locally available sand;
- GSC bags are more easily/cheaply removed than rock if required in the future.
- GSC-structures are flexible and behave advantageously under cyclic hydrodynamic loads. They can also adapt and conform readily to changing site conditions and morphological foundation changes;
- No rock haulage and associated construction impacts on roads or users;
- Good resilience to climate change, as they are able to be easily topped up, modified or removed if necessary;
- GSC revetments can add to local amenity and reduce the potential for injury and public liability when compared to hard rock revetments; and
- A GSC revetment can occupy a slightly smaller footprint than a rock armoured revetment due to the ability to stack bags at a steeper slope. This can have implications for reflection and scour, however.

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Disadvantages

- The containers can be subject to vandalism which, unlike rock armour, can have a direct impact on the structural integrity of the structure;
- GSC units are vulnerable to wear as a result of UV exposure and abrasion. This is particularly important for Maitiakona, given the structure is likely to be constructed on an abrasive surface;
- There are limitations on the placement of GSC units which restrict any curvature of the structure to approximately 27m in diameter;
- GSC units exposed to tides, waves and UV have a shorter design life than rock armoured structures.
- Generally, GSC units can be considered to have a maximum design life of between 15 and 25 years (at present);
- GSC revetments form impermeable structures which do not absorb wave energy, this results in the structure being more vulnerable to wave over topping, wave reflection and scour as compared to a porous armoured structure. The vulnerability of the GSC revetment to wave over topping, wave reflection and scour generally increases as the revetment slope is steepened.



Figure 68: Example of a GSC revetment in NSW, Australia (Geofabrics, accessed 2023)

Option 3 Vertical Retaining Walls or Hybrid Walls

Vertical walls in the coastal environment are rigid structures, typically constructed as either an in situ poured concrete structure, sheet piled wall or as a wall formed from stacked interlocking units. An example of such structure would be concrete weighted blocks as provided by Redi Rock or similar, which may be preferred if suitable rock armour is not available, or where horizontal space is limited. These blocks rely on their weight to provide stability or could be tied back using geogrid strips between compacted layers behind the wall. Examples of the Redi Rock wall is provided in Figure 6-8, below. Some advantages and disadvantages associated with vertical walls are discussed below.



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Advantages

- Vertical walls require less space than sloped, semi rigid structures. If appropriate coastal management is undertaken, this can result in a larger area of beach fronting the structure and in turn, improving amenity. This is not likely to be a factor for Maitakona, given the lack of useable beach in front of the structure; and
- The smaller footprint of a vertical wall can be more aesthetically pleasing than sloped revetments to many stakeholders.

Disadvantages

- The vertical face of the wall does not absorb wave energy, and consequently creates wave reflection;
- resulting in scour at the toe of the wall as well as contributing to wave overtopping as waves are deflected upward. This is only relevant if is expected to be regularly impacted by coastal processes;
- As a result of the lack of wave absorption characteristics, the crest level of a vertical wall typically needs to be higher than that of sloped seawall;
- Vertical walls tend to have limited adaptability to climate change, as they can be more difficult to raise than sloped, armoured structures;
- Vertical walls for coastal protection require a well-founded toe, preferably on hard substrate or should be deeply piled to avoid scour and undermining;
- It is common for vertical walls to be constructed with additional protection at the toe. This is often in the form of rock armoured units. Should the design require additional toe protection, any benefits from a reduction in structure footprint may be lessened;
- Vertical walls or revetments designed for regular coastal impact can have a highly industrial look and be aesthetically displeasing to some stakeholders; and
- Potential safety implications associated with the steep drop off at the edge of the wall.



Figure 6-9: Example Hybrid Wall using Concrete Block Wall with Armour Revetment (Redi Rock, 2023)

Based on a high-level appraisal of the three coastal protection options, the rock armoured revetment has been selected as the preferred option at Maitakona. Following discussions with local GSC providers, the risk of abrasion due to airborne rocks during elevated wave conditions is considered to be unacceptable. Given there is suitable rock available in the vicinity of the proposed coastal protection, a rock armoured revetment is anticipated to be a more economical than a vertical wall. See Figure 6-7.

6.2.2 HIGH-LEVEL CONCEPT DESIGN

A high-level concept design has been prepared for the rock armoured revetment option at Mataikona. The concept design has largely been based on our knowledge of similar designs at comparatively



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exposed sections of coastline along the west coast of New Zealand. This concept design will need to be reviewed and validated during subsequent stages of the project. High level concept design sketches used for costing are included in Appendix B. An overview of the key features of the revetment cross section is provided below.

The high-level concept design includes the following key features:

- Two layers of 1,000kg to 3,000 kg primary armour rock;
- 1m thick 60 – 300 kg underlayer rock;
- Geotextile filter layer;
- 1V:2H armour slope;
- 0.5 m deep trenched toe;
- Crest height to tie into existing embankment; and
- A rock density of 2.5t/ m³ has been assume, based on preliminary discussions with local quarries.

Consideration has been given to the proposed crest level of the structure, based on a freeboard assessment using local water level data and allowances for physical processes such as storm surge, sea level rise and subsidence. For this assessment, a tidal datum of 0.48m, NZVD 2016, was adopted, corresponding to the local secondary port: Castle Point's Mean High Water Spring (MHWS). In order to account for nearshore water level processes, such as storm surge and wind and wave setup, an allowance of 0.6m has been considered, as per MfE guidance for open coasts in NZ. Additional allowance has been made for future sea level rise (SLR) and vertical land movement, across the design life of the structure. The New Zealand Searise (New Zealand Searise, 2023) indicates approximately 6mm of vertical land movement (VLM) per annum, over the road section and approximately 160mm to 310mm of sea level rise, Figure 6-10.

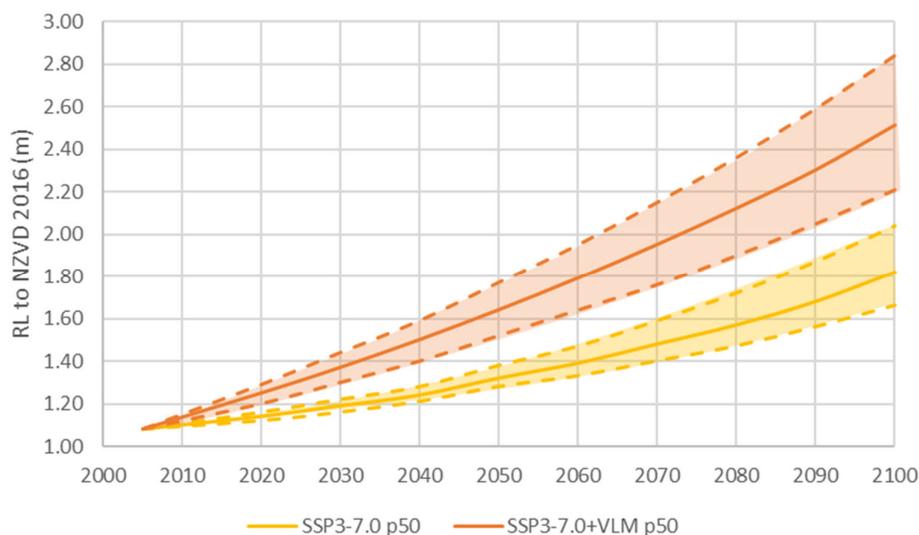


Figure 6-10: Extreme Water Levels with SLR + VLM



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In addition to the still water level, wave runup effects on the proposed coastal protection option may occasionally lead to overtopping and inundation of the adjacent land. This will be most notable at the beach area to the north of Mataikona, south of the river mouth which is already low lying, at approximately 2.82m RL. This area is often inundated with debris washing over the buried rock protection, see Figure 6-11. At the current water levels (without an allowance for SLR) there is currently a freeboard of approximately 1.7m to the road level, this will reduce over time to approximately 1m by 2060, which will likely lead to an increased frequency of inundation. It is not anticipated that the road would be inundated on the MHSW until 2080 if the upper band of SLR + VLM is reached.

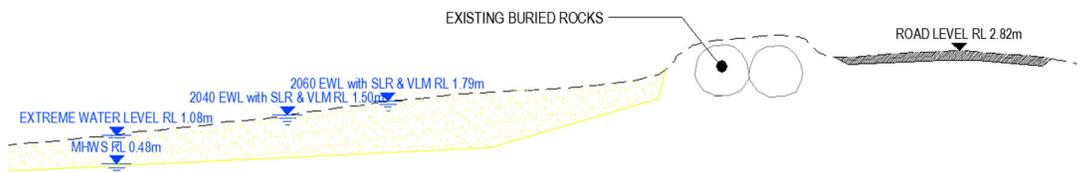


Figure 6-11: Cross Section Through Beach North of Mataikona Settlement

6.3 Geotechnical

6.3.1 REGIONAL GEOLOGY

The regional geology for the area is described in the 1:250,000 scale geological map of the Wairarapa Area and the associated publication (refer to Figure 6-12). The geological map indicates that the Mataikona site has the following geological units along the existing road alignment.

- Whakataki Formation (Miw): Alternating graded sandstone and mudstone; minor bioclastic limestone and breccia horizons.
- Whangai Formation (Kiw): Grey to brown, grey to white weathering, massive to poorly bedded, mudstone. Locally interbedded sandstone and mudstone.
- Holocene Alluvium (Q1a): Moderately to well sorted alluvial flood plain gravel with minor sand and/or silt.
- Holocene Beach Deposits (Q1b): Loose boulders and sand on modern day marine terrace.



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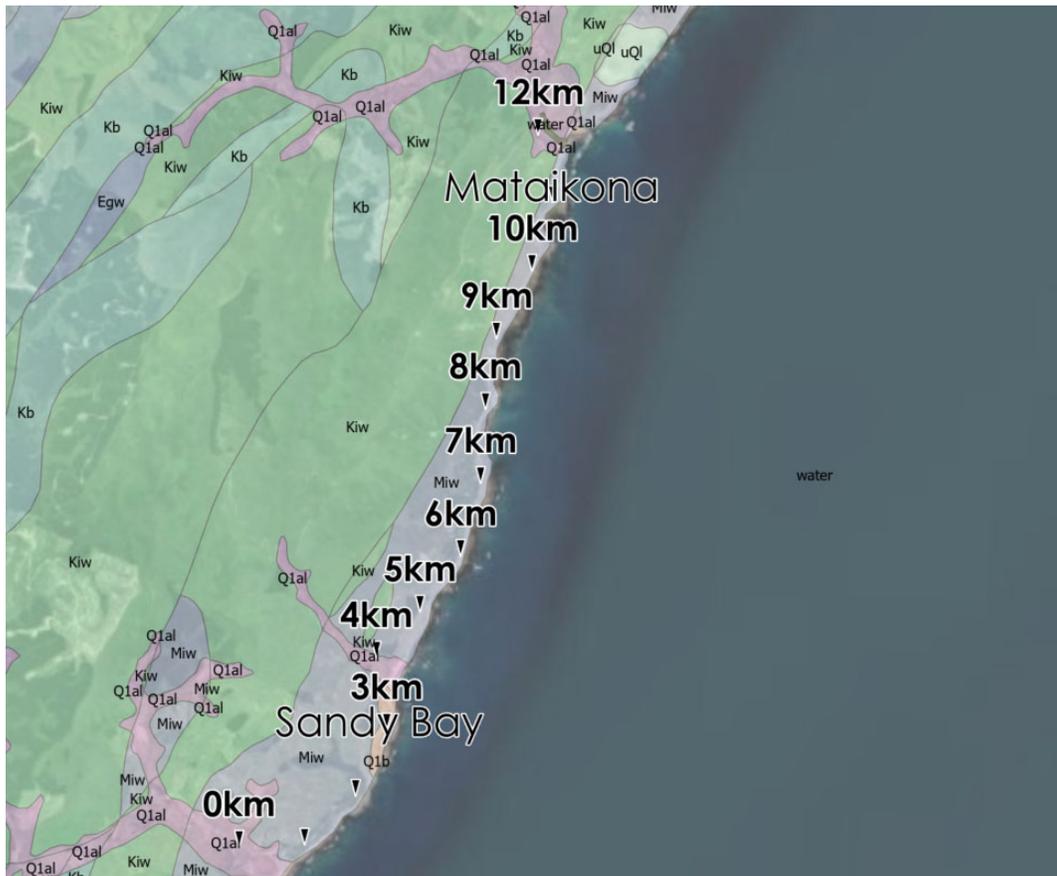


Figure 6-12 Regional geological map (Lee and Begg, 2002)

6.3.2 SEISMICITY

The Masterton region is an area of significant seismic risk. A series of southwest-northeast trending active faults within the region compound the seismic hazard. The primary faults include the Wellington, Wairarapa, Alfredton, Carterton and Saunders Road Faults, but there are numerous other smaller faults that are mapped as active in the region. All the larger fault lines listed, with the exception of the Carterton Fault, are located further inland, west and north of Masterton or at least 40km away from the site.

6.3.3 SLOPE STABILITY AND RISK ASSESSMENTS

Due to the varying nature of the topography and external influences (e.g. wave energy, stormwater), slope stability needs to be ascertained on a site-specific basis. No site assessments have been undertaken by geotechnical engineers, so slope risk assessments have been conducted using available information such as drone imagery, google earth, photos, RAMM data and drive through videos, as well as our experience of the behaviour of road corridors in similar topographical and geotechnical context.

Slope risk assessments have been completed using a modified version of NZTA Z/44 – Risk Management Practice Guide. Likelihood ratings are as per Z/44 Table 4.3 for threats. Consequence



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ratings have been adjusted to be more relevant to the Mataikona alignment, on a scale of no loss of route for insignificant to loss of route for more than 3 months being extreme. The Z/44 overall risk matrix is presented in Figure 6-13, noting only the threat categorisation applies.

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

Figure 6-13 Z/44 overall risk matrix (Waka Kotahi, 2018)

6.3.4 GEOTECHNICAL HAZARDS

The following is a typical but not exhaustive list of geotechnical hazards that affect Mataikona Road.

Uphill Sites

- Rockfall: fallen mass of rock from a slope above, typically experienced as loose debris from a fractured rock slope.
- Landslide: the movement downslope of a soil or earth mass. Landslides occur when gravitational and other types of shear stresses within a slope exceed the shear strength of the materials that form the slope.
- Debris Flow: Oversaturation of soils in a gully or channel that results in a ‘semi-fluid’ flow of debris down a slope.
- Hanging Gully: Steep (usually), natural drainage channel which directs overland stormwater quickly towards the road.

Downhill Sites

- Underslip: Slip formed beneath the road due to one or many of improper drainage, oversteep batter angle, unsuitable founding material, loss of toe support/erosion and surcharge applied



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to the slope. Underslips are of greater consequence for the road, due to the greater loss of service, higher costs and longer timeframes for reinstatement.

- Culvert Outlets: Culvert outlets, where not suitably managed, can outlet onto a slope, increasing erosion, saturation and leading to washout of slope material or slope failure.
- Coastal Influences: Wave and tidal influences.

6.3.5 TYPICAL MITIGATION MEASURES

The proposed typical mitigation measures are described in Table 6-1 below.

Table 6-1 Summary of typical landslide mitigation measures

Site Hazard	Mitigation Type	Mitigation Description	Standard Construction Cost Range (\$NZD)
Uphill - Rockfall	Low-Cost Remediation	Scaling of loose rocks and debris on slope.	10 – 20 per m ²
	High-Cost Remediation	Scaling and localised anchoring in weak zones and/or installation of an engineered catch fence.	Anchor: 2000 – 3000 per m ² Catch Fence: 1000 – 5000 per m
	Medium Cost	Non-engineered barriers such as ditches or concrete blocks.	300 – 800 per m
Uphill - Landslide	Low-Cost Remediation	Scaling of loose material and planting (as appropriate) of the slope face.	10 – 20 per m ²
	Medium-Cost Remediation	Erosion protection matting, with planting. Steel mesh may be required on steeper slopes.	Mat: 30 – 70 per m ² Planting: 50 – 100 per m ² Mesh: 50 – 70 per m ²
	High-Cost Remediation	Anchor and mesh stabilisation of slope with shotcrete facing.	2000 – 3000 per m ²
	Retreat	Retreat of the hillside which may involve reprofiling of the slope and other stabilisation measures.	Costs vary depending on scope of retreat
	Drainage (standalone or combined with above options)	Sub-horizontal drains, cut-off drains and other drainage improvements.	1500 – 3000 per m
Uphill - Debris Flow	Low-Cost Remediation	Scaling of loose rocks and debris on slope.	10 – 20 per m ²



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Site Hazard	Mitigation Type	Mitigation Description	Standard Construction Cost Range (\$NZD)
	High-Cost Remediation	Installation of an engineered debris flow fence.	5000 – 1000 per m
	Drainage (standalone or combined with above options)	Reprofiling of drainage channel, improvements of culverts and surface drainage below slope.	20 – 50 per m
Downhill – Underslip	Low-Cost Remediation	Planting on the road embankment downslopes.	50 – 100 per m ²
	Medium-Cost Remediation	Erosion protection matting, with planting. Steel mesh may be required on steeper slopes.	Mat: 30 – 70 per m ² Planting: 50 – 100 per m ² Mesh: 50 – 70 per m ²
	High-Cost Remediation	Retaining walls such as anchors post and lagging walls or MSE. Wall type varies based of site-specific conditions.	10000 – 25000 per m
	Retreat	Retreat of the road to create a buffer zone to the downslope hazards.	Costs vary depending on scope of retreat
	Drainage (standalone or combine with above options)	Installation of flumes and channels on critical downslope culverts. Improvement of drainage to prevent overland flow scouring slope crest.	New culvert: 2000 – 5000 per m Improvements: 10 – 50 per m
Downhill – Coastal Influences	Riprap Revetment	Excluded from Geotechnical Costings and Considerations.	
	Retaining Walls or Hybrid Walls		



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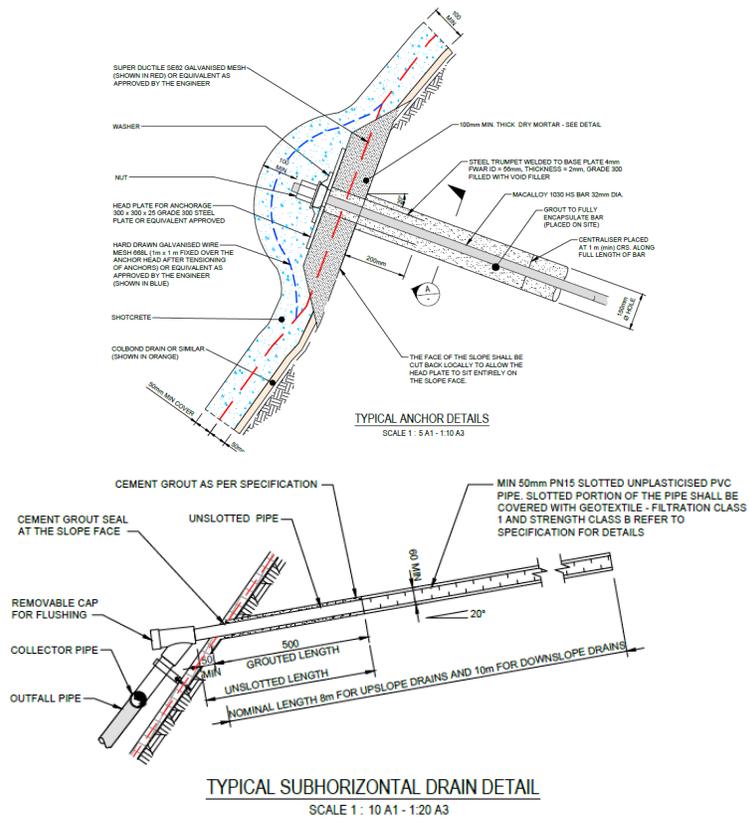


Figure 6-14: Typical anchor and sub-horizontal drain typical details



Figure 6-15: Example photograph of anchor and mesh slope remediation



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Figure 6-16: Erosion Protection mat with steel mesh



Figure 6-17: Example of rock fall protection fence installed at the toe of the slope



6.3.6 COST SUMMARY AND PRICE BAND EXPLANATION

Based on the desktop assessment of the alignment, cost estimates have been produced. The costs are our best estimate based on typical construction rates for similar projects and site complexity and exclude any costs related to retreat or coastal protection. Final costs will vary depending on the tolerable level of residual risk and design details of the remedial solution.

Sites that have been identified as being high or critical risk based on the Z/44 risk assessment have been assessed in higher detail as shown in Table 7-1. These sites have two cost bands, including:

- Lower band costing: Cost associated with preventative maintenance including scaling, patch remediation, drainage upgrades or construction. This cost band is not intended to mitigate or reduce the long-term risk profile but will improve resilience and potentially reduce frequency of maintenance actions. A longer-term approach to asset maintenance will still be required.
- Higher band costing: Cost associated with short to medium term remediations such as sub-horizontal drains, erosion protection mats, planting of slopes, localised anchoring or other high-cost mitigation and may include maintenance items as described above in lower band costing category. In many cases, the upper bound estimate will not substantially reduce the consequence of failure but is intended to reduce the likelihood of events and the frequency of maintenance required to maintain the existing level of service. The upper band estimate does not constitute a complete risk mitigation of the site (unless otherwise indicated) and in some cases full mitigation may require at least 2 to 3 times the higher band if a permanently lower residual risk is required.

A complete list of identified geotechnical risk sites are presented in Appendix A.

Overall, we estimate the cost associated with mitigation of the geotechnical hazards to be on the order of \$3.5M to \$10M, noting that coastal and retreat sites have been excluded from this cost. The lower end estimate involves employing lower cost and higher risk initiatives for short-term improvement and reduction in maintenance actions. The higher cost estimate will provide more significant remediation and future resilience but does not attempt to mitigate the risk entirely, particularly at the high and critical risk sites.

6.3.7 KEY LIMITATIONS

The key limitations of the slope risk assessments are as follows:

- The site has not been visited and inspected by a geotechnical professional.
- Risk assessments were undertaken using available information such as drone imagery, google earth, photos, RAMM data and drive through videos.
- The resources used for assessment were taken prior to cyclone Gabrielle. While new sites have been added to the register, the condition of the originally identified sites may have changed or worsened as a result of this event.



7 Cost Estimate

The costs for the proposed interventions have been compiled based on the risk rating has been categorised as follows. For geotechnical sites, refer Section 6.3.6 for explanation of cost bands and expected outcomes provided at each fee value.

Table 7-1 Critical Site Summary

Chainage	Risk Rating	Hazard Description	Proposed Remediation	Estimated Base Cost Range
1020 – 1320	Critical	High slope with rock layers visible on the face. Scarps at the top and indication of past slips.	Scaling to localised anchoring and erosion protection mat and/or mesh.	\$200,000 - \$1,400,000
1320 – 1650	Critical	High slope with historic instabilities. Overhanging trees at the top of the slope.	Scaling to isolated anchoring and erosion protection mat and/or mesh. Undermined tree removal	\$200,000 - \$1,000,000
2859 – 3764	High	Coastal Erosion	Retreat and realignment of road.	\$ 2,000,000 - \$ 2,400,000
4390 – 4600	High	High slope with historic instabilities.	Erosion protection mat and planting. Potential sub-horizontal drains and other drainage improvements.	\$100,000 - \$500,000
5910 – 6040	Critical	Erosion due to stormwater scour and coastal influences.	Retreat and realignment of road.	\$ 850,000 - \$1,100,000
7090 – 7777	High	Immediately before Suicide Rock	Erosion due to stormwater scour and coastal influences.	Retreat and realignment of road.
7880 - 8100	Critical	Erosion due to stormwater scour and coastal influences.	Retaining wall or anchored solution. Likely improvement of coastal protection.	\$200,000 - \$1,200,000 (excluding coastal protection)
8300 – 8340	Critical	Pre-existing landslide remobilised	Erosion protection mat and planting.	\$300,000 - \$1,500,000



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Chainage	Risk Rating	Hazard Description	Proposed Remediation	Estimated Base Cost Range
		and extends through entire road.	Potential sub-horizontal drains and other drainage improvements.	
8720 - 8800	Critical/ High	Erosion due to coastal influences.	Retreat and realignment of road.	\$ 1,200,000 - \$1,500,000
8970 - 8990		Erosion due to coastal influences.	Retreat and realignment of road.	
9690 - 9975		Erosion due to coastal influences.	Retreat and realignment of road.	
9975 - 10040		Erosion due to coastal influences.	Retreat and realignment of road.	
10900 - 11060	High	Erosion due to coastal influences.	Coastal Protection	\$ 1,850,000 - \$ 2,200,000
11970 - 11990	Critical	Underslip has occurred. Half of road width lost, and bypass has been put in place.	Installation of retaining wall to reinstate width. Scour protection at toe.	\$1,200,000 - \$2,030,000
11990 - 12240	High	Erosion due to river scour causing Underslip.	Installation of retaining wall and/or scour protection. Retreat if possible.	\$600,000 - \$1,200,000 Not considering retreat

This has determined that the works would cost approximately the following:

Table 7-2: Physical Works Cost Estimate Summary

	Critical	High	Medium & Low
Total Pre-implementation	\$1, 536, 864	\$ 1, 234, 5434	\$ 457, 500
Sub Total Base Implementation Fees	\$ 512, 288	\$ 411, 511	\$152, 500
Sub Total Base Physical works	\$10, 245, 758	\$8, 230, 228	\$3, 050, 000
Project Base Estimate	\$ 12, 294, 910	\$ 9, 876, 274	\$ 3,660,000

On top of these costs, the property procurement costs would need to be added for any relocations works, along with any contingency and funding risk allowances.



8 Future Considerations and Staging

The next stage would be to develop a detailed climate adaptation pathway for the road which includes the triggering events and actions. This will assist in making decisions to continue with current mitigations or implement planned future mitigation measures.



Figure 8-1: Draft Adaptation Pathway

- Coastal Processes Assessment for design conditions and structure impact assessment in consenting.
- Climate adaptation pathway development with detailed triggering assessment to provide better estimates of timelines.

9 Safety in Design

A Safety in Design review has been undertaken at concept design stage and will be updated during the design process.

The SiD register is provided in Appendix C



APPENDICES



Appendix A Summarised risk assessment for all identified geotechnical hazard sites on Mataikona Road

Chainage Start (m)	Chainage End (m)	Site Type	Risk Likelihood	Risk Consequence	Risk Rating
0	50	Flat	Unlikely	Minor	Low
470	700	Uphill	Rare	Insignificant	Low
520	530	Downhill	Rare	Moderate	Low
690	720	Downhill	Rare	Moderate	Low
740	780	Uphill	Unlikely	Severe	Medium
840	880	Downhill	Rare	Insignificant	Low
840	860	Uphill	Rare	Moderate	Low
850	1000	Uphill	Unlikely	Minor	Low
1020	1060	Downhill	Unlikely	Moderate	Medium
1020	1320	Uphill	Almost Certain	Severe	Critical
1380	1380	Uphill	Rare	Moderate	Low
1320	1650	Uphill	Almost Certain	Extreme	Critical
1380	1680	Downhill	Rare	Moderate	Low
1680	1680	Uphill	Rare	Moderate	Low
1680	2000	Uphill	Likely	Insignificant	Low
1680	2000	Downhill	Unlikely	Moderate	Medium
2120	2180	Uphill	Possible	Moderate	Medium
2200	2260	Uphill	Possible	Minor	Medium
2200	2260	Downhill	Possible	Minor	Medium
2260	2590	Uphill	Likely	Minor	Medium
3200	3400	Uphill	Unlikely	Insignificant	Low
4210	4275	Downhill	Unlikely	Moderate	Medium
4350	4370	Uphill	Rare	Moderate	Low
4390	4597	Downhill	Likely	Moderate	High
4550	4597	Uphill	Rare	Moderate	Low
4670	4740	Downhill	Rare	Moderate	Low
4670	4740	Downhill	Rare	Moderate	Low
4780	4840	Uphill	Rare	Minor	Low
4780	4840	Downhill	Unlikely	Moderate	Medium



Mataikona SSBC PREFERRED Option Concept Design
Summarised risk assessment for all identified geotechnical hazard sites on Mataikona Road

Chainage Start (m)	Chainage End (m)	Site Type	Risk Likelihood	Risk Consequence	Risk Rating
4940	5000	Uphill	Unlikely	Moderate	Medium
4970	5000	Downhill	Unlikely	Moderate	Medium
5033	5090	Downhill	Unlikely	Moderate	Medium
5100	5130	Downhill	Unlikely	Moderate	Medium
5200	5260	Downhill	Unlikely	Moderate	Medium
5457	5534	Downhill	Unlikely	Moderate	Medium
5748	5770	Uphill	Rare	Moderate	Low
5748	5770	Downhill	Coastal Erosion Protection		
5870	5900	Downhill	Coastal Erosion Protection		
5910	6040	Downhill	Coastal Erosion Protection. Even with the proposed retreat, mitigation is likely still required at this location (but with reduced priority).		
5900	6052	Uphill			
6075	6100	Downhill			
6200	6300	Uphill	Unlikely	Insignificant	Low
6075	6100	Uphill	Rare	Moderate	Low
6200	6300	Downhill	Coastal Erosion Protection. Even with the proposed retreat, mitigation is likely still required at this location (but with reduced priority).		
6435	6450	Uphill	Rare	Moderate	Low
6435	6450	Downhill	Unlikely	Moderate	Medium
7300	7680	Downhill	Coastal Erosion Protection. Site mitigation can be largely reduced if the retreat option is undertaken.		
7300	7680	Downhill			
7807	7807	Downhill			Low
7816	7866	Downhill	Coastal Erosion Protection		
7816	7866	Uphill	Possible	Moderate	Medium
7880	8100	Downhill	Possible	Extreme	Critical
7880	8000	Uphill	Possible	Minor	Medium
8100	8250	Uphill	Unlikely	Moderate	Medium
8300	8340	Downhill	Possible	Extreme	Critical
8538	8538	Downhill	Unlikely	Insignificant	Low
8720	8800	Downhill	Coastal Erosion Protection		
8970	8990	Downhill	Coastal Erosion Protection		
9140	9200	Uphill	Unlikely	Moderate	Medium
9100	9200	Downhill	Coastal Erosion Protection. Site mitigation can be reduced if the retreat option is undertaken.		
9251	9251	Downhill			



Mataikona SSBC PREFERRED Option Concept Design
Summarised risk assessment for all identified geotechnical hazard sites on Mataikona Road

Chainage Start (m)	Chainage End (m)	Site Type	Risk Likelihood	Risk Consequence	Risk Rating
9690	10000	Downhill			
9975	10040	Downhill			
10150	10165	Downhill			
10250	10250	Downhill			
11450	11550	Uphill	Rare	Minor	Low
11700	11970	Downhill	Unlikely	Minor	Low
11730	11850	Uphill	Rare	Minor	Low
11970	11990	Downhill	Almost Certain	Severe	Critical
12020	12250	Uphill	Unlikely	Minor	Low
11990	12240	Downhill	Possible	Severe	High
12340	12330	Downhill	Unlikely	Moderate	Medium
12270	12410	Uphill	Rare	Minor	Low
12440	12570	Uphill	Rare	Minor	Low
12600	12680	Downhill	Rare	Moderate	Low
12570	12720	Uphill	Possible	Minor	Medium
12860	12910	Uphill	Rare	Insignificant	Low

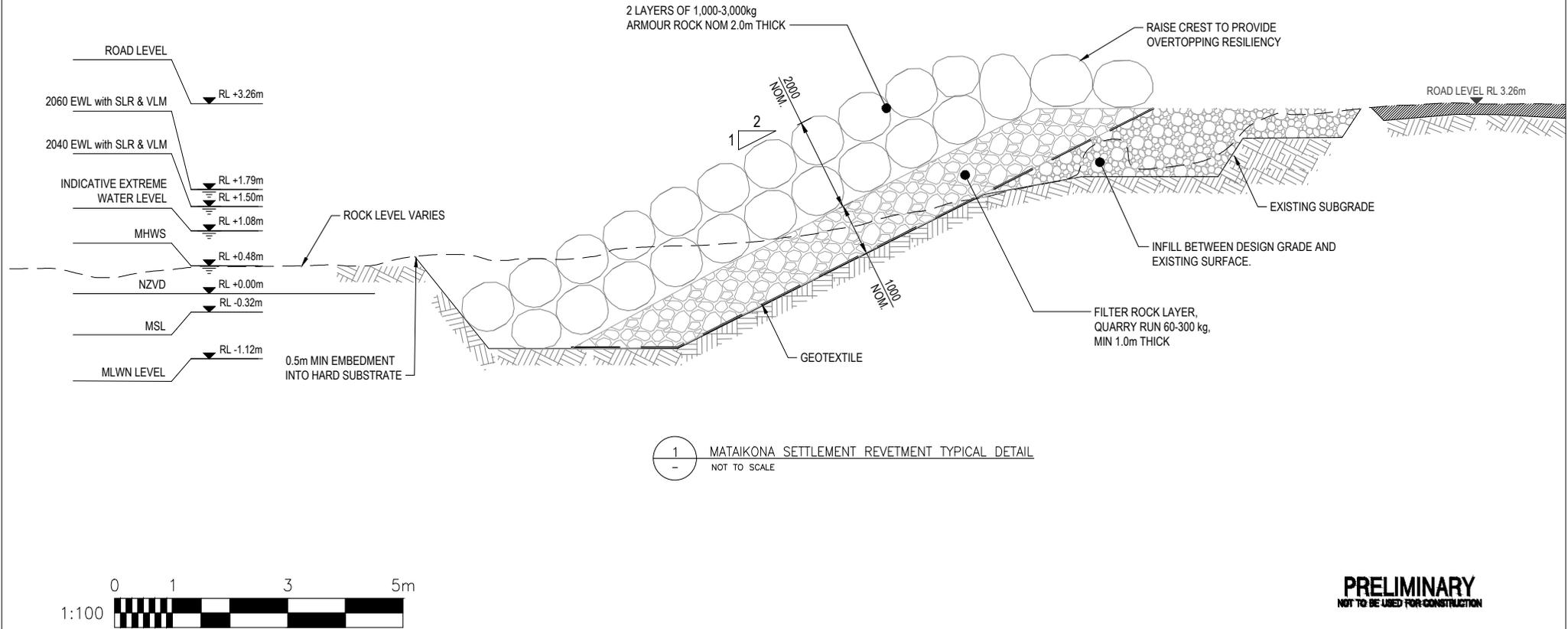


Appendix B Concept Sketches



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1 MATAIKONA SETTLEMENT REVETMENT TYPICAL DETAIL
- NOT TO SCALE



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Notes

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COUNCIL
MATAIKONA SSBC

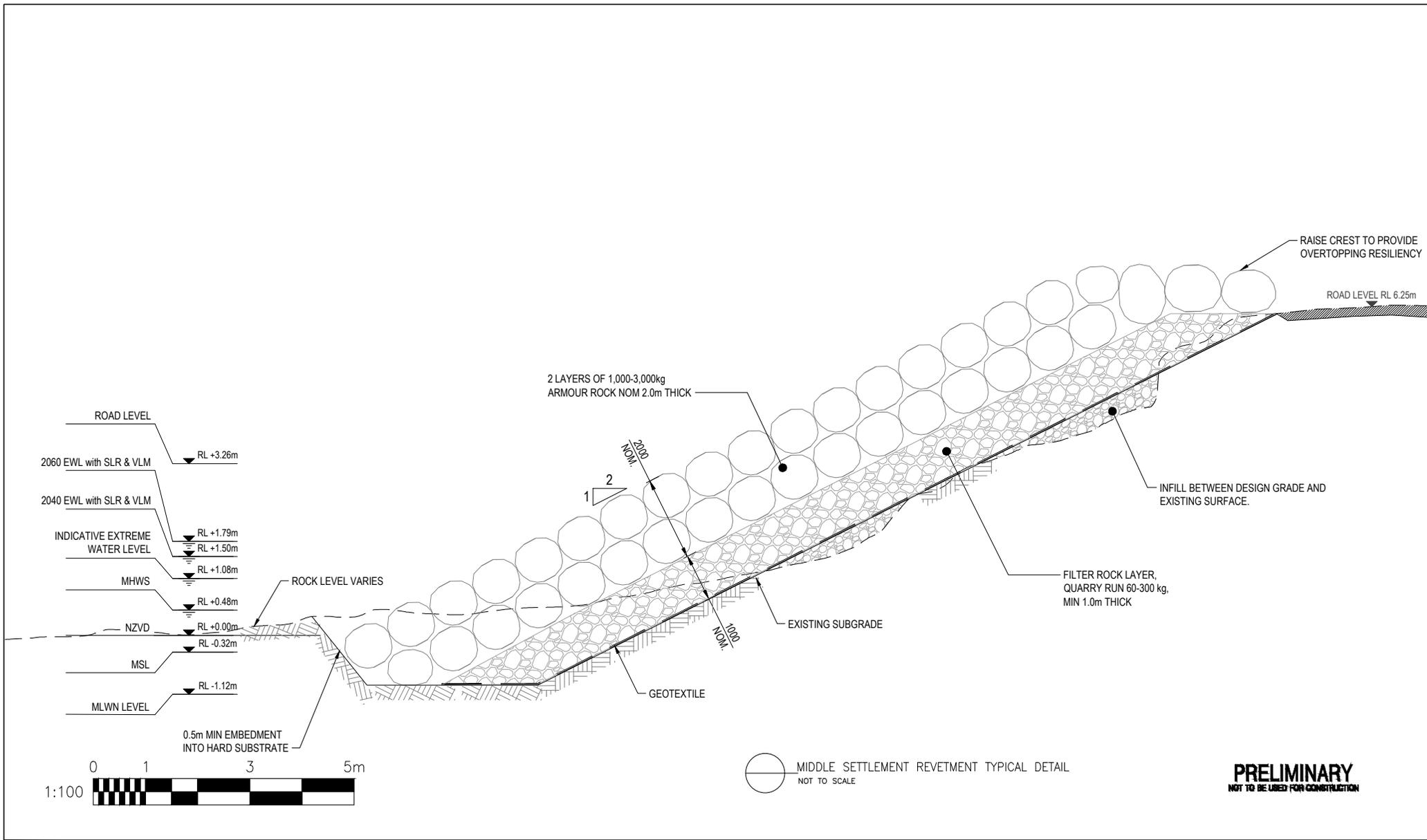
Project No.
310205311

Title
MATAIKONA SETTLEMENT
COASTAL PROTECTION

Revision B	Date 2023.06.13
Reference Sheet 1	Figure No. 002

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Notes

Client/Project
MASTERTON DISTRICT
COUNCIL
MATAIKONA SSBC

Project No.
310205311

Title
MIDDLE SETTLEMENT
COASTAL PROTECTION

Revision B	Date 2023.06.13
Reference Sheet 1	Figure No. 001

Appendix C Safety In Design Register



Appendix N Summary of hazards, remediations and estimated costs

Start	End	Risk	Hazard	Proposed Remediation	Estimated base cost
0	50	Low	Flooding	Drainage Improvements: upgrade culvert	\$25,000
740	780	Medium	Overall slope failure - material blocking the road	Minor slope stabilisation: Isolated tree removal, replanting and erosion protection mat	\$360,000
1,020	1,060	Medium	Underslip	Minor erosion protection: Erosion protection mat and possible tree planting	\$95,000
1,020	1,320	Critical	High slope with rock layers visible on the face. Scarps at the top and indication of past slips.	Slope stabilisation: High slope with rock layers visible on the face. Scarps at the top and indication of past slips.	\$1,700,000
1,380	1,380	Low	Debris Flow	Drainage Improvements: Install culvert	\$25,000
1,320	1,650	Critical	High slope with historic instabilities. Overhanging trees at the top of the slope.	Slope stabilisation: High slope with historic instabilities. Overhanging trees at the top of the slope.	\$1,200,000
1,680	2,000	Medium	Underslip	Minor erosion protection: Erosion protection mat and possible tree planting	\$95,000
2,120	2,180	Medium	Debris flows - flooding - erosion at the downhill slopes	Drainage Improvements: Culvert and drainage channel improvements	\$35,000
2,200	2,260	Medium	Slip, water flows on the slope surface	Minor slope stabilisation: Debris flow catch fence	\$200,000
2,200	2,260	Medium	Underslip	Minor erosion protection: Erosion protection mat and possible tree planting	\$100,000
2,260	2,590	Medium	Large Slips	Drainage Improvements and planting	\$35,000
2,859	3,764	High	Coastal Erosion	Retreat and realignment of road.	\$6,200,000
4,210	4,275	Medium	Large Slips	Minor slope stabilisation: Erosion protection mat and planting. Potential sub-horizontal drains and other drainage improvements.	\$240,000
4,390	4,600	High	High slope with historic instabilities.	Minor slope stabilisation: Erosion protection mat and planting. Potential sub-horizontal drains and other drainage improvements.	\$600,000
4,670	4,740	Low	Debris Flow	Drainage Improvements	\$10,000
4,780	4,840	Medium	Underslip	Drainage Improvements and additional erosion protection	\$70,000
4,940	5,000	Medium	Underslip	Drainage Improvements and additional erosion protection	\$70,000



Start	End	Risk	Hazard	Proposed Remediation	Estimated base cost
4,970	5,000	Medium	Large slips	Drainage Improvements and additional erosion protection	\$70,000
5,033	5,090	Medium	Underslip	Drainage Improvements and additional erosion protection	\$70,000
5,100	5,130	Medium	Underslip	Drainage Improvements and additional erosion protection	\$70,000
5,200	5,260	Medium	Underslip	Drainage Improvements and additional erosion protection	\$70,000
5,457	5,534	Medium	Underslip	Drainage Improvements and additional erosion protection	\$72,000
5,748	5,770	Low	Debris Flow	Drainage Improvements	\$10,000
5,775	6,353	Critical	Erosion due to stormwater scour and coastal influences.	Retreat and realignment of road.	\$1,100,000
7,090	7,777	Critical	Erosion due to stormwater scour and coastal influences.	Retreat and realignment of road.	\$1,200,000
7,807	7,807	Low	Underslip	Drainage Improvements: Improve drainage and or install culvert	\$25,000
7,816	7,866	Medium	Large Slips	Minor slope stabilisation: Potential sub-horizontal drains or erosion protection matting	\$600,000
7,880	8,100	Critical	Erosion due to stormwater scour and coastal influences.	Slope stabilisation: Retaining wall or anchored solution. Likely improvement of coastal protection.	\$1,500,000
7,880	8,000	Medium	Large Slips	Minor slope stabilisation: Potential sub-horizontal drains or erosion protection matting	\$480,000
8,100	8,250	Medium	Large Slips	Minor slope stabilisation: Potential sub-horizontal drains or rock catch fences. Localised anchoring if required.	\$600,000
8,300	8,340	Critical	Large Slips	Slope stabilisation	\$1,800,000
8,538	8,538	Low	Large Slips	Drainage Improvements: Culvert improvements	\$10,000
8,520	8,580	Critical	Erosion due to coastal influences.	Coastal protection: rock armoured revetment. Critical Risk: full construction to bridge gaps in existing short-term repairs. High Risk: Top up on top of existing short-term repairs.	Critical: \$2,900,000 High: \$1,800,000
8,665	8,705	High			
8,705	8,755	Critical			
8,755	8,793	High			
8,793	8,841	Critical			
8,841	8,900	High			



Start	End	Risk	Hazard	Proposed Remediation	Estimated base cost
8,900	10,230	Critical	Erosion due to coastal influences.	Retreat and realignment of road.	\$1,400,000
9,140	9,200	Medium	Flooding, erosion, road stability	Drainage Improvements: Culvert improvements	\$25,000
10,900	11,060	High	Erosion due to coastal influences.	coastal protection	\$1,800,000
11,890	11,970	Critical	Underslip has occurred. Half of road width lost, and bypass has been put in place.	Slope stabilisation	\$2,400,000
11,990	12,240	High	Erosion due to river scour causing Underslip.	Retaining wall: Installation of retaining wall and/or scour protection.	\$1,440,000
12,020	12,250	Low	Debris flows, rockfall, instabilities	Drainage Improvements: Improve drainage and ponding issues.	\$35,000
12,340	12,330	Medium	Underslip	Drainage Improvements and erosions protection.	\$50,000
12,600	12,680	Medium	Underslip	Drainage Improvements: Improve drainage capacity and overland flow to prevent further scour. Erosion protection or other low level remediation	\$50,000
12,570	12,720	Medium	Debris flows, rockfall, instabilities	Minor slope stabilisation: Erosion protection, scaling and planting	\$60,000



Appendix O Project Cost Estimate



Project Estimate - Form C

DBE

<https://www.nzta.govt.nz/assets/resources/cost-estimat>

Project Name:

Detailed Business Case Estimate

Item	Description	Base Estimate	Contingency	Funding Risk Contingency
	Property Purchase and Compensation Costs	4,943,660		
	Property Owner Accommodation Works			
	Property Consultancy Fees			
A	Total Property Cost	4,943,660	1,235,915	1,235,915
	Project Development Phase			
	- Consultancy Fees	Nil	Nil	Nil
	- Waka Kotahi Managed Costs (Form G)	Nil	Nil	Nil
B	Total Project Development	Nil	Nil	Nil
	Pre-Implementation Phase			
	- Consultancy Fees	3,228,898	645,780	968,669
	- Waka Kotahi Managed Costs (Form G)			
C	Total Pre-implementation	3,228,898	645,780	968,669
	Implementation Phase			
	Implementation Fees			
	- Consultancy Fees	1,076,299	215,260	322,890
	- Waka Kotahi Managed Costs (Form G)			
	- Alliance IPAA			
	Sub Total Base Implementation Fees	1,076,299	215,260	322,890
	Physical Works			
1	Environmental Compliance	185,500		
2	Earthworks	2,030,000		
3	Ground Improvements	-		
4	Drainage	2,271,000		
5	Pavement and Surfacing	1,398,000		
6	Bridges	-		
7	Retaining Walls	8,960,000		
8	Traffic Services	74,200		
9	Utility Services	-		
10	Landscaping	-		
11	Traffic Management	288,400		
12	Preliminary and General	1,659,130		
12A	Contractor's design and construction phase services (D&C, ECI and Alliances only)	-		
13	Extraordinary Construction Costs	4,659,756		
	Sub Total Base Physical works	21,529,986	4,305,197	6,457,796
D	Total for Implementation Phase	2,260,286	452,045	678,068
E	Project Base Estimate (A+C+D)	3,077,484		
F	Contingency (Assessed/Analysed) (A+C+D)		640,215	
G	Project Expected Estimate (E+F)		3,717,699	
	Total Property Cost Expected Estimate	6,179,575		
	Project Development Phase Expected Estimate	Nil		
	Pre-implementation Phase Expected Estimate	3,874,678		
	Implementation Phase Expected Estimate	2,712,274		
H	Funding Risk Contingency (Assessed/Analysed) (A+C+D)			8,985,270
I	95th percentile Project Estimate (G+H)			46,162,265
	Total Property Cost 95th percentile Estimate	7,415,490		
	Project Development Phase 95th percentile Estimate	Nil		
	Pre-implementation Phase 95th percentile Estimate	4,843,347		
	Implementation Phase 95th percentile Estimate	3,390,342		

Property Group: Mataikona Road Project Retreat and Strengthen

Summary		
Critical	High	Medium & Low
\$ 721,461	\$ 4,222,199	\$ -

\$ 1,807,875	\$ 963,523	\$ 457,500
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\$ 602,625	\$ 321,174	\$ 152,500
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\$ 12,052,498	\$ 6,423,488	\$ 3,050,000
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\$ 15,184,458	\$ 11,930,385	\$ 3,660,000
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\$ 3,072,965	\$ 2,597,187	\$ 732,000
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\$ 18,300,000	\$ 14,600,000	\$ 4,400,000
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Date of Estimate	Cost Index (Qtr/Year)
Estimate prepared by	Signed
Estimate internal peer review by	Signed
Estimate external peer review by	Signed
Estimate accepted by Waka Kotahi project manager	Signed

- Note:
- (1) These estimates are exclusive of escalation and GST.
 - (2) Project Development Phase Estimates are set to Nil as these are now sunk costs.
 - (3) Include Project Phase Funding Application Assessment Forms 2 and 4 with the DBE.
 - (4) Margin for Implementation Phase IPAA & PAA costs is included within the Physical Works item.

Elemental Cost Model Mataikona Road Corridor Improvements

Item Description	Unit	Rate	MC01 RP 2859-3764 Sandy Bay High		MC21 RP 5775-6353 Before Te Rerenga o Te Aohuruhuru Critical		MC22 RP 7090-7777 Before Te Rerenga o Te Aohuruhuru Critical		MC30 RP 8911-10230 After Middle Settlement Critical		Comment
			Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	
1 Development (Non Construction Costs)											
1.1 Investigation & Reporting	%	0.0%	1,680,900		694,590		822,510		984,230		
1.2 Detailed Design	%	15.0%	1,680,900	252,135	694,590	104,189	822,510	123,377	984,230	147,635	
1.3 MS&QA	%	5.0%	1,680,900	84,045	694,590	34,730	822,510	41,126	984,230	49,212	
Development Total (A)				336,180		138,918		164,502		196,846	
2 Construction											
2.1 Environmental Compliance	Km	50,000.00	1.350	67,500	0.580	29,000	0.870	43,500	0.910	45,500	Assume light compliance required (Low
2.2 Earthworks (this is an average between haulage off site and importing)	M3	65.00	7,800	507,000	3,000	195,000	3,000	195,000	2,200	143,000	
2.3 Ground Improvements	M2		-	-	-	-	-	-	-	-	Risk
2.4 Drainage (Assumption is that the existing culverts will be updated if required)	Km	100,000.00	1.350	135,000	0.580	58,000	0.870	87,000	0.910	91,000	
2.5 Pavement and surfacing (AP40 stabilized and AP65 subbase)	M2	75.00	6,700	502,500	2,900	217,500	3,400	255,000	-	-	
2.5 Pavement and surfacing (this made up of AP40 stabilized and AP65 subbase and chip seal)	M2	90.00	-	-	-	-	-	-	4,700	423,000	
2.6 Bridges	M2	4,087.99	-	-	-	-	-	-	-	-	
2.7 Retaining Walls	M2	646.67	-	-	-	-	-	-	-	-	assuming none needed
2.8 Traffic Services	Km	20,000.00	1.350	27,000	0.580	11,600	0.870	17,400	0.910	18,200	assuming road markings and small sign
2.9 Service Relocations	Km	100,000.00	-	-	-	-	-	-	-	-	assuming none needed
2.10 Landscaping	Km	25,000.00	-	-	-	-	-	-	-	-	assuming none needed
2.11 Traffic Management (the rate is based on \$2000 day for one month to do the earthworks)	Km	40,000.00	1.350	54,000	0.580	23,200	0.870	34,800	0.910	36,400	
Construction Sub-Total (Excluding P&G)				1,293,000		534,300		632,700		757,100	
2.12 Contractor's Preliminaries and General	%		30.0%	387,900	30.0%	160,290	30.0%	189,810	30.0%	227,130	
Construction Total (Including P&G) (B)				1,680,900		694,590		822,510		984,230	
3 Extraordinary Project Costs											
3.1											
Extraordinary Project Costs (C)				-		-		-		-	
Construction Total (B + C)	Km			1,680,900		694,590		822,510		984,230	
Project Total (A +B + C)				2,017,080		833,508		987,012		1,181,076	

H	Funding Risk Contingency (Assessed/Analysed)	403,416	166,702	197,402	236,215
I	95th percentile Project Estimate	2,420,496	1,000,210	1,184,414	1,417,291
	95th percentile Project Estimate (rounded)	2,430,000	1,010,000	1,190,000	1,420,000

From Long List Costing

\$810k to \$1215k for 900m

\$1584k to \$2376k for 1800m

\$1368k to \$2052k for 1592m

Date of Estimate	Cost Index (Qtr/Year)
Estimate prepared by	Signed
Estimate internal peer review by	Signed
Estimate external peer review by	Signed
Estimate accepted by Waka Kotahi project manager	Signed

Section Chainage	Front Hill 0	Sandy Bay Settlem Second Hill 2200 4000		Second Hill to Sui Suicide Rock (hill) 5600 7800		Middle Settlement South Mataikona 8400 9000		Mataikona Settlem Mataikona River 10900 11500		13000	RISK ASSESSMENT			
		LOW	MEDIUM	HIGH	CRITICAL									
Item	Description	Base Estimate	Base Estimate	Base Estimate	Base Estimate	Base Estimate	Base Estimate	Base Estimate	Base Estimate	Base Estimate	Base Estimate	Base Estimate	Base Estimate	Base Estimate
	Property Purchase and Compensation Costs													
	Property Owner Accommodation Works													
	Property Consultancy Fees													
A	Total Property Cost													
	Project Development Phase													
	- Consultancy Fees	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
	- Waka Kotahi Managed Costs (Form G)	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
B	Total Project Development	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
	Pre-Implementation Phase													
	- Consultancy Fees	439,500	40,500	169,500	1,500	618,000	1,500	3,000	-	504,000	18,000	439,500	255,000	1,065,000
	- Waka Kotahi Managed Costs (Form G)													
C	Total Pre-Implementation	439500	40500	169500	1500	618000	1500	3000	0	504000	18000	439500	255000	1065000
	Implementation Phase													
	Implementation Fees													
	- Consultancy Fees	146,500	13,300	56,500	500	206,000	500	1,000	-	168,000	6,000	146,500	85,000	355,000
	- Waka Kotahi Managed Costs (Form G)													
	- Alliance IPAA													
	Sub Total Base Implementation Fees	146500	13500	56500	500	206000	500	1000	0	168000	6000	146500	85000	355000
	Physical Works													
1	Environmental Compliance	-	-	-	-	-	-	-	-	-	-	-	-	-
2	Earthworks	460,000	80,000	-	-	400,000	-	-	-	50,000	-	990,000	-	-
3	Ground Improvements	-	-	-	-	-	-	-	-	-	-	-	-	-
4	Drainage	70,000	30,000	630,000	10,000	1,020,000	10,000	20,000	-	110,000	120,000	1,780,000	-	-
5	Pavement and Surfacing	-	-	-	-	-	-	-	-	-	-	-	-	-
6	Bridges	-	-	-	-	-	-	-	-	-	-	-	-	-
7	Retaining Walls	2,400,000	160,000	500,000	-	2,700,000	-	-	-	3,200,000	-	160,000	1,700,000	7,100,000
8	Traffic Services	-	-	-	-	-	-	-	-	-	-	-	-	-
9	Utility Services	-	-	-	-	-	-	-	-	-	-	-	-	-
10	Landscaping	-	-	-	-	-	-	-	-	-	-	-	-	-
11	Traffic Management	-	-	-	-	-	-	-	-	-	-	-	-	-
12	Preliminary and General	-	-	-	-	-	-	-	-	-	-	-	-	-
12A	Contractor's design and construction phase services (D&C, E&I and Alliances only)	-	-	-	-	-	-	-	-	-	-	-	-	-
13	Extraordinary Construction Costs	-	-	-	-	-	-	-	-	-	-	-	-	-
	Sub Total Base Physical works	2930000	270000	1130000	10000	4120000	10000	20000	0	3360000	120000	2930000	1700000	7100000
D	Total for Implementation Phase	3076500	283500	1186500	10500	4326000	10500	21000	0	3528000	126000	3076500	1785000	7455000
E	Project Base Estimate (A+C+D)	3516000	324000	1356000	12000	4944000	12000	24000	0	4032000	144000	3516000	2040000	8520000
	Contingency (Assessed/Analysed) (A+C+D)	703,200	64,800	271,200	2,400	988,800	2,400	4,800	0	806,400	28,800	703,200	408,000	1,704,000
G	Project Expected Estimate (E + F)	4,219,200	388,800	1,627,200	14,400	5,932,800	14,400	28,800	0	4,838,400	172,800	4,219,200	2,448,000	10,224,000
	Project Expected Estimate (rounded)													
	Total Property Cost Expected Estimate													
	Project Development Phase Expected Estimate													
	Pre-implementation Phase Expected Estimate													
	Implementation Phase Expected Estimate													
H	Funding Risk Contingency (Assessed/Analysed)	1,265,760	116,640	488,160	4,320	1,779,840	4,320	8,640	0	1,451,520	51,840	1,265,760	734,400	3,067,200
I	95th percentile Project Estimate	5,484,960	505,440	2,115,360	18,720	7,712,640	18,720	37,440	0	6,289,920	224,640	5,484,960	3,182,400	13,291,200
	95th percentile Project Estimate (rounded)													

Date of Estimate	Cost Index (Qtr/Year)
Estimate prepared by	Signed
Estimate internal peer review by	Signed
Estimate external peer review by	Signed
Estimate accepted by Waka Kotahi project manager	Signed

- Note:
- (1) These estimates are exclusive of escalation and GST.
 - (2) Project Development Phase Estimates are set to Nil as these are now sunk costs.
 - (3) Include Project Phase Funding Application Assessment Forms 2 and 4 with the DBE.
 - (4) Margin for Implementation Phase IPAA & PAA costs is included within the Physical Works item.
 - (5) Refer to Section 6.6 for guidance on rounding.

Section		Middle Settlement Critical	Middle Settlement High	Mataikona Settlem High
Item	Description	Base Estimate	Base Estimate	Base Estimate
A	Property Purchase and Compensation Costs			
	Property Owner Accommodation Works			
	Property Consultancy Fees			
	Total Property Cost			
B	Project Development Phase			
	- Consultancy Fees	Nil	Nil	Nil
	- Waka Kotahi Managed Costs (Form G)	Nil	Nil	Nil
	Total Project Development	Nil	Nil	Nil
C	Pre-implementation Phase			
	- Consultancy Fees	367,675	228,727	227,662
	- Waka Kotahi Managed Costs (Form G)			
	Total Pre-implementation	367675	228727	227662
D	Implementation Phase			
	Implementation Fees			
	- Consultancy Fees	122,558	76,242	75,887
	- Waka Kotahi Managed Costs (Form G)			
	- Alliance IPAA			
	Sub Total Base Implementation Fees	122558	76242	75887
	Physical Works			
	1 Environmental Compliance			
	2 Earthworks			
	3 Ground Improvements			
	4 Drainage			
	5 Pavement and Surfacing			
	6 Bridges			
	7 Retaining Walls			
	8 Traffic Services			
	9 Utility Services			
	10 Landscaping			
	11 Traffic Management	60,000	40,000	40,000
	12 Preliminary and General	298,000	198,000	198,000
	12A Contractor's design and construction phase services (D&C, ECI and Alliances only)			
	13 Extraordinary Construction Costs	2,093,168	1,286,844	1,279,744
Sub Total Base Physical works	2451168	1524844	1517744	
Total for Implementation Phase	2573727	1601087	1593631	
E Project Base Estimate (A+C+D)	2941402	1829813	1821293	
Project Base Estimate (rounded)				
F Contingency (Assessed/Analysed) (A+C+D)	588,280	365,963	364,259	
G Project Expected Estimate (E + F)	3,529,682	2,195,776	2,185,551	
Project Expected Estimate (rounded)				
Total Property Cost Expected Estimate				
Project Development Phase Expected Estimate				
Pre-implementation Phase Expected Estimate				
Implementation Phase Expected Estimate				
H Funding Risk Contingency (Assessed/Analysed)	1,058,905	658,733	655,665	
I 95th percentile Project Estimate	4,588,587	2,854,509	2,841,216	
95th percentile Project Estimate (rounded)				

Date of Estimate
Estimate prepared by
Estimate internal peer review by
Estimate external peer review by
Estimate accepted by Waka Kotahi project manager

- Note:
- (1) These estimates are exclusive of escalation and GST.
 - (2) Project Development Phase Estimates are set to Nil as these are now sunk costs.
 - (3) Include Project Phase Funding Application Assessment Forms 2 and 4 with the DBE.
 - (4) Margin for Implementation Phase IPAA & PAA costs is included within the Physical Works item.
 - (5) Refer to Section 6.6 for guidance on rounding.

Appendix P Consenting Plan



Preliminary Planning Assessment – Mataikona Single Stage Business Case

This document was prepared by Stantec New Zealand (“Stantec”) for the account of Masterton District Council (the “Client”). The conclusions in the Report titled Planning Assessment – Mataikona Single Stage Business Case are Stantec’s professional opinion, as of the time of the Report, and concerning the scope described in the Report. The opinions in the document are based on conditions and information existing at the time the document was published and do not take into account any subsequent changes. The Report relates solely to the specific project for which Stantec was retained and the stated purpose for which the Report was prepared. The Report is not to be used or relied on for any variation or extension of the project, or for any other project or purpose, and any unauthorized use or reliance is at the recipient’s own risk.

Stantec has assumed all information received from the Client and third parties in the preparation of the Report to be correct. While Stantec has exercised a customary level of judgment or due diligence in the use of such information, Stantec assumes no responsibility for the consequences of any error or omission contained therein.

This Report is intended solely for use by the Client in accordance with Stantec’s contract with the Client. While the Report may be provided to applicable authorities having jurisdiction and others for whom the Client is responsible, Stantec does not warrant the services to any third party. The report may not be relied upon by any other party without the express written consent of Stantec, which may be withheld at Stantec’s discretion.

Quality statement

Rev. no	Date	Description	Prepared by	Checked by	Reviewed by	Approved by
1	15.05.2023	Final	KB	CV	CV	

1 Introduction

The east coast has been hit by multiple heavy rainfall events over the last several years. These weather events have resulted in flooding, ground instability, slips and compounding damage and disruptions to Council's road network and infrastructure. Council and Waka Kotahi have funded several temporary repairs work in recent years to Mataikona Road, with varying degrees of success. Mataikona Road is a 13 km long, mostly gravel road that provides the only vehicle access to three coastal settlements (Sandy Bay, Mataikona and a smaller settlement in between these two), several farming and forestry properties, as well as the Mataikona Rocks. Mataikona Road has slowly been under pressure from storm events and coastal erosion.

Masterton District Council (MDC) needs to provide a resilient and sustainable access to Mataikona. Mataikona Road is now becoming a significant maintenance problem and sections of the route are at real risk of undermining, washing out entirely, or being blocked by debris, thereby isolating the communities. A Single Stage Business Case (SSBC) is being undertaken to identify the preferred option that will provide residents with certainty around future access to their properties, and to Council with a way forward.

A short list of options was developed from a long list of options. The outputs of the Multi Criteria Analysis (MCA), mana whenua rankings and economics assessments were presented to a stakeholder workshop and community meeting to get feedback on which option or combination of options is preferred. The preferred option is referred to as a 'hybrid' package which consists of elements of the short list options including:

- Drainage improvements
- Coastal erosion protection
- Over slip and under slip road protection
- Retreating of roads, including road realignment

This short report provides a preliminary planning assessment by reviewing the preferred (hybrid) option for the Mataikona SSBC against the relevant planning instruments, including the:

- Wairarapa Combined District Plan (WCDP)
- Proposed Natural Resources Plan (PNRP) for the Wellington Region
- Resource Management (National Environmental Standards for Freshwater) Regulations 2020 (NESFM)
- National Policy Statement for Freshwater Management 2020 (NPSFM)
- Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011 (NESCS)
- New Zealand Coastal Policy Statement 2010 (NZCPS)

This preliminary planning assessment identifies, at a high level, regulatory constraints and opportunities in relation to the project which may help inform decisions through the SSBC process and provide early identification of any further technical assessments required. Appended to this short report is an Environmental Screen which is a requirement for all Waka Kotahi projects funded by the National Land Transport Fund (NLTF) or where Waka Kotahi is the primary entity responsible for the activity (i.e., where Crown funding is used).

1.1 Overview of Planning Advice

This assessment finds that resource consents will be required for some, if not all, of the activities involving earthworks, indigenous vegetation clearance, drainage improvements and coastal protection along the project corridor from both the district and regional Council.

Further information and assessments are recommended as the design progresses to confirm consents and application requirements relating to any proposed structures/bridges over or within rivers, and drainage discharging to the coast. Regarding rock rip rap and revetment solutions along the coast, a coastal processes assessment would be required. An application for consents would need to be supported by specialist input commensurate with the scale of effects. Input from others is anticipated to assess effects in relation to ecology, hydrology, land stability, cultural impacts and values and coastal processes.

Due to heritage of the area and the uncertainty of uncovering archaeological artefacts, an archaeological assessment is recommended. The archaeological assessment will make recommendation(s) as to whether having an archaeological authority in place before works start would be appropriate and/or accidental discovery protocols.



In situations when work or access over private land is required, consultation with the affected landowners must be undertaken with a view of obtaining written approvals. The realignment through Sandy Bay will affect several landowners. Managed retreat is a highly emotive topic when it comes to people and their land. A robust Consultation and Engagement Plan will be essential to set out a clear process of engagement not only in relation to property matters but all interventions along this coastline.

Where works are proposed within the coastal environment, as defined under the WCDP, engagement and consultation with mana whenua must be undertaken. Rangitāne o Wairarapa and Ngāti Kahungunu ki Wairarapa have engaged with the SSBC providing feedback on the long list of packages. It is important to continue open, early and meaningful engagement with iwi partners.

2 Mataikona SSBC Project Corridor

The project corridor is a 13 km stretch of Mataikona Road, which is a mostly gravel road that provides access to three settlements and Mataikona Station. Mataikona Road provides the only vehicle access to several residential, farming, and forestry properties, as well as the Mataikona Rocks, a well known geological location.

The preferred option is a hybrid between the retreat and strengthen, and increased maintenance options. The preferred (hybrid) option will include the key elements that provide the highest benefits within the available budget and other constraints. This option will be optimised to align with the anticipated Low-Cost Low-Risk Waka Kotahi funding model. The project corridor and high-level breakdown of the preferred interventions is provided in Figure 2-1 below.



Figure 2-1: High Level Hybrid Option Intervention Breakdown

The environment within the project area is described in the SSBC report and is relied upon for this planning advice. A description of the preferred interventions along the project corridor is provided in sections 2.1 – 2.3 below.

2.1 Sandy Bay

At the southern end of the project corridor, Mataikona Road traverses roughly 2km of regenerating forest over steep terrain and elevated from the coastline. The road then drops down to sea level at the first settlement along the project corridor at Sandy Bay. This section of the project corridor and preferred interventions are shown in Figure 2-2 below.

Several site hazards exist along the first 2km section due to the geology and terrain including rockfall, loose debris, and landslides from uphill of the road and slips, loss of toe support and erosion downhill of the road. **Over slip and under slip protection** is the preferred intervention.

As the road drops down to sea level, natural drainage from the steeper slopes direct overland stormwater quickly towards the road and to the near coastline. Oversaturation of soils uphill, causing slope failure and slips also result in a semi-fluid flow of debris down the slope which can obstruct, flood and erode the road. **Drainage improvements** are the preferred intervention through that section before the settlement.

Mataikona Road then bypasses the Sandy Bay settlement, with residents gaining direct access to their homes from Sandy Bay Road which is approximately 70 m set back from Mataikona Road. Mataikona Road is set back between approximately 50 m and 0 m from the coastline. **Realignment** of Mataikona Road is proposed along the alignment of Sandy Bay Road to create a buffer between the road and coastline. The realignment is shown in Figure 2-3 below. Extensive vegetation is notable at the proposed start and end of the realignment as shown in Figure 2-4 below.



Figure 2-2: South extent of project corridor to Sandy Bay and preferred interventions

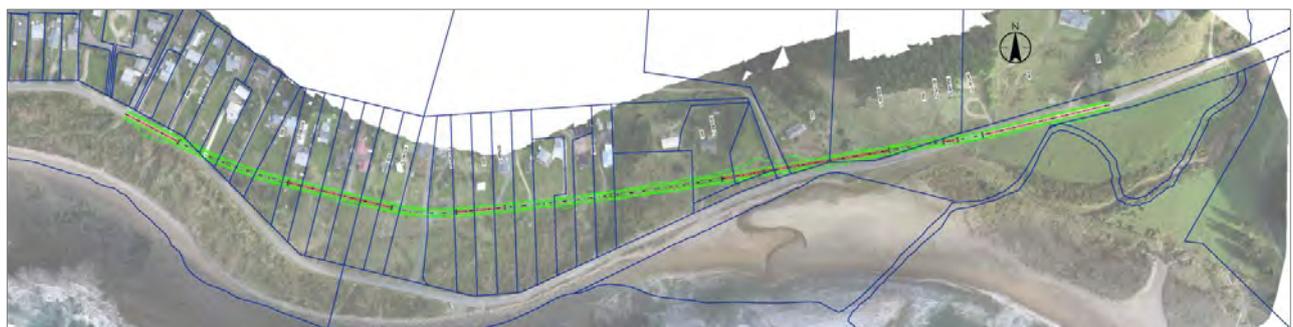


Figure 2-3: Realignment through Sandy Bay settlement



Figure 2-4: Extensive native vegetation in path of road realignment

2.2 South of Te Rerenga o Te Aohuruhuru (Suicide Rock)

North of Sandy Bay and south of Te Rerenga o Te Aohuruhuru are sections of regenerating forest and variable terrain. Mataikona Road is set back between approximately 90 m and 0 m from the coastline. This section of the project corridor and preferred interventions are shown in Figure 2-5 below.

Several site hazards exist due to the geology and terrain including rockfall, loose debris, and landslides from uphill of the road. Natural drainage from the steeper slopes direct overland stormwater quickly towards the road and to the near coastline. Oversaturation of soils uphill, causing slope failure and slips also result in a semi-fluid flow of debris down the slope which can obstruct, flood and erode the road.

Over the first 2 km past Sandy Bay, **drainage improvements** and **over slip protection** are the preferred interventions.

Where Mataikona Road is in very close proximity to the coastline (approximately 25 m – 0 m), **retreating the road** is the preferred intervention.



Figure 2-5: North of Sandy Bay and south of Te Rerenga o Te Aohuruhuru and preferred interventions



Figure 2-6: Sections of road retreat

2.3 Middle settlement to Mataikona

This extent of the project corridor is north of the middle settlement to approximately 1 km past Mataikona settlement. The road along this section is low lying, generally at sea level. This section of the project corridor and preferred interventions are shown in Figure 2-7 below.

Site hazards exist due to the geology, low lying road and surrounding steeper terrain to the west of the road. Site hazards include rockfall, loose debris, and landslides from uphill of the road. Natural drainage from the steeper slopes direct overland stormwater quickly towards the road and to the near coastline. Oversaturation of soils uphill, causing slope failure and slips also result in a semi-fluid flow of debris down the slope which can obstruct, flood and erode the road.

South and centre of the middle settlement, **drainage improvements** and **over slip and under slip protection** are the preferred interventions. Over slip protection is also the preferred intervention to the section of road north of the Mataikona settlement.

Where Mataikona Road is in very close proximity to the coastline (approximately 25 m – 0 m), **retreating the road** is the preferred intervention over a small section as shown in Figure 2-8.



Figure 2-7: Middle settlement to Mataikona and preferred interventions



Figure 2-8: Section of road retreat

The coastline is also susceptible to erosion and, as with other sections of the project corridor where the road is close to the coastline, this means the road and subsequently settlements will be impacted in years to come. Comparison of the 2012/13 and 2021 aerial photography at 1139-1147 Mataikona Road (Figure 3-4 and Figure 3-5) shows that the coastline has retreated seven metres in eight years. At the current rate of retreat, the road in this location will be impacted by mid-2024, the property boundaries by 2037, the buildings by 2055. **Coastal protection interventions** are the preferred interventions to mitigate further erosion of the embankment. The extent of proposed coastal protection includes the road for the area in front of the Middle and Mataikona settlements, including along the road to pack spur along the river.



Figure 2-9: 1139-1147 Mataikona Road (2013)¹



Figure 2-10: 1139-1147 Mataikona Road (2021)²

3 Statutory Planning Requirements

3.1 Masterton District Council

There are four types of interventions along the project corridor. Each intervention and the types of activities, or physical works which would be required, are identified in Table 3-1 below. All interventions are indicated as being within the Coastal Environment Management Area within the rural zone under the Wairarapa Combined District Plan (WCDP).

Table 3-1: Interventions and mitigating activities.

Intervention	Overview of Mitigation Activities
Drainage Improvements	<ul style="list-style-type: none"> - Sub-horizontal drains, cut-off drains and other drainage improvements. - Reprofilng of drainage channel, improvements of culverts and surface drainage below slope. - Installation of flumes and channels on critical downslope culverts. Improvement of drainage to prevent overland flow scouring slope crest.
Coastal Erosion Protection	<ul style="list-style-type: none"> - Riprap Revetment - Retaining Walls or Hybrid Walls
Over slip Protection	<p>Uphill site hazards</p> <ul style="list-style-type: none"> - Scaling of loose rocks and debris - Localised anchoring - Engineering catch fence - Planting on slope face

¹ Land Information New Zealand. n.d. "Wellington 0.3m Rural Aerial Photos (2012-2013)." Last modified 12 March 2014.

<https://data.linz.govt.nz/layer/51870-wellington-03m-rural-aerial-photos-2012-2013/>

² Land Information New Zealand. n.d. "Masterton 0.075m Urban Aerial Photos (2021)." Last modified 13 August 2021.

<https://data.linz.govt.nz/layer/105879-masterton-0075m-urban-aerial-photos-2021/>



	<ul style="list-style-type: none"> - Erosion protection matting with planting; Steel mesh on steeper slopes - Anchor and mesh stabilisation with shotcrete facing
Under slip Protection	<p>Downhill site hazards</p> <ul style="list-style-type: none"> - Planting on the road embankment downslopes. - Erosion protection matting, with planting. Steel mesh may be required on steeper slopes. - Retaining walls such as anchors post and lagging walls or MSE. Wall type varies based of site-specific conditions.
Retreat Road	<ul style="list-style-type: none"> - Retreat of the hillside which may involve reprofiling of the slope and other stabilisation measures. - Retreat of the road to create a buffer zone to the downslope hazards. - Realignment

The activities in Table 3-1 above have been assessed against the provisions of the WCDP and the following activities and rules are relevant:

- **Earthworks:** For sites less than 20 hectares in area shall not exceed:
 - (a) 1.5 metres (cut or fill) measured vertically;
 - (b) Where earthworks exceed 1.5 metres (cut or fill) measured vertically, those earthworks shall not exceed 3.0 metres (cut or fill) measured vertically and shall not exceed a distance of 20 metres in continuous horizontal length;
 Non-compliance will require resource consent as a **restricted discretionary activity** under Rule 21.4.4(a).

- **Indigenous vegetation and habitats:** The disturbance, removal, damage or destruction (“modification”) of naturally occurring indigenous vegetation by any network utility³ operator to ensure the safety and integrity of any network utility or to maintain access to the network utility is a **permitted activity**.

Any disturbance, removal, damage or destruction (“modification”) of indigenous vegetation within 20 metres of a river or a water body requires resource consent as a **restricted discretionary activity** under Rule 21.4.2. This rule does not apply to entirely artificially created water bodies (e.g. duck ponds, existing farm drains) or vegetation in gardens.

- **Archaeology, geology and cultural significance:** Any modification, alteration, disturbance or destruction of any archaeological site, geological site, waahi tapu, or area of significance to tangata whenua listed in Appendix 1.5 Archaeological and Geological Sites and Appendix 1.6 Sites of Significance to Tangata Whenua, requires resource consent as a **discretionary activity** under Rule 21.6(e). Within the project corridor the following are identified:
 - 8 archaeological sites identified in Appendix 1.5(a);
 - 1 geological site (coast for 1-2 km north of Whakataki) identified in Appendix 1.5(b)
 - 1 area of significance to Tangata Whenua (Te Rerenga o Te Aohuruhuru) identified in Appendix 1.6
- **Heritage:**
 - 1 heritage item (Whare Pouri’s Mark Cairn – near Sandy Bay) identified in Appendix 1.7.

Further information in relation to the extent of physical works, design and construction methodology is required to confirm whether any resource consent requirements are triggered. However based on the relevant rules and review of the project corridor it is likely resource consents will be required for some, if not all, the activities above.

³ Network utility means any utility which is part a network and includes, *inter alia*, roads, and associated support structures.

3.2 Greater Wellington Regional Council

The Proposed Natural Resources Plan for the Wellington Region (PNRP) replaces five regional plans for managing the coast, soil, discharges to land, fresh water and air. Decisions on the PNRP were publicly notified on 31 July 2019, and from the date of the public notice the PNRP was amended in accordance with those decisions. Where there have been changes as a result of consent orders or decisions on appeals these are also shown in the Appeals version. Given that all the provisions of the PNRP relevant to this application are deemed operative as a result of consent orders, the PNRP is the only regional plan that is relevant to this planning advice. The relevant rules are identified in Table 3-2 below.

Table 3-2:

Relevant Provision	Activity Status	Area of intervention
5.2 Discharges to land and water		
Rule R54: The discharge of stormwater into water, or onto or into land where it may enter a surface water body or coastal water, including through a local authority stormwater network, from a port, or airport is a restricted discretionary activity.	<p>Restricted discretionary</p> <p><i>Matters for discretion:</i></p> <ol style="list-style-type: none"> 1. <i>The management of the adverse effects of stormwater capture and discharge, including cumulative effects, of stormwater on aquatic ecosystem health and mahinga kai, contact recreation and Māori customary use</i> 2. <i>The management of effects on sites identified in Schedule A (outstanding water bodies), Schedule B (Ngā Taonga Nui a Kiwa), Schedule C (mana whenua), Schedule F (indigenous biodiversity)</i> 3. <i>Minimisation of the adverse effects of stormwater discharges</i> 4. <i>Requirements of any relevant local authority stormwater network discharge consent</i> 	Drainage improvements, and activities directing stormwater to coastal water, will need to be assessed against this rule to determine new discharges which would trigger this rule.
5.3 Land use		
Rule R101: The use of land, and the associated discharge of sediment into water or onto or into land where it may enter water from earthworks up to a total area of 3,000m ² per property per 12 month period	<p>Permitted activity subject to conditions.</p> <ol style="list-style-type: none"> (a) soil or debris from earthworks is not placed where it can enter a surface water body or the coastal marine area, and (b) earthworks will not create or contribute to instability or subsidence of a slope or another land surface at or beyond the boundary of the property where the earthworks occurs, and (c) any earthworks shall not, after the zone of reasonable mixing, result in the production of conspicuous oil or grease films, scums of foams, or floatable or suspended materials; conspicuous change in colour or visual clarity; rendering of fresh water unsuitable for consumption by animals; or 	This rule would apply across the project corridor and therefore the cumulative area of earthworks will need to be confirmed to determine whether consent is required.

	<p>significant adverse effect on aquatic life.</p> <p>(d) Earthworks shall not occur within 5m of a surface water body.</p> <p>(e) work areas are stabilised within six months after the completion of the earthworks.</p>	
<p>Rule R104: The use of land, and the associated discharge of sediment into water or onto or into land where it may enter water from vegetation clearance up to a total area of 2ha per property per 12 month period on erosion prone land</p> <p><i>Erosion prone land means the pre-existing slope of the land exceeds 20 degrees.</i></p>	<p>Permitted activity subject to conditions.</p> <p>Generally, as per (a) and (c) above. Also, vegetation clearance shall not occur within 5m of a surface water body.</p>	<p>As per above, further information is required regarding the location and extent of vegetation clearance required.</p>
<p>Rule R107: The use of land, and the associated discharge of sediment into water or onto or into land where it may enter water from earthworks, or vegetation clearance on erosion prone land that is not permitted by R101 and 104 .</p>	<p>Discretionary activity</p>	<p>A discretionary activity consent will be required if the extent/limits in R101 and R104 are exceeded.</p>
<p>5.4 Wetlands and beds of lakes and rivers</p>		
<p>Rule R122: Maintenance, repair, replacement, upgrade or use of existing structures. The maintenance (including the maintenance of function), repair, replacement, upgrade or use of a lawfully established structure or a part of a structure</p>	<p>Permitted activity subject to conditions.</p> <p>shall comply with the beds of lakes and rivers general conditions* specified above in Section 5.4.4, except the use of existing structures shall only comply with conditions (d), (h), (j), and (k),</p> <p>Conditions (g) to (m).</p>	<p>Several conditions apply and therefore any activity of this nature will need to be assessed further against the conditions of this permitted activity rule.</p> <p>Condition (h) includes any removal of flood debris, gravel, sand accumulated, for purpose of maintain function of a structure including to reduced perched nature of any culvert due to scour. Non-compliance with (h) is a controlled activity (Rule R123).</p>
<p>5.6 Coastal Management</p>		
<p>Rule R182: The placement of a new structure, addition or alteration to a structure and the associated use of the structure inside a site or habitat identified in Schedule C (mana whenua), Schedule F4 (coastal sites), Schedule F5 (coastal habitats) or Schedule J (geological features) in the coastal marine area.</p>	<p>Non-complying activity</p>	<p>Any structures in the following areas along the project corridor:</p> <p>Schedule C5: Sites of significance to Rangitāne o Wairarapa & Ngāti Kahungunu ki Wairarapa – Whakataki coast, relates to the entire coastline of the project corridor.</p> <p>Schedule J – Significant geological features in the CMA: Near (south of) Sandy Bay settlement. Whakataki</p>

		<p>formation sandstone and mudstone turbidite flysch (20 Ma), tilted and differentially eroded; turbidites and offset faulting and folding.</p> <p>Schedule F4 – Indigenous Biodiversity Coastal: Mataikona Reefs. This applies to the project corridor north of Te Rerenga o Te Aohuruhuru (Suicide Rock).</p>
<p>Rule R211: The disturbance of the foreshore or seabed from the clearance of a stormwater pipe in the coastal marine area</p>	<p>Permitted activity subject to conditions which include the disturbance must be under by or for a local authority/road controlling authority; disturbance limited to that required to create a free-draining path from stormwater outlet to the sea; shall not prevent public access, excavated material retained within active beach system and stored as to not create ponding or diversion of water.</p>	
<p>Rule R218: The disturbance of the foreshore or seabed from motor vehicles inside a site or habitat identified in Schedule C (mana whenua), Schedule E4 (archaeological sites), Schedule F2c (birds-coastal), Schedule F4 (coastal sites), Schedule F5 (coastal habitats) or Schedule J (geological features) in the coastal marine area</p>	<p>Non-complying activity.</p>	<p>Refer to Rule R182 above.</p>
<p>Rule R235: Destruction, damage, or disturbance or deposition inside a site and habitat identified in Schedule C (mana whenua), Schedule E4 (archaeological sites), Schedule F4 (coastal sites), Schedule F5 (coastal habitats) or Schedule J (geological features) in the coastal marine area.</p>	<p>Non-complying activity.</p>	<p>Any other disturbance within the coastal area within the project corridor and particular disturbance of the areas below:</p> <p>Schedule C5: Sites of significance to Rangitāne o Wairarapa & Ngāti Kahungunu ki Wairarapa – Whakataki coast, relates to the entire coastline of the project corridor.</p> <p>Schedule J – Significant geological features in the CMA: Near (south of) Sandy Bay settlement. Whakataki formation sandstone and mudstone turbidite flysch (20 Ma), tilted and differentially eroded; turbidites and offset faulting and folding.</p> <p>Schedule F4 – Indigenous Biodiversity Coastal: Mataikona Reefs. This applies to the project corridor north of Te Rerenga o Te Aohuruhuru (Suicide Rock).</p>



The placement of culvert structures is generally regulated by the NES-F over the PNRP (see Section 3.3.2 below). Similarly, activities within 100 m of a natural wetland are generally regulated by the NES-F over the PNRP. Any activities occurring within the bed of a lake or river will require further assessment as not enough information is known at this stage.

The placement of a new structure, addition or alteration to a structure and disturbance of land within the coastal area will likely require consent as a non-complying activity. As a non-complying activity, in order for an application to be considered for approval under s104B of the RMA, the proposal must satisfy at least one of the subsections of section 104D of the RMA, known as 'gateway tests'. That is, to grant a resource consent for a non-complying activity, the consent authority must be satisfied that either the adverse effects of the activity on the environment will be minor (s104D(1)(a)), or the proposed activity will not be contrary to the objectives and policies of a proposed plan and/or plan (s104D(1)(b)).

An application for consents would need to be supported by specialist input commensurate with the scale of effects. Input from others is anticipated to assess effects in relation to ecology, hydrology, land stability and coastal processes. Particularly for works within the coastal environment, engagement with mana whenua is needed, notably in preparing applications for a non-complying activity for works being undertaken within sites of significance to Rangitāne o Wairarapa & Ngāti Kahungunu ki Wairarapa.

3.3 National Planning Instruments

3.3.1 New Zealand Coastal Policy Statement

The purpose of the New Zealand Coastal Policy Statement 2010 (NZCPS) is to promote the sustainable management of natural and physical resources in relation to the coastal environment of New Zealand. Resource consent decision-makers must have regard to relevant NZCPS objectives and policies especially in relation to works affecting the coastal environment.

The seven objectives of the NZCPS are summarised as follows:

- Objective 1: To safeguard the integrity, form, functioning and resilience of the coastal environment and sustain its ecosystems, including marine and intertidal areas, estuaries, dunes and land.
- Objective 2: To preserve the natural character of the coastal environment and protect natural features and landscape values.
- Objective 3: To take account of the principles of the Treaty of Waitangi, recognise the role of tangata whenua as kaitiaki and provide for tangata whenua involvement in management of the coastal environment.
- Objective 4: To maintain and enhance the public open space qualities and recreation opportunities of the coastal environment.
- Objective 5: To ensure that coastal hazard risks taking account of climate change, are managed.
- Objective 6: To enable people and communities to provide for their social, economic, and cultural wellbeing and their health and safety, through subdivision, use, and development.
- Objective 7: To ensure that management of the coastal environment recognises and provides for New Zealand's international obligations regarding the coastal environment, including the coastal marine area.

Coastal protection interventions are proposed within the coastal environment and drainage improvements will result in stormwater being directed to the ocean. A full assessment of the proposal against the objectives and policies of the NZCPS is required, noting that to grant a resource consent for a non-complying activity, the consent authority must be satisfied that either the adverse effects of the activity on the environment will be minor (s104D(1)(a)), or the proposed activity will not be contrary to the objectives and policies of a proposed plan and/or plan (s104D(1)(b)) which includes the NZCPS.

3.3.2 Freshwater Management

The Resource Management (National Environment Standards for Freshwater Management) Regulations 2020 (**NES-F**), amended with changes in effect from 8 December 2022, sets out the objectives and policies for the management of freshwater.

These regulations relate to activities which involve the installation of structures in a waterway which may affect fish passage. The NES-F regulations also apply to activities within, or between 10 – 100m of, wetlands. Further information and assessment are required to identify areas of wetland and if any other proposed activities in proximity to wetlands or in rivers or lakes (as defined by the RMA) require consent under these regulations. Some of the primary and potential consent triggers are identified in Table 3-3 below (note this is not an exhaustive list).

Table 3-3:

Activity	Relevant Rules	Activity Status	Comments
Vegetation clearance in, or within a 10m setback from wetlands	NESFM Reg 45 (1) Vegetation clearance for constructing specified infrastructure within, or within a 10m setback from a natural wetland	Discretionary Activity	There may be vegetation clearance within 10m of natural wetlands along the project corridor.
Earthworks, land disturbance and diversion and drainage within, or within a 10m setback from a wetland	NESFM Reg 45 (2) Earthworks or land disturbance for constructing specified infrastructure within, or within a 10m setback of a natural wetland	Discretionary Activity	There may be earthworks within 10m of natural wetlands along the project corridor.
	NESFM Reg 45 (4) Taking, use, damming, diversion, or discharge of water for specific infrastructure within, or within a 100 m setback from a natural wetland if for the purpose of constructing specified infrastructure	Discretionary Activity	Further information and assessment would be required to determine whether any drainage improvements require during construction, or result in post construction, the taking, use, damming, diversion, or discharge of water within 100m of a natural wetland.

As GWRC administer the NES-F, any consents identified to be required under the NES-F can be included in any application required under the PNRP.

The National Policy Statement for Freshwater Management 2020 (**NPS-FM**) sets out the objectives and policies for the management of freshwater. The NPS-FM took effect on 3 September 2020 and replaces the National Policy Statement for Freshwater Management 2014 (amended 2017).

The NPS-FM sets out:

- how local authorities must implement this National Policy Statement, particularly in relation to giving effect to Te Mana o te Wai (as reflected in the statement's objective below)
- the National Objectives Framework for managing freshwater
- additional requirements on regional councils relating to freshwater management.

Section 2.1 of the NPS-FM states that:

The objective of this National Policy Statement is to ensure that natural and physical resources are managed in a way that prioritises:

- first, the health and well-being of water bodies and freshwater ecosystems*
- second, the health needs of people (such as drinking water)*
- third, the ability of people and communities to provide for their social, economic, and cultural well-being, now and in the future.*

The NPS-FM applies to all freshwater (including groundwater) and, to the extent they are affected by freshwater, to receiving environments (which may include estuaries and the wider coastal marine area). Any resource consent application for activities in relation to a wetland, structures in waterways, stormwater discharges or dewatering activities will require an assessment of the proposal against the provisions of the NPS-FM.



3.3.3 Land Contamination

The Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011 (NES-CS) provides a nationally consistent set of planning controls for the management of activities on contaminated and potentially contaminated land. The NES-CS applies when activities such as soil disturbance are undertaken on land where an activity described in the Hazardous Activities and Industries List (HAIL) is currently, has previously been, or is likely to have been undertaken.

The primary activity occurring on land being disturbed within the road reserve is not described on the HAIL and roads are not deemed to be 'a piece of land' under the NESCS. However, as the project area is situated within a predominantly rural area, if any excavation is proposed (such as excavation of banks) it is recommended that a check of adjacent land is undertaken to confirm whether any contaminating activities (described on the HAIL) have been undertaken on the site which might present a risk of contaminant migration within the works area.

If there are any HAIL (Ministry for the Environment - Hazardous Activities and Industries List) sites along the alignment of the proposed upgrade works where land disturbance may occur, a resource consent from the relevant district council under the NESCS is likely to be required. The preparation of a Preliminary Site Investigation (PSI) for the whole corridor would provide further assurance of the extent of HAIL sites within the project area and reduce the likelihood of encountering unexpected contamination.

3.4 Culture and Archaeology

Archaeological sites are protected under Section 42 of the Heritage New Zealand Pouhere Taonga Act 2014 (HNZPTA). It is an offense to carry out work that may "modify or destroy, or cause to be modified or destroyed, the whole or any part of that site if that person knows, or ought reasonably to have suspected, that the site is an archaeological site", whether or not the site has been previously recorded.

Due to heritage of the area and the uncertainty of uncovering archaeological artefacts, an archaeological assessment is recommended. The archaeological assessment will make recommendation(s) as to whether having an archaeological authority in place before works start would be appropriate and/or accidental discovery protocols. This assessment should be undertaken prior to works commencing, allowing enough time to obtain and authority (if required) and to avoid any future delays should anything be discovered.

If an authority is not required, the possibility that unexpected archaeological material could be found during the works cannot be discounted. In the event that unexpected archaeological material is discovered during the project, Council and their contractors should follow an Archaeological Discovery Protocol (ADP).

Reference is made to Section 2.3 of the SSBC which identifies several features of cultural importance along this coastline and within the project corridor. The entire coast between the Whakataki River mouth and Mataikona River mouth is highlighted as an area with significant mana whenua values in the PRNP. There are also many wāhi tapu and archaeological sites in the coastal area as identified in the WCDP (refer Section 3.1 above) and further listed by the New Zealand Archaeological Association. Consultation with mana whanua in relation to the project is discussed further in Section 3.5 below.

3.5 Consultation and Affected Parties

Requirements for works and/or access over private land should be confirmed as soon as possible as design progresses. In situations when work or access over private land is required, consultation with the affected landowners must be undertaken with a view of obtaining written approvals. This undertaking can have an impact upon the programme and potentially the final design solution in some cases.

The Property Group completed an initial assessment of the land required to allow for retreat of the road in four places (refer to Appendix P of the SSBS). The proposed retreat alignment has changed slightly since this report was completed. However, Section 16.3 of the SSBS explains that if investment Option A (critical risks only) is chosen only the retreat before Te Rerenga o Te Aohuruhuru (Suicide Rock), would be implemented. This would only affect one landowner. Under investment Options B and C four retreat locations would be addressed and 37 properties will likely be affected.

Managed retreat is a highly emotive topic when it comes to people and their land. As described in Section 16.3 of the SSBC, the approach to managed retreat is being informed by the National Adaptation Plan and direction is expected from the government as this problem becomes more widespread. Currently there is no formal Council policy for the acquisition or disposal of land. Typically, each decision to purchase or sell land needs a council resolution. This requires a report to a full council forum seeking a decision. Consultation with stakeholders identified in the SSBC to date indicates strong support for this project and awareness that lack of investment will result in severance and loss of road access for many properties in the short and long term. However, a robust Consultation and Engagement Plan will be essential to set out a clear process of engagement not only in relation to property matters but all interventions along this coastline.

The Whakataki coastline which spans the entirety of the project corridor is a site of significance to Rangitāne o Wairarapa & Ngāti Kahungunu ki Wairarapa. Where works are proposed within the coastal environment as defined under the WCDP engagement and consultation with mana whenua must be undertaken. There are also significant geological features and indigenous biodiversity sites noted along the project corridor and therefore work in these areas should be further determined and incorporated into the engagement and consultation strategy.

Rangitāne o Wairarapa and Ngāti Kahungunu ki Wairarapa have engaged with the SSBC providing feedback on the long list of packages. It is important to continue open, early and meaningful engagement with iwi partners.

4 Consenting Risks

As a non-complying activity application to the GWRC, the proposal must satisfy at least one of the subsections of section 104D of the RMA, known as 'gateway tests'. That is, to grant a resource consent for a non-complying activity, the consent authority must be satisfied that either the adverse effects of the activity on the environment will be minor (s104D(1)(a)), or the proposed activity will not be contrary to the objectives and policies of a proposed plan and/or plan (s104D(1)(b)). It is recommended that design as it is progressed is informed by objectives and policies of the NZCPS, the PNRP and Regional Policy Statement.

Managed retreat is a highly emotive topic when it comes to people and their land. Although consultation with stakeholders identified in the SSBC to date indicates strong support for this project, a robust Consultation and Engagement Plan will be essential to set out a clear process of engagement not only in relation to property matters but all interventions along this coastline. Rangitāne o Wairarapa and Ngāti Kahungunu ki Wairarapa have engaged with the SSBC providing feedback on the long list of packages. It is important to continue open, early and meaningful engagement with iwi partners.

5 Summary

5.1 District Council Requirements

Further information in relation to the extent of physical works, design and construction methodology is required to confirm whether any resource consent requirements are triggered. However, based on the relevant rules and review of the project corridor it is likely resource consents will be required for some, if not all, of the activities described in Section 3.1 including:

- earthworks;
- indigenous vegetation clearance within 20 m of a river or waterbody; and
- modification, alteration, disturbance or destruction of any archaeological site, geological site, waahi tapu, or area of significance to tangata whenua listed in Appendix 1.5 Archaeological and Geological Sites and Appendix 1.6 Sites of Significance to Tangata Whenua

At this stage, the most restrictive activity status for the interventions would be a discretionary activity. An application for consents would need to be supported by specialist input commensurate with the scale of effects. Input from others is anticipated to assess effects in relation to ecology, hydrology, land stability and potentially coastal processes.



5.2 Regional Council Requirements

Resource consents are anticipated for most activities such as land disturbance, vegetation clearance (native or exotic) and structures within waterways and/or coastal environment and riparian margins. Activities within the coastal environment (or drainage improvements discharging to and disturbing the coastal environment) are likely to require consents as non-complying activities.

Although the degree of the effects from the proposed interventions cannot be fully understood at this stage, the preliminary findings through the SSBC process and this planning review indicate some consenting constraints including:

- Activities/interventions along the coastline requiring specialists input to the proposed design solution(s) and consultation which may have a significant time impact to the project if not proactively managed;
- The road realignment through the Sandy Bay settlement which will have potentially significant consenting constraints depending on the ecological qualities and value of the vegetation required to be removed. The vegetation could be determined to be natural wetland which will result in a fairly complex consenting process. Negotiations with private property owners would also be necessary.

Further information and assessment are recommended as design progresses to confirm consents and application requirements relating to any proposed structures/bridges over or within rivers, and drainage discharging to the coast. Regarding rock rip rap and revetment solutions along the coast, a coastal processes assessment would be required. An application for consents would need to be supported by specialist input commensurate with the scale of effects. Input from others is anticipated to assess effects in relation to ecology, hydrology, land stability and coastal processes.

5.3 Other Approvals

Due to heritage of the area and the uncertainty of uncovering archaeological artefacts, an archaeological assessment is recommended. The archaeological assessment will make recommendation(s) as to whether having an archaeological authority in place before works start would be appropriate and/or accidental discovery protocols.

In situations when work or access over private land is required, consultation with the affected landowners must be undertaken with a view of obtaining written approvals.

Where works are proposed within the coastal environment as defined under the WCDP engagement and consultation with mana whenua must be undertaken.

Appendix Q Property Report





Mataikona Road Project Retreat and Strengthen Cost Estimate September 2022





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Executive Summary

The purpose of this document is to provide a summary of the initial high level property cost estimates and assumptions made in relation to the Masterton District Council’s (Council) Retreat and Strengthen option (Option) to support the Initial Business Case phase for the Mataikona Road Project (the Project).

We have produced a Live Map (LM) based on basic .KMZ files provided by Stantec showing the proposed centre line and adopting a 20m legal road corridor, as advised by Stantec following consultation with Council on the appropriate road corridor width. Using this information, our assessment has identified that the Option footprint will affect some 37 properties.

Gross total property acquisition costs equate to **\$7,415,489** (including contingency).

The total gross estimate is comprised as follows:

Base Estimate of Total Property Costs (Gross) including Property Market Appreciation Contingency	\$4.94M
Contingency (Gross)	\$1.24M
Funding Risk Contingency (Gross)	\$1.24M
95th Percentile Estimate of Total Property Costs (Gross)	\$7.42M

A breakdown of the 37 properties affected by the Option footprint are outlined as follows:

- 30 private properties which are all General Land. We note that there are instances of common ownership for some properties.
- 1 Local Purpose Recreation Reserve held by Masterton District Council (LM Ref 15). We have not determined whether this is a Crown derived reserve or is vested in Council.
- 2 Recreation Reserves (LM Ref 5 & 6) pursuant to the Reserves Act 1977. These were vested in the Crown in 1953 pursuant to Section 13 of the Land Subdivision in Counties Act 1946 and appear to continue to be held by the Crown.
- 1 area of common marine and coastal area (LM Ref 16).

Key assumptions and considerations

The following key assumptions and considerations were made as part of the cost estimate exercise:

- This estimate is based on the Project information available as at the date of this report and is subject to further refinement as design progresses.
- This estimate includes property acquisition costs only. All physical project construction costs are excluded.

- We have assumed additional compensation of 10% of land value (including injurious affect) up to a maximum of \$25,000.00 for owners in terms of s72(c) Public Works Act 1981.
- No allowance has been made for damage that may occur to property of affected landowners during construction.
- No allowance has been made for referring matters to the Land Valuation Tribunal.
- Injurious Affection has been assessed in our cost estimate spreadsheet (where applicable). The injurious affection assessment does not anticipate mitigation measures. Where mitigation measures are included in the design, the injurious affection will require reassessment.
- We have assumed in all instances of severance land, that the land is purchased alongside the required land as a reflection of the severance being significantly less useful to the owner. At this early stage of our assessment, we have anticipated that due to the location of the severance areas these may be held by Council due to potentially limited use and demand for these sites with coastal hazards and issues to be considered. Accordingly, we have not provided for any proceeds of sale for any severance land at this stage.

Property Market

The rateable valuations (RV) for properties located within the Masterton District were last assessed in September 2020.

Between September 2020 and February 2022, the district experienced significant house price increases. In line with most regions throughout New Zealand, house price growth was driven by the historically low interest rate environment, a shortage of housing, interest from buyers located outside the district and increased competition for the limited number of listings on the market.

Towards the end of 2021 and early 2022 the market was going through a transitional period. Market statistics indicated that the market had noticeably slowed with properties being on the market for longer periods before achieving a sale. The increased time has been needed for borrowers to satisfy their obligations to obtain finance with main trading banks noticeably slower to grant approval. The market has also been affected by various other legislation changes along with increasing interest rates, substantial increases in inflation over the past year as well as a well-publicised building materials shortage.

The Masterton district market has continued in a relatively consistent negative pattern since February 2022 for all property types. Values are continuing to reduce, and sales volumes remain at very low levels.

Based on current market trajectories, we have considered the potential appreciation in market values over the next year to be 0%.

Current market value and anticipated market appreciation

Property type	Increase on 2020 Rating Value	Market Appreciation
Residential	50%	0%
Lifestyle	50%	0%

Rural	50%	0%
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Estimated Acquisition Costs

Each of the inputs tabularised below are based on our research, knowledge, and experience of completing acquisitions of multiple properties for similar infrastructure projects. The properties affected by the Mataikona ‘retreat and strengthen’ option roading Project are located along the coastline. The properties comprise a combination of rural, lifestyle and residential properties all within rural zoned land and we have tailored our market assessments to each of these property types.

As a rule, the below table outlines what costs have been applied.

Other property costs – partial purchases

Property type	Injurious affection	Additional Compensation per property	S66 PWA costs per owner	Acquisition costs per owner
Residential	5%	10% up to \$25,000	\$20,000	Individually assessed
Lifestyle	5%	10% up to \$25,000	\$20,000	Individually assessed
Rural	1%	10% up to \$25,000	\$30,000	Individually assessed

Injurious Affection

The Mataikona live map provides an indicative footprint of the Project. Whilst it is noted that these are not final plans, based on our experience of other acquisitions for similar infrastructure projects, we have assessed injurious affection on a percentage of value based on a desktop review of anticipated effect on balance land on a case-by-case basis.

Additional compensation

The land requirements for the project are all partial acquisitions accordingly we have assumed additional compensation of 10% of land value up to a maximum of \$25,000 in accordance with Section 72C PWA.

Section 66 PWA owners’ costs

Based on our experience the wider region, we have assumed that the owners will not engage a property advocate to assist with their negotiations.

We estimate partial acquisitions will incur an upper limit of landowner costs per property of \$20,000 for the subject residential and lifestyle properties and \$30,000 for rural properties.

The s66 costs exclude business-related claims provided for above.

Acquisition costs

Estimated direct acquisition costs for the requiring authority for partial purchases are:

Consultancy fees	Average \$25,000 per property.
Valuation fees	\$2,000 per residential property \$3,000 per lifestyle property \$10,000 per rural property
Building reports	Not required. Improvements are not being acquired by the project.
Contamination reports	Not required. Improvements are not being acquired by the project.
Reinstatement costs (accommodation works)	Additional costs have been provided against each property as a reflection of the improvements which may be affected as a consequence of the works. Such costs have been established on a property-by-property basis and range from \$5,000 to \$40,00 to reflect the size and scale of the operations on each property, and the anticipated effect of the works on that property.

Contingencies

P 50 Contingencies

The SM014 definition of contingency is a financial provision added to the Base Estimate to provide for uncertainty in relation to the estimate inputs and specific project related threats and opportunities with a cost impact to derive the Expected Estimate.

For the purposes of this high level cost estimate assessment, we have applied an indicative 25% contingency to the Base Estimate to provide for uncertainty in relation to the estimate inputs and specific project related threats.

Funding risk contingency

The SM014 definition of funding risk contingency is an additional financial provision to provide for uncertainty in relation to the estimate inputs and project related threats and opportunities with a cost impact which represents the difference between the Expected Estimate and the 95th percentile estimate.

For the purposes of this high level cost estimate assessment we have applied an indicative 25% funding risk contingency to provide for uncertainty in relation to the estimate inputs and specific project related threats and opportunities.

Land Affected by Option Footprint

Opportunity to Lessen Impact

It is important to note that in taking the indicative alignment provided by Stantec and applying this, there are some parcels of land which can be avoided through further design and review. These are mainly parcels of land where a very small area of the property is affected by the footprint.

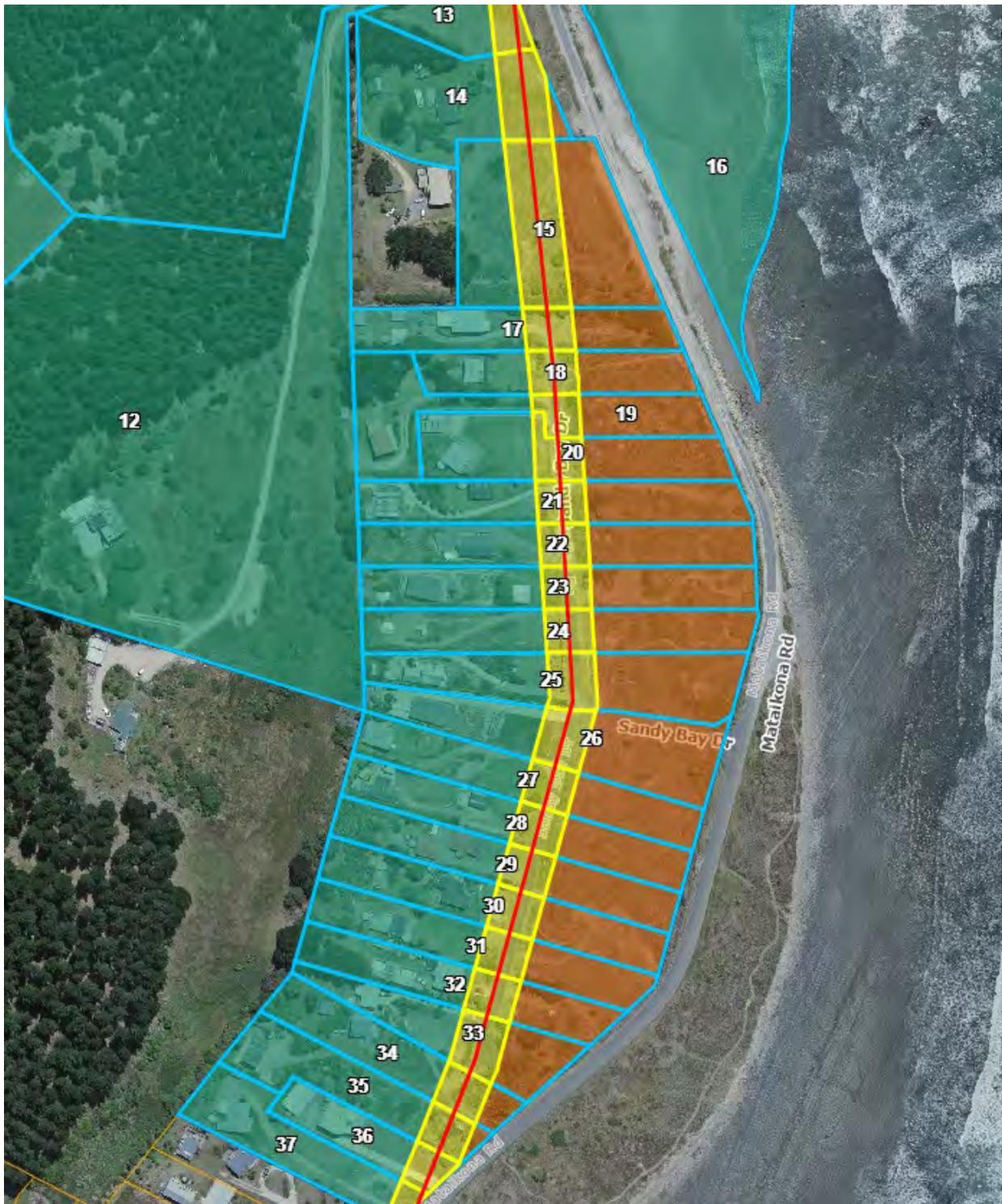
An example of which is outlined in the image below in relation to LM Ref 10.



Severance

The Option footprint creates a number of areas of potential ‘severance’ An example of this is where the Option proposes to be formed over the right of way referred to as ‘Sandy Bay Drive’. This is not a legal road but rather right of way. On that basis, the acquisition of land for legal road will create severance to those parcels of land which all extend to the existing Mataikona Road alignment.

This is illustrated in the image below, with the proposed Option footprint in yellow along Sandy Bay Drive and the balance of the owner’s land located on either side, with the area of potential severance shaded in tan.



Severance is where the acquisition of part of an owner's land for a public work (legal road is a public work), results in another part of that land being severed from the retained land so that it becomes more costly to retain or less useful to the landowner.

In these circumstances, the land may require Council to purchase the severed land. In some cases, the Council may be able to dispose/sell the land in due course, but this will be dependent on suitability of the land and market demand.

To ensure that the initial assessment is assessed on a worse case basis, we have assumed that any severance land will need to be acquired as per Council’s obligations, if required by a landowner.

Further Investigation Required

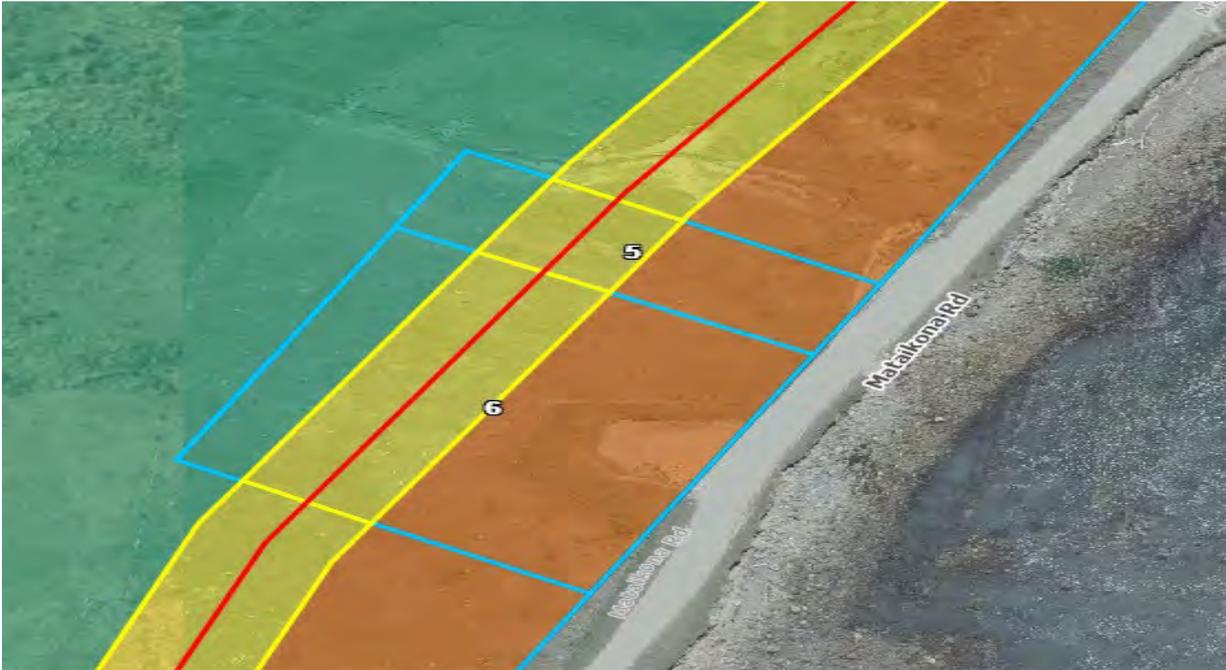
The Option footprint affects a number of Crown and public land parcels which will require further investigation to determine the status of these individual land parcels and likewise ownership and a pathway to acquire land for legal road under the Option.

A brief summary of our initial investigation to date of these parcels of land is outlined as follows.

Recreation Reserve (LM Ref 5 & 6)

These two parcels of land are located adjacent to one another as shown in the image below. Both parcels of land were vested in the Crown in 1953 pursuant to Section 13 of the Land Subdivision in Counties Act 1946. They both appear to continue to be held by the Crown as a Recreation Reserve by New Zealand Gazette Notice 1953 p1968. We anticipate that these parcels of land continue to be held by the Crown pursuant to the Reserves Act 1977

It is possible that further gazettal action may have been undertaken to change the status and administering body, but this requires further investigation if the Option progresses further.



Local Purpose Recreation Reserve (LM Ref 15)

This parcel of land is held by Council as a Local Purpose Recreation Reserve pursuant to the Reserves Act 1977. It appears that the reserve may have been created and vested as a result of a subdivision as shown on Deposited Plan 68354, in which case the land may be vested in Council and may not be a Crown derived reserve.

The status of this land requires further investigation if the Option progresses further.

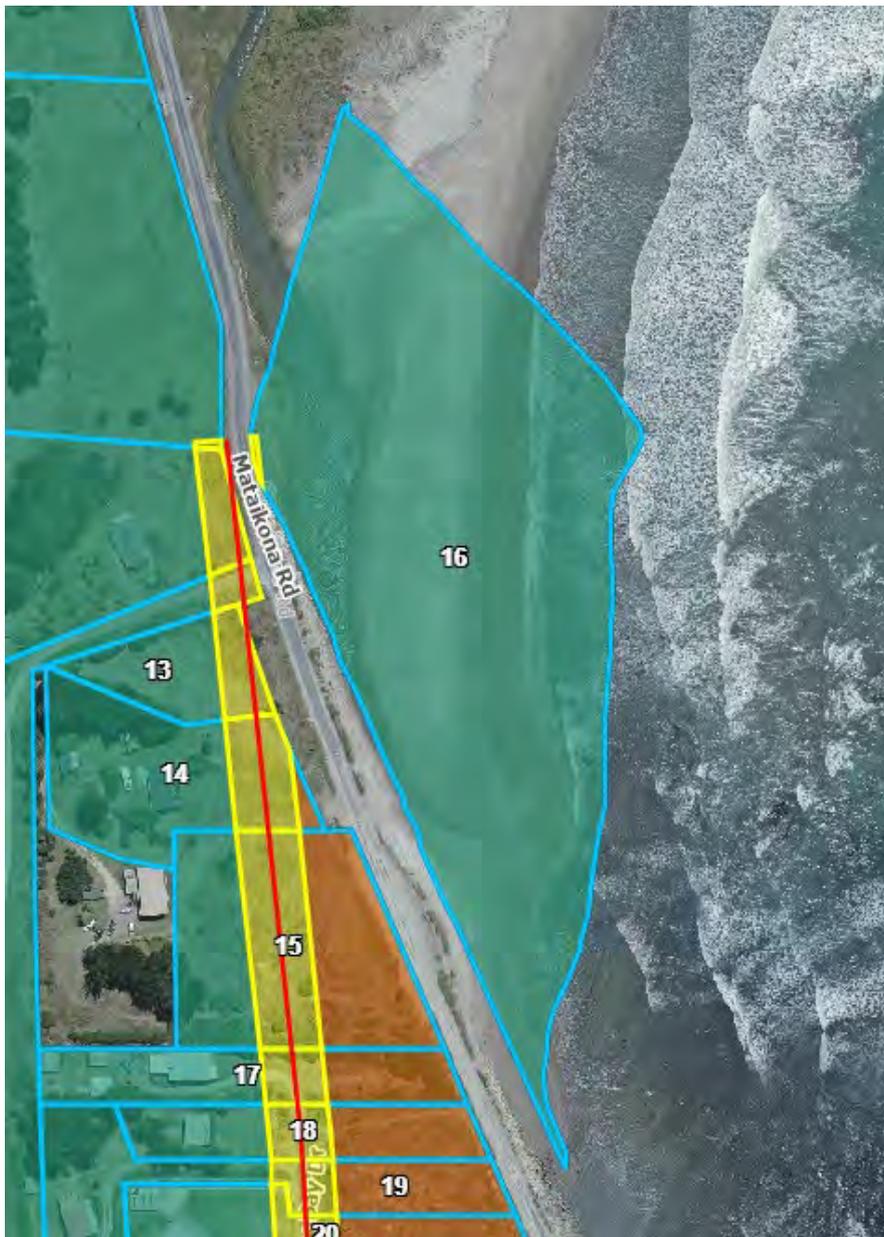


Common Marine and Coastal Parcel (LM Ref 16)

There is a parcel of land (16) that is shown as foreshore, but we anticipate that part of this parcel of land will in effect form part of the 'marine and coastal area' pursuant to the Marine and Coastal Area (Takutai Moana) Act 2011.

As this parcel of land is located on the seaward side of the existing legal road and given the natural occurrences in relation to the coast overtime, it may be that the full parcel area forms part of the marine and coastal area. Further investigation would be required to determine this.

If the Option progresses, noting the minor area of the Option footprint on this land parcel, we would recommend that any further alignment investigation and design looks to avoid impacting this parcel of land.



Recommendations

The following recommendations are made as part of the cost estimate exercise:

- A portion of severance land (1,508m²) from the Haab farm (LM Ref 1) located at the back of properties 7 and 8 (as well as 11 properties without land requirement) will need to be purchased as road so those aforementioned properties can legally access their land from the proposed new road.
- A small portion of required land (1m²) is currently proposed from the Aspell property (LM Ref 2). To enable a cleaner tie in to the existing road corridor, we suggest revisiting the requirement from this property.
- A small portion of required land (12m²) is currently proposed from the Matai Beach Ltd property (LM Ref 7). Suggest avoiding if possible.

- A small portion of required land (2m²) is currently proposed from the Foreman property (LM Ref 8). Suggest avoiding if possible.
- The existing road is encroaching on portions of the Professional Guiding Services Ltd property (LM Ref 9), this may need to be addressed during negotiations by way of an exchange agreement.
- A small portion of required land (22m²) is currently proposed from the Trobe Holdings Ltd property (LM Ref 10). To enable a cleaner tie into the existing road corridor, we suggest revisiting the requirement from this property.
- A small portion of required land (23m²) is currently proposed from a parcel of land located on the foreshore (LM Ref 16). Suggest avoiding if possible.

If any part of this report requires further clarification, please don't hesitate to contact us. We look forward to providing any further advice and support required for further stages of the Project.

Prepared by:

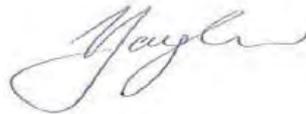


Sarah Busuttin

Property Consultant

027 220 2591

SBusuttin@propertygroup.co.nz



Jesse Taylor

Senior Property Consultant

027 333 4454

JTaylor@propertygroup.co.nz

Appendix 1: Cost Estimate Spreadsheet



TPG Live Map Reference	Record of Title	Legal Description	Address	Owner(s)	Property Type	Title Area (ha)	Land Required (ha)	Severance Area (ha)	Balance (ha)	Zoing	Comments	Access Effects	Full/Partial	Valuation Land	Valuation Number	RV Land Value Sept2020	RV Improvement Value Sept2020	RV Capital Value Sept2020	
Mataikona Road Cost Estimate																			
1	533587	Lot 6 DP 403262	1282 Mataikona Road, Mataikona	Astrid Haab-Zuber, Robin Otto Georg Haab	Pastoral Farm	493.2973	4.0924	4.5540	484.6509	Rural	Part of a larger pastoral farm this portion of land will be affected on the eastern boundary creating severance land between the road and oldroad/foreshore. Portion of severance land (1508m ²) at the back of properties 7, 8 (and 11 others) will need to be purchased as road so those properties can legally access their land - included this in land requirement. Road requirement affects shed/workshop, suggest curving to avoid.	Not affected	Partial	1549.4834	17970/1200	\$8,030,000	\$2,120,000	\$10,150,000	
2	WN601/19	Lot 1 DP 16653	1063 Mataikona Road, Mataikona	Claire Alicia Aspell	Residential Dwelling	0.0861	0.0001	0.0000	0.0860	Rural	The proposed road will require a small portion from the front eastern corner, to have a seamless road suggest taking more land from this property, or avoid	Access will be affected	Partial	0.0860	17970/02500	\$200,000	\$120,000	\$320,000	
3	WN885/5	Lot 1 DP 21440	1061 Mataikona Road, Mataikona	Annette Sharon Watson, Lindsay Edmund Watson	Residential Dwelling	0.0993	0.0069	0.0000	0.0924	Rural	The proposed road will require a small slither from the eastern boundary bringing the road closer to the house.	Access will be affected	Partial	0.1012	1797002400	\$210,000	\$120,000	\$330,000	
4	WN904/76	Lot 2 DP 21440	1061 Mataikona Road, Mataikona	Annette Sharon Watson, Lindsay Edmund Watson	Residential Vacant	0.1029	0.0049	0.0000	0.0980	Rural	The proposed road will require a small slither from the eastern boundary. Property vacant and used as yard space to adjacent property (same owners).	Access will be affected	Partial	0.1012	17970/02401	\$210,000	\$10,000	\$220,000	
5 & 6	<Null>	Lot 13 DP 32246, Lot 18 DP 16652	Mataikona Road, Mataikona	Lot 13 DP 32246 ; [Create] Recreation Reserve New Zealand Gazette 1953 p 1968, Lot 18 DP 16652 ; [Create] Recreation Reserve New Zealand Gazette 1953 p 1968	Recreation reserve Vacant	0.5160	0.1623	0.2586	0.0951	Rural	Property will be split in half, both portions would have road access. Portion to west could be offered to adjacent rural neighbour.	Not affected	Partial	0.5160	17970/2600	\$66,000	\$1,000	\$67,000	
7	463570	Lot 7 DP 403262	887 Mataikona Road, Mataikona	Matai Beach Limited	Residential Dwelling	0.2024	0.0012	0.0000	0.2012	Rural	Small triangular portion on western boundary affected. Road will be closer to dwelling due to realignment. Avoid if possible.	Not affected	Partial	0.2023	17970/02800	\$230,000	\$85,000	\$315,000	
8	533585	Lot 4 DP 403262	863 Mataikona Road, Mataikona	Ben Jamie Foreman	Residential Vacant	0.0843	0.0002	0.0000	0.0842	Rural	Small triangular portion on western boundary affected. Avoid if possible.	Not affected	Partial	0.0843	17970/01215	\$210,000	\$0	\$210,000	
9	WN53D/668	Part Section 6 Mataikona SETT	379 Mataikona Road, Mataikona ; 583 Mataikona Road, Mataikona ; 649 Mataikona Road, Mataikona	Professional Guiding Services Limited	Pastoral Farm	2025.0578	2.0886	0.2045	2022.7647	Rural	The proposed road will require portions running along the eastern boundary of rural pastoral land, bringing the road closer to 5 dwellings. Might need to fix existing road encroachment on this property.	Access to 5 dwellings will be affected	Partial	2025.3999	17970/02200	\$4,770,000	\$880,000	\$5,650,000	
10	WN53D/648	Lot 1 DP 86136	353C Mataikona Road, Mataikona	Trobe Holdings Limited	Lifestyle Vacant	2.0002	0.0022	0.0000	1.9981	Rural	The proposed road will require a small portion from the south-eastern corner, to have a seamless road suggest taking more land from this property.	Not affected	Partial	2.0000	17970/02222	\$280,000	\$40,000	\$320,000	
11	WN53D/649	Lot 2 DP 86136	353C Mataikona Road, Mataikona	Trobe Holdings Limited	Lifestyle Property	2.6386	0.0432	0.0000	2.5954	Rural	The proposed road will require land on the eastern boundary, bringing the road closer to the house.	Access will be affected via neighbouring ROW	Partial	2.6380	17970/02231	\$335,000	\$105,000	\$440,000	
12	WN53D/651	Lot 4 DP 86136	353B Mataikona Road, Mataikona	David Paul De Terte	Lifestyle Property	3.2833	0.0191	0.0000	3.2642	Rural	The proposed road will require land on the eastern boundary, affects dogleg access to rear site and ROW to neighbouring properties.	Access will be affected for subject ppty plus neighbours	Partial	3.2830	17970/02228	\$425,000	\$190,000	\$615,000	
13	169434	Lot 1 DP 341214	Mataikona Road, Mataikona	Bretton Keith Walker, Geoffrey Copeland Baker, Jennifer Anne Walker	Residential Vacant	0.1559	0.0437	0.0000	0.1122	Rural	The proposed road will require land on the eastern boundary. Property vacant and used as yard space to adjacent property (same owners).	Access will be affected via neighbouring ROW	Partial	0.1560	17970/02227	\$240,000	\$10,000	\$250,000	
14	169435	Lot 2 DP 341214	345 Mataikona Road, Mataikona	Bretton Keith Walker, Geoffrey Copeland Baker, Jennifer Anne Walker	Residential Dwelling	0.3523	0.0722	0.0106	0.2695	Rural	The proposed road will require a portion from the eastern boundary, bringing the road closer to the house and creating severance.	Access will be affected via neighbouring ROW	Partial	0.3525	17970/02233	\$270,000	\$145,000	\$415,000	
15	WN52D/966	Lot 25 DP 68354	<Null>	Masterton District Council	Recreation reserve Vacant	0.5019	0.1412	0.1969	0.1637	Rural	Property will be split in half. Both portions would have road access.	Not affected	Partial	0.5018	17970/02225	\$52,000	\$1,000	\$53,000	
16	<Null>	Part Section 724 Mataikona SET	<Null>	Part Section 724 Mataikona SETT	Foreshore	2.1196	0.0023	0.0000	2.1173	Rural	The proposed road will require a small slither from the eastern boundary. Area is made up of foreshore/beach. Avoid if possible.	Not affected	Partial	n/a	n/a	n/a	n/a	n/a	
17	WN37C/917	Lot 24 DP 68355	18 Sandy Bay Drive, Mataikona	Dianne Christine Millar, Peter Geoffrey Borrie	Residential Dwelling	0.2404	0.0361	0.0753	0.1289	Rural	The proposed road will split the property in half creating severance land. The road will be closer to the dwelling.	Access will be affected	Partial	0.2404	17970/02224	\$240,000	\$400,000	\$640,000	
18	295352	Lot 1 DP 373036	17 Sandy Bay Drive, Mataikona	Marc John King	Residential Dwelling	0.2039	0.0361	0.0855	0.0822	Rural	The proposed road will split the property in half creating severance land. The road will be closer to the dwelling.	Access will be affected	Partial	0.2039	17970/02223	\$250,000	\$225,000	\$475,000	
19	295353	Lot 2 DP 373036	16 Sandy Bay Drive, Mataikona	Geraldine May Godden, James David Godden	Residential Dwelling	0.3080	0.0310	0.0969	0.1801	Rural	The proposed road will split the property in half creating severance land. The road will be closer to the dwelling.	Access will be affected	Partial	0.3079	17970/02221	\$255,000	\$245,000	\$500,000	
20	WN53A/777	Lot 2 DP 85231	15 Sandy Bay Drive, Mataikona	Alan John Currie, Christine Lesley Barbridge, Kevin John Barbridge	Residential Dwelling	0.2843	0.0411	0.1085	0.1347	Rural	The proposed road will split the property in half creating severance land. The road will be closer to the dwelling.	Access will be affected	Partial	0.2843	17970/02229	\$240,000	\$200,000	\$440,000	
21	WN37C/913	Lot 20 DP 68355	14 Sandy Bay Drive, Mataikona	Peter James Gaskin	Residential Dwelling	0.2899	0.0360	0.1199	0.1340	Rural	The proposed road will split the property in half creating severance land. The road will be closer to the dwelling.	Access will be affected	Partial	0.2901	17970/02220	\$255,000	\$255,000	\$510,000	
22	WN37C/912	Lot 19 DP 68355	13 Sandy Bay Drive, Mataikona	Stephen George Vine	Residential Dwelling	0.2956	0.0361	0.1241	0.1354	Rural	The proposed road will split the property in half creating severance land. The road will be closer to the dwelling.	Access will be affected	Partial	0.2949	17970/02219	\$240,000	\$370,000	\$610,000	
23	WN37C/911	Lot 18 DP 68355	12 Sandy Bay Drive, Mataikona	Thomas Raymond Ward	Residential Dwelling	0.2951	0.0360	0.1236	0.1356	Rural	The proposed road will split the property in half creating severance land. The road will be closer to the dwelling.	Access will be affected	Partial	0.2955	17970/02218	\$255,000	\$295,000	\$550,000	
24	WN37C/910	Lot 17 DP 68355	11 Sandy Bay Drive, Mataikona	Gail Linda Donaldson, Jean Louis Macadre, Macalister Mazengarb Trust Company Limited	Residential Vacant	0.2932	0.0361	0.1198	0.1373	Rural	The proposed road will split the property in half creating severance land. The road will be closer to the dwelling.	Access will be affected	Partial	0.2924	17970/02217	\$255,000	\$20,000	\$275,000	
25	WN37C/909	Lot 16 DP 68355	10 Sandy Bay Drive, Mataikona	Ross Erl Percy, Sharon Elizabeth Parker	Residential Dwelling	0.3394	0.0472	0.1593	0.1329	Rural	The proposed road will split the property in half creating severance land. The road will be closer to the dwelling.	Access will be affected	Partial	0.3392	17970/02216	\$255,000	\$315,000	\$570,000	
26	WN37C/908	Lot 15 DP 68355	9 Sandy Bay Drive, Mataikona	Fay Margaret Dalglish, Walter Stuart Dalglish	Residential Dwelling	0.3524	0.0496	0.1745	0.1283	Rural	The proposed road will split the property in half creating severance land. The road will be closer to the dwelling.	Access will be affected	Partial	0.3526	17970/02215	\$255,000	\$365,000	\$620,000	
27	WN37C/907	Lot 14 DP 68355	8 Sandy Bay Drive, Mataikona	Gawith Trustees Limited, Geoffrey Peter Patterson, Janet Esther Williams, Mark Alister Williams, Pamela Ann Patterson	Residential Dwelling	0.2659	0.0362	0.0979	0.1318	Rural	The proposed road will split the property in half creating severance land. The road will be closer to the dwelling.	Access will be affected	Partial	0.2640	17970/02214	\$255,000	\$255,000	\$510,000	
28	WN37C/906	Lot 13 DP 68355	7 Sandy Bay Drive, Mataikona	Christine Mavis Ellery, Richard Noel Ellery	Residential Dwelling	0.2646	0.0360	0.0976	0.1310	Rural	The proposed road will split the property in half creating severance land. The road will be closer to the dwelling.	Access will be affected	Partial	0.2641	17970/02213	\$255,000	\$245,000	\$500,000	
29	WN37C/905	Lot 12 DP 68355	6 Sandy Bay Drive, Mataikona	Hannah Louise Meulenbroek, Robert Peter Meulenbroek	Residential Dwelling	0.2616	0.0357	0.0971	0.1288	Rural	The proposed road will split the property in half creating severance land. The road will be closer to the dwelling.	Access will be affected	Partial	0.2641	17970/02212	\$255,000	\$185,000	\$440,000	
30	WN37C/904	Lot 11 DP 68355	5 Sandy Bay Drive, Mataikona	Christine Ann Edge, Stephen Ronald Edge	Residential Dwelling	0.2668	0.0363	0.0977	0.1329	Rural	The proposed road will split the property in half creating severance land. The road will be closer to the dwelling.	Access will be affected	Partial	0.2642	17970/02211	\$240,000	\$280,000	\$520,000	
31	WN37C/903	Lot 10 DP 68355	4 Sandy Bay Drive, Mataikona	BWNR Limited	Residential Dwelling	0.2609	0.0362	0.0916	0.1331	Rural	The proposed road will split the property in half creating severance land. The road will be closer to the dwelling.	Access will be affected	Partial	0.2584	17970/02210	\$240,000	\$80,000	\$320,000	
32	WN37C/902	Lot 9 DP 68355	3 Sandy Bay Drive, Mataikona	Troy Calvin Rolls	Residential Dwelling	0.2353	0.0355	0.0713	0.1284	Rural	The proposed road will split the property in half creating severance land. The road will be closer to the dwelling.	Access will be affected	Partial	0.2390	17970/02209	\$240,000	\$210,000	\$450,000	
33	WN37C/901	Lot 8 DP 68355	2 Sandy Bay Drive, Mataikona	Gael Hargreaves, Mark Alan Hargreaves, Peter Wood	Residential Dwelling	0.2215	0.0492	0.0726	0.0997	Rural	The proposed road will split the property in half creating severance land. The road will be closer to the dwelling.	Access will be affected	Partial	0.2338	17970/02208	\$240,000	\$195,000	\$435,000	
34	WN37C/900	Lot 7 DP 68355	1 Sandy Bay Drive, Mataikona	Linda Charmaine Webster, Michael Raymond Webster	Residential Dwelling	0.2088	0.0358	0.0225	0.1506	Rural	The proposed road will split the property in half creating severance land. The road will be closer to the dwelling.	Access will be affected	Partial	0.1961	17970/02207	\$240,000	\$115,000	\$355,000	
35	WN47B/497	Lot 1 DP 80750	297 Mataikona Road, Mataikona	Jane Elizabeth Williams, Maitlinn Hull Williams, Peter James Gaskin	Residential Dwelling	0.2157	0.0356	0.0078	0.1723	Rural	The proposed road will split the property in half creating severance land. The road will be closer to the dwelling.	Access will be affected	Partial	0.2153	17970/02206	\$280,000	\$220,000	\$500,000	
36	WN47B/499	Lot 3 DP 80750	295 Mataikona Road, Mataikona	Barry Vincent Stevens	Residential Dwelling	0.1352	0.0288	0.0000	0.1064	Rural	The proposed road will require a portion from the eastern boundary, bringing the road closer to the house.	Access will be affected	Partial	0.1353	17970/02205	\$210,000	\$400,000	\$610,000	
37	WN47B/498	Lot 2 DP 80750	293 Mataikona Road, Mataikona	Chapel Street Trustees Limited, Park Street Trustees Number 23 Limited	Residential Dwelling	0.2066	0.0139	0.0000	0.1928	Rural	The proposed road will require a portion from the eastern boundary, bringing the road closer to the house.	Access will be affected	Partial	0.2040	17970/02204	\$280,000	\$240,000	\$520,000	
Subtotal																			
Estimated Property Supplier Costs																			
Base Estimate of Total Property Acquisition Costs																			
Contingency																			
Expected Estimate of Total Property Costs (P50)				25.00%															
95th percentile of total property acquisition costs (P95)				25.00%															
Expected Estimate of Total Property Costs																			

Index off LV	Adjusted Land Value	Market Apprctn Cont.	Land Value including Market Apprctn Cont.	Land Value Land Rate per m²	Adjusted Land Rate per m²	Adjustment Comment	Applied Land Rate m²	Estimated Land and Buildings Acquisition Cost	IJ Comment	Injurious Affection Rate	Injurious Affection Value	Owner Section 66 Costs	Additional Compensation	Accommodation Works: Driveway/Access	Accommodation works: Rural property	Accommodation Works: Planting	Accommodation Works: Fence/gate	Estimated Accommodation Work Cost	Council Acquisition Costs: Council Valuation	Council Acquisition Costs (excl PC Costs)	Estimated Gross Acquisition Cost
1.50	\$12,045,000	0.00%	\$12,045,000	\$0.78	0%		\$0.78	\$ 67,213	IJ is a percentage of value based on desktop review of anticipated effect on balance land.	1%	\$119,778	\$30,000	\$ 25,000	\$0	\$20,000	\$0	\$20,000	\$40,000	\$10,000	\$50,000	\$ 291,991
1.50	\$300,000	0.00%	\$300,000	\$348.84	0%		\$348.84	\$ 213	IJ is a percentage of value based on desktop review of anticipated effect on balance land.	5%	\$14,989	\$20,000	\$ 1,520	\$0	\$0	\$0	\$5,000	\$5,000	\$2,000	\$7,000	\$ 43,722
1.50	\$315,000	0.00%	\$315,000	\$311.26	0%		\$311.26	\$ 21,546	IJ is a percentage of value based on desktop review of anticipated effect on balance land.	5%	\$14,673	\$20,000	\$ 3,622	\$0	\$0	\$0	\$5,000	\$5,000	\$2,000	\$7,000	\$ 66,840
1.50	\$315,000	0.00%	\$315,000	\$311.26	0%		\$311.26	\$ 15,283	IJ is a percentage of value based on desktop review of anticipated effect on balance land.	5%	\$14,986	\$20,000	\$ 3,027	\$0	\$0	\$0	\$5,000	\$5,000	\$2,000	\$7,000	\$ 60,296
1.50	\$99,000	0.00%	\$99,000	\$19.19	-100%	Reserve land, assume no compensation	\$0.00	\$ -	No effect	0%	\$0	\$0	\$ -	\$0	\$0	\$0	\$5,000	\$5,000	\$0	\$5,000	\$ 5,000
1.50	\$345,000	0.00%	\$345,000	\$170.54	0%		\$170.54	\$ 2,101	IJ is a percentage of value based on desktop review of anticipated effect on balance land.	5%	\$17,145	\$20,000	\$ 1,925	\$0	\$0	\$0	\$5,000	\$5,000	\$2,000	\$7,000	\$ 48,171
1.50	\$315,000	0.00%	\$315,000	\$373.67	0%		\$373.67	\$ 669	IJ is a percentage of value based on desktop review of anticipated effect on balance land.	5%	\$15,717	\$20,000	\$ 1,639	\$0	\$0	\$0	\$5,000	\$5,000	\$2,000	\$7,000	\$ 45,024
1.50	\$7,155,000	0.00%	\$7,155,000	\$0.35	0%		\$0.35	\$ 8,101	IJ is a percentage of value based on desktop review of anticipated effect on balance land.	1%	\$71,469	\$30,000	\$ 7,957	\$0	\$20,000	\$0	\$20,000	\$40,000	\$10,000	\$50,000	\$ 167,527
1.50	\$420,000	0.00%	\$420,000	\$21.00	0%		\$21.00	\$ 454	IJ is a percentage of value based on desktop review of anticipated effect on balance land.	5%	\$20,977	\$20,000	\$ 2,143	\$0	\$0	\$0	\$5,000	\$5,000	\$3,000	\$8,000	\$ 51,574
1.50	\$502,500	0.00%	\$502,500	\$19.05	0%		\$19.05	\$ 8,222	IJ is a percentage of value based on desktop review of anticipated effect on balance land.	5%	\$24,714	\$20,000	\$ 3,294	\$0	\$0	\$0	\$5,000	\$5,000	\$3,000	\$8,000	\$ 64,230
1.50	\$637,500	0.00%	\$637,500	\$19.42	0%		\$19.42	\$ 3,717	Rear property, dwelling far from requirement	0%	\$0	\$20,000	\$ 372	\$0	\$0	\$0	\$5,000	\$5,000	\$3,000	\$8,000	\$ 32,088
1.50	\$360,000	0.00%	\$360,000	\$230.77	0%		\$230.77	\$ 100,855	IJ is a percentage of value based on desktop review of anticipated effect on balance land.	5%	\$12,957	\$20,000	\$ 11,381	\$0	\$0	\$0	\$5,000	\$5,000	\$2,000	\$7,000	\$ 152,194
1.50	\$405,000	0.00%	\$405,000	\$114.89	0%		\$114.89	\$ 95,169	IJ is a percentage of value based on desktop review of anticipated effect on balance land.	5%	\$15,492	\$20,000	\$ 11,066	\$0	\$0	\$0	\$5,000	\$5,000	\$2,000	\$7,000	\$ 148,726
1.50	\$78,000	0.00%	\$78,000	\$15.54	-100%	Reserve land, assume no compensation	\$0.00	\$ -	No effect	0%	\$0	\$0	\$ -	\$0	\$0	\$0	\$5,000	\$5,000	\$0	\$5,000	\$ 5,000
n/a	n/a	n/a	n/a	n/a	0%	Foreshore land, assume no compensation	\$0.00	\$ -	No effect	0%	\$0	\$0	\$ -	\$0	\$0	\$0	\$5,000	\$5,000	\$0	\$5,000	\$ 5,000
1.50	\$360,000	0.00%	\$360,000	\$149.75	-50%	New road to replace existing driveway, severance land buffer zone, assume view not lost	\$74.88	\$ 83,420	IJ is a percentage of value based on desktop review of anticipated effect on balance land.	5%	\$13,829	\$20,000	\$ 9,725	\$0	\$0	\$0	\$5,000	\$5,000	\$2,000	\$7,000	\$ 133,974
1.50	\$375,000	0.00%	\$375,000	\$183.91	-50%	New road to replace existing driveway, severance land buffer zone, assume view not lost	\$91.96	\$ 111,862	IJ is a percentage of value based on desktop review of anticipated effect on balance land.	5%	\$13,157	\$20,000	\$ 12,502	\$0	\$0	\$0	\$5,000	\$5,000	\$2,000	\$7,000	\$ 164,521
1.50	\$382,500	0.00%	\$382,500	\$124.23	-50%	New road to replace existing driveway, severance land buffer zone, assume view not lost	\$62.11	\$ 79,431	IJ is a percentage of value based on desktop review of anticipated effect on balance land.	5%	\$15,153	\$20,000	\$ 9,458	\$0	\$0	\$0	\$5,000	\$5,000	\$2,000	\$7,000	\$ 131,043
1.50	\$360,000	0.00%	\$360,000	\$126.63	-50%	New road to replace existing driveway, severance land buffer zone, assume view not lost	\$63.31	\$ 94,711	IJ is a percentage of value based on desktop review of anticipated effect on balance land.	5%	\$13,264	\$20,000	\$ 10,798	\$0	\$0	\$0	\$5,000	\$5,000	\$2,000	\$7,000	\$ 145,773
1.50	\$382,500	0.00%	\$382,500	\$131.85	-50%	New road to replace existing driveway, severance land buffer zone, assume view not lost	\$65.93	\$ 102,765	IJ is a percentage of value based on desktop review of anticipated effect on balance land.	5%	\$13,987	\$20,000	\$ 11,675	\$0	\$0	\$0	\$5,000	\$5,000	\$2,000	\$7,000	\$ 155,427
1.50	\$360,000	0.00%	\$360,000	\$122.08	-50%	New road to replace existing driveway, severance land buffer zone, assume view not lost	\$61.04	\$ 97,746	IJ is a percentage of value based on desktop review of anticipated effect on balance land.	5%	\$13,113	\$20,000	\$ 11,086	\$0	\$0	\$0	\$5,000	\$5,000	\$2,000	\$7,000	\$ 148,945
1.50	\$382,500	0.00%	\$382,500	\$129.44	-50%	New road to replace existing driveway, severance land buffer zone, assume view not lost	\$64.72	\$ 103,248	IJ is a percentage of value based on desktop review of anticipated effect on balance land.	5%	\$13,963	\$20,000	\$ 11,721	\$0	\$0	\$0	\$5,000	\$5,000	\$2,000	\$7,000	\$ 155,932
1.50	\$382,500	0.00%	\$382,500	\$130.81	-50%	New road to replace existing driveway, severance land buffer zone, assume view not lost	\$65.41	\$ 101,976	IJ is a percentage of value based on desktop review of anticipated effect on balance land.	5%	\$14,026	\$20,000	\$ 11,600	\$0	\$0	\$0	\$5,000	\$5,000	\$2,000	\$7,000	\$ 154,602
1.50	\$382,500	0.00%	\$382,500	\$112.77	-50%	New road to replace existing driveway, severance land buffer zone, assume view not lost	\$56.38	\$ 116,436	IJ is a percentage of value based on desktop review of anticipated effect on balance land.	5%	\$13,303	\$20,000	\$ 12,974	\$0	\$0	\$0	\$5,000	\$5,000	\$2,000	\$7,000	\$ 169,714
1.50	\$382,500	0.00%	\$382,500	\$108.48	-50%	New road to replace existing driveway, severance land buffer zone, assume view not lost	\$54.24	\$ 121,556	IJ is a percentage of value based on desktop review of anticipated effect on balance land.	5%	\$13,047	\$20,000	\$ 13,460	\$0	\$0	\$0	\$5,000	\$5,000	\$2,000	\$7,000	\$ 175,064
1.50	\$382,500	0.00%	\$382,500	\$144.89	-50%	New road to replace existing driveway, severance land buffer zone, assume view not lost	\$72.44	\$ 97,152	IJ is a percentage of value based on desktop review of anticipated effect on balance land.	5%	\$14,267	\$20,000	\$ 11,142	\$0	\$0	\$0	\$5,000	\$5,000	\$2,000	\$7,000	\$ 149,561
1.50	\$382,500	0.00%	\$382,500	\$144.83	-50%	New road to replace existing driveway, severance land buffer zone, assume view not lost	\$72.42	\$ 96,772	IJ is a percentage of value based on desktop review of anticipated effect on balance land.	5%	\$14,286	\$20,000	\$ 11,106	\$0	\$0	\$0	\$5,000	\$5,000	\$2,000	\$7,000	\$ 149,164
1.50	\$382,500	0.00%	\$382,500	\$144.83	-50%	New road to replace existing driveway, severance land buffer zone, assume view not lost	\$72.42	\$ 96,123	IJ is a percentage of value based on desktop review of anticipated effect on balance land.	5%	\$14,319	\$20,000	\$ 11,044	\$0	\$0	\$0	\$5,000	\$5,000	\$2,000	\$7,000	\$ 148,486
1.50	\$360,000	0.00%	\$360,000	\$136.26	-50%	New road to replace existing driveway, severance land buffer zone, assume view not lost	\$68.13	\$ 91,267	IJ is a percentage of value based on desktop review of anticipated effect on balance land.	5%	\$13,437	\$20,000	\$ 10,470	\$0	\$0	\$0	\$5,000	\$5,000	\$2,000	\$7,000	\$ 142,174
1.50	\$360,000	0.00%	\$360,000	\$139.32	-50%	New road to replace existing driveway, severance land buffer zone, assume view not lost	\$69.66	\$ 89,029	IJ is a percentage of value based on desktop review of anticipated effect on balance land.	5%	\$13,549	\$20,000	\$ 10,258	\$0	\$0	\$0	\$5,000	\$5,000	\$2,000	\$7,000	\$ 139,835
1.50	\$360,000	0.00%	\$360,000	\$150.63	-50%	New road to replace existing driveway, severance land buffer zone, assume view not lost	\$75.31	\$ 80,489	IJ is a percentage of value based on desktop review of anticipated effect on balance land.	5%	\$13,976	\$20,000	\$ 9,446	\$0	\$0	\$0	\$5,000	\$5,000	\$2,000	\$7,000	\$ 130,911
1.50	\$360,000	0.00%	\$360,000	\$153.98	-50%	New road to replace existing driveway, severance land buffer zone, assume view not lost	\$76.99	\$ 93,733	IJ is a percentage of value based on desktop review of anticipated effect on balance land.	5%	\$13,313	\$20,000	\$ 10,705	\$0	\$0	\$0	\$5,000	\$5,000	\$2,000	\$7,000	\$ 144,751
1.50	\$360,000	0.00%	\$360,000	\$183.58	-50%	New road to replace existing driveway, severance land buffer zone, assume view not lost	\$91.79	\$ 53,461	IJ is a percentage of value based on desktop review of anticipated effect on balance land.	5%	\$15,327	\$20,000	\$ 6,879	\$0	\$0	\$0	\$5,000	\$5,000	\$2,000	\$7,000	\$ 102,667
1.50	\$420,000	0.00%	\$420,000	\$195.08	-50%	New road to replace existing driveway, severance land buffer zone, assume view not lost	\$97.54	\$ 42,314	IJ is a percentage of value based on desktop review of anticipated effect on balance land.	5%	\$18,884	\$20,000	\$ 6,120	\$0	\$0	\$0	\$5,000	\$5,000	\$2,000	\$7,000	\$ 94,318
1.50	\$315,000	0.00%	\$315,000	\$232.82	0%		\$232.82	\$ 67,135	IJ is a percentage of value based on desktop review of anticipated effect on balance land.	5%	\$12,393	\$20,000	\$ 7,953	\$0	\$0	\$0	\$5,000	\$5,000	\$2,000	\$7,000	\$ 114,481
1.50	\$420,000	0.00%	\$420,000	\$205.88	0%		\$205.88	\$ 28,548	IJ is a percentage of value based on desktop review of anticipated effect on balance land.	5%	\$19,573	\$20,000	\$ 4,812	\$0	\$0	\$0	\$5,000	\$5,000	\$2,000	\$7,000	\$ 79,932
																					\$4,118,660
																					\$825,000
																					\$4,943,660
																					\$1,235,914.99
																					\$1,235,914.99
																					\$2,471,829.98
																					\$7,415,489.94

Appendix R Safety in Design



DESIGN WITH COMMUNITY IN MIND

Communities are fundamental. Whether around the corner or across the globe, they provide a foundation, a sense of place and of belonging. That's why at Stantec, we always design with community in mind.

We care about the communities we serve—because they're our communities too. This allows us to assess what's needed and connect our expertise, to appreciate nuances and envision what's never been considered, to bring together diverse perspectives so we can collaborate toward a shared success.

We're designers, engineers, scientists, and project managers, innovating together at the intersection of community, creativity, and client relationships. Balancing these priorities results in projects that advance the quality of life in communities across the globe.

Stantec trades on the TSX and the NYSE under the symbol STN.
Visit us at stantec.com or find us on social media.

Stantec Building, Level 15, 10 Brandon Street, Wellington 6011
PO Box 13052, Christchurch 8141
Tel +64 4 381 6700 | www.stantec.com

