

Mahurangi Land Restoration Programme

Te Muri Sub-Catchment Action Plan 2023



Photo by H. Fleming 2022

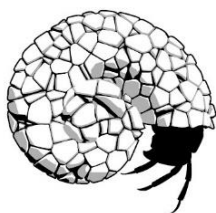
The purpose of this plan is to describe the unique environment, land use, and risks in the Te Muri Sub-catchment. It also links these with the actions and milestones achieved to engage the community and reduce sediment loss across this sub-catchment and the wider Mahurangi Harbour Catchment.

The Te Muri Sub-catchment Action Plan forms part of a series covering the sub-catchments of Mahurangi Harbour, produced under the Mahurangi Land Restoration Programme (MELR). This plan does not in any way serve as an action plan to give effect to the National Policy Statement for Freshwater Management, including Te Mana o te Wai.

Published September 2023



This sub-catchment action plan has been prepared for Auckland Council by Adaptive Environmental Consulting.



Adaptive
Environmental Consulting

*Ko au te awa Mahurangi, ko te awa Mahurangi ko au –
I am the Mahurangi river, the Mahurangi river is me.*

The river is of huge importance to Ngāti Manuhiri who used it as a highway, a food source, and a spiritual home. Our uniqueness and identity as Ngāti Manuhiri is expressed in all the things that we do, that we can see, touch, and hear. Our cultural footprint is underpinned by Manuhiritanga and how we express that through our tikanga and kawa. One of our responsibilities and obligations as Mana Whenua Kaitiaki is to actively protect and enhance Ngā Taonga for the use and benefit of future generations as acknowledged in our governance and management protocols. The name Mahurangi was taken from Motu Mahurangi, an island at the mouth of the Waiwerawera River - important in Ngāti Manuhiri traditions.

At some point in time, the name was re-used to refer to the entire coastal region. Generational occupation is also reflected by the other numerous place names and landmarks that dominate the wider area e.g. Waihē (inner Mahurangi River), Motu Kororā (Saddle Island), the island pā of Maunganui (Casnell Island), Motu Kauri (Grant's Island), Puhinui (the waterfalls at Warkworth), and Pukapuka, a kāinga and now the site of a Cemetery which remains at the head of the harbor.

“Ko te iti ō Waihē, he puta kino nui” - Even though Waihē (the disputed waterway) is not large, it has been the cause of great trouble.

The area known today as Warkworth is traditionally called Puhinui after the waterfalls at the head of the Mahurangi River in the centre of town. The Puhinui Falls are wāhi tapu, being of significance to Ngāti Manuhiri. Further south of the falls along the awa (river) are waka landing sites used by the people as they travelled inland from the coast, to kāinga, cultivations or through travel. Many Ngāti Manuhiri tupuna are associated with or known to have occupied this wider area.

The Mahurangi River flows southeast from Puhinui and into the inner Mahurangi Harbour which is known to Ngāti Manuhiri as te Waihē. Te Waihē is navigable for over 10 kilometres inland up to the waterfalls at Warkworth and was a main route inland with several known waka landing sites along the banks. The river itself and the falls are both wāhi tapu. The awa is known to be the resting place of a taniwha, Waawaia, who is a kaitiaki and protector of this wai and of Ngāti Manuhiri.

Historically this inland area was forested (kauri) and was utilized for many resources i.e., snaring forest birds; gathering fruits and berries for food or rongoā (medicine); trapping and gathering tuna (eels), koura, kākahi (freshwater mussels) and waterfowl from the Mahurangi River and its tributaries; felling trees for waka; and harvesting flax for weaving. New sites within Ngāti Manuhiri rohe (tribal area) are still being uncovered today.

Kourawhero (Red freshwater Crayfish) were a valued mahinga kai (cultivated food) species and considered a delicacy by Ngāti Manuhiri. In the past, they were a staple food item in that area. Kourawhero were found in abundance and greatly prized.

Introduction

The MELR is a co-governance project developed by Auckland Council in partnership with the Ngāti Manuhiri Settlement Trust. The project goal is “to increase the mauri of the Mahurangi Harbour and its waterways by achieving measurable reductions in human induced sediment from rural land management activities”.

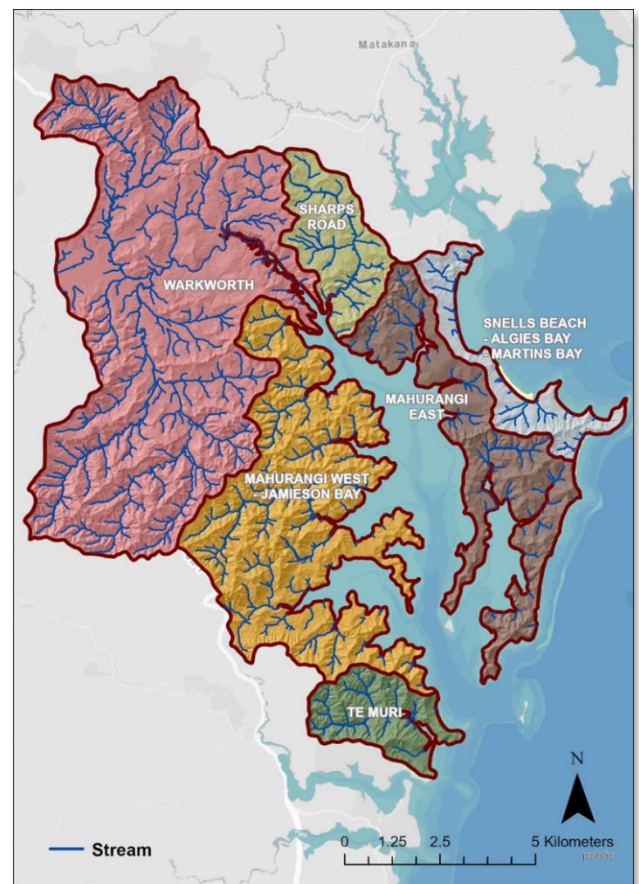
Catchment Description

The Te Muri sub-catchment (SC) encompasses the Mahurangi River catchment. It is one of six sub-catchments that form the wider Mahurangi catchment centering around te Waihē - the Harbour.

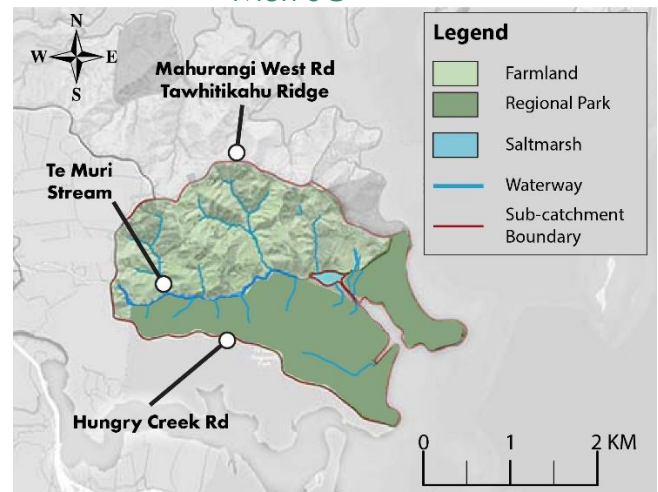
The sub-catchment covers 647 ha and is situated between Mahurangi West Road to the north and Hungry Creek Road to the south. Approximately 47% of the SC is managed under national or regional parkland, including Te Muri regional park and part of Mahurangi regional park. Auckland Council has been monitoring rainfall and temperature at Te Muri since November 2013. The average summer to winter temperatures range from 18.5°C and 10.8°C, respectively and the catchment receives approximately 1,432mm of rainfall annually. Elevation ranges from sea-level at the harbour margin to 149 m at Mahurangi West Road, which forms part of the Tawhitikahu Ridge. Te Muri SC is steep with 65% of the land ≥ 20 degrees.

Te Muri SC has 14.8 km of permanently flowing streams and 7.2 km of harbour margin. Te Muri O Tarariki stream forms the main waterway in the sub-catchment. Te Muri O Tarariki stream flows into an intertidal wetland which

Map 1 – MELR Sub-catchments



Map 2 – Topographic Map of Te Muri SC



provides an important habitat for fish as well as wetland and wading birds.

Bedrock, Soils and Slope

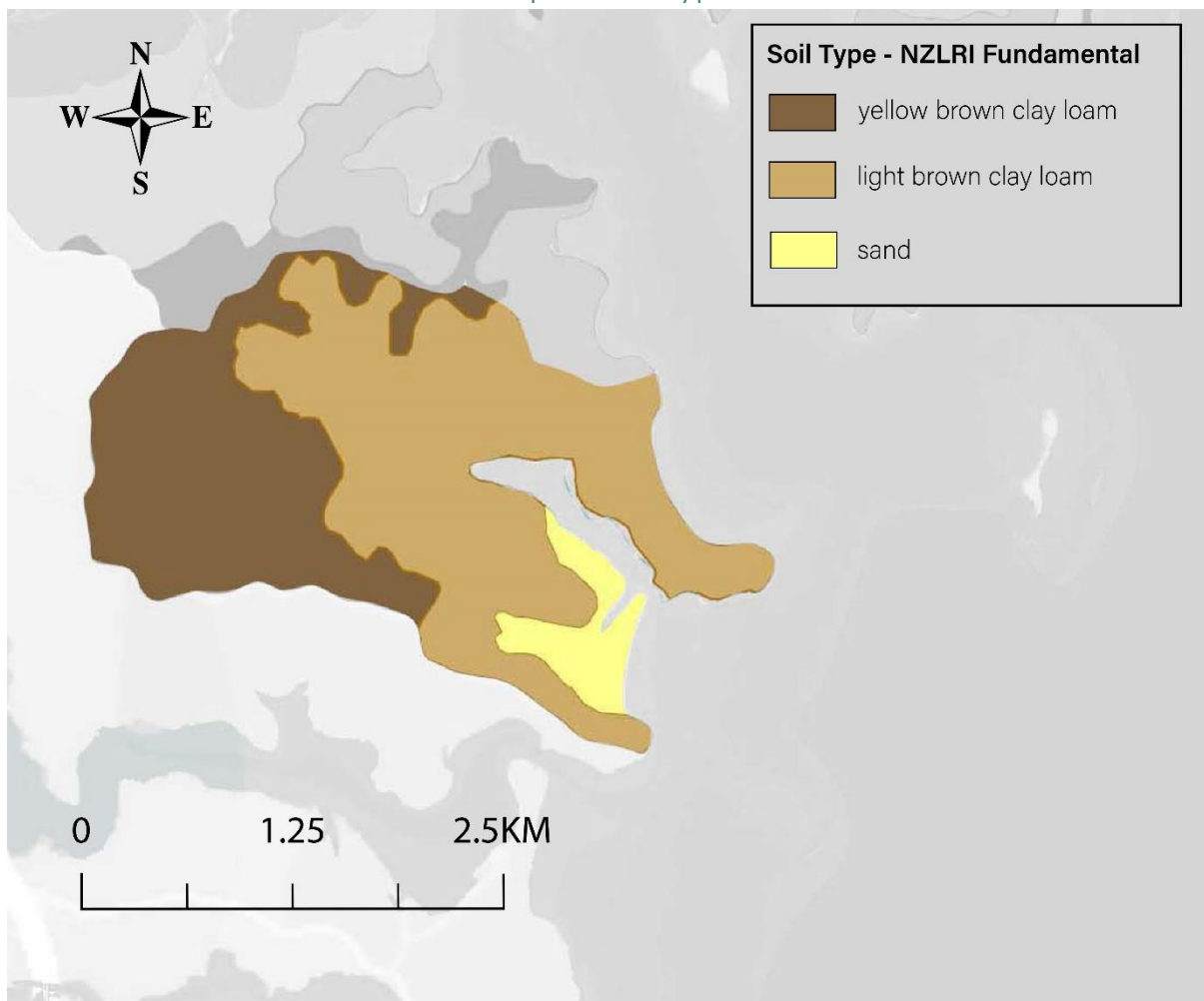
The catchment is dominated by Waitemata interbedded sandstone and siltstone (91%). Alluvial rock (8%) and beach deposits (1%) make up the remainder. The rocks are relatively young and of marine origin, formed between 11.6 to 5.3 Ma during the late Miocene period. These rocks are classed as weak bedrock and are subject to gully and slip erosion.

The main soil types are Puhoi light brown clay loam (56%) and

Whangaripo clay loam (37%). The remainder is Whakapara sand (6%). The soil types are predominantly strongly weathered and poorly drained and as such can become waterlogged and prone to pugging (Map 3).

The catchment is very steep with just over half the catchment (51%) classed as steep to near vertical land (≥ 25 -35 degrees) and 40% classed as moderately steep to rolling (8-25°). Only 9% of the SC is classed as flat to undulating (0-7°) (Map 4).

Map 3 - Soil Type



Map 4 – Slope

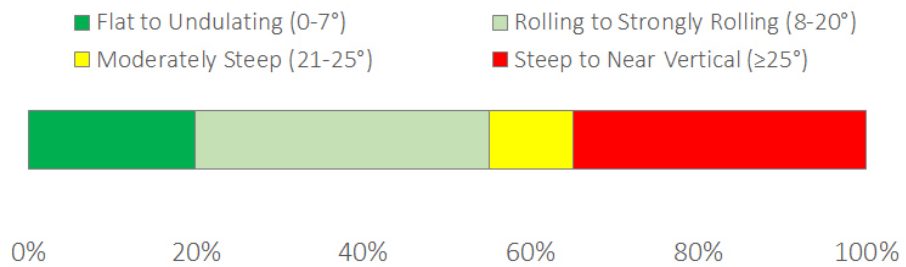
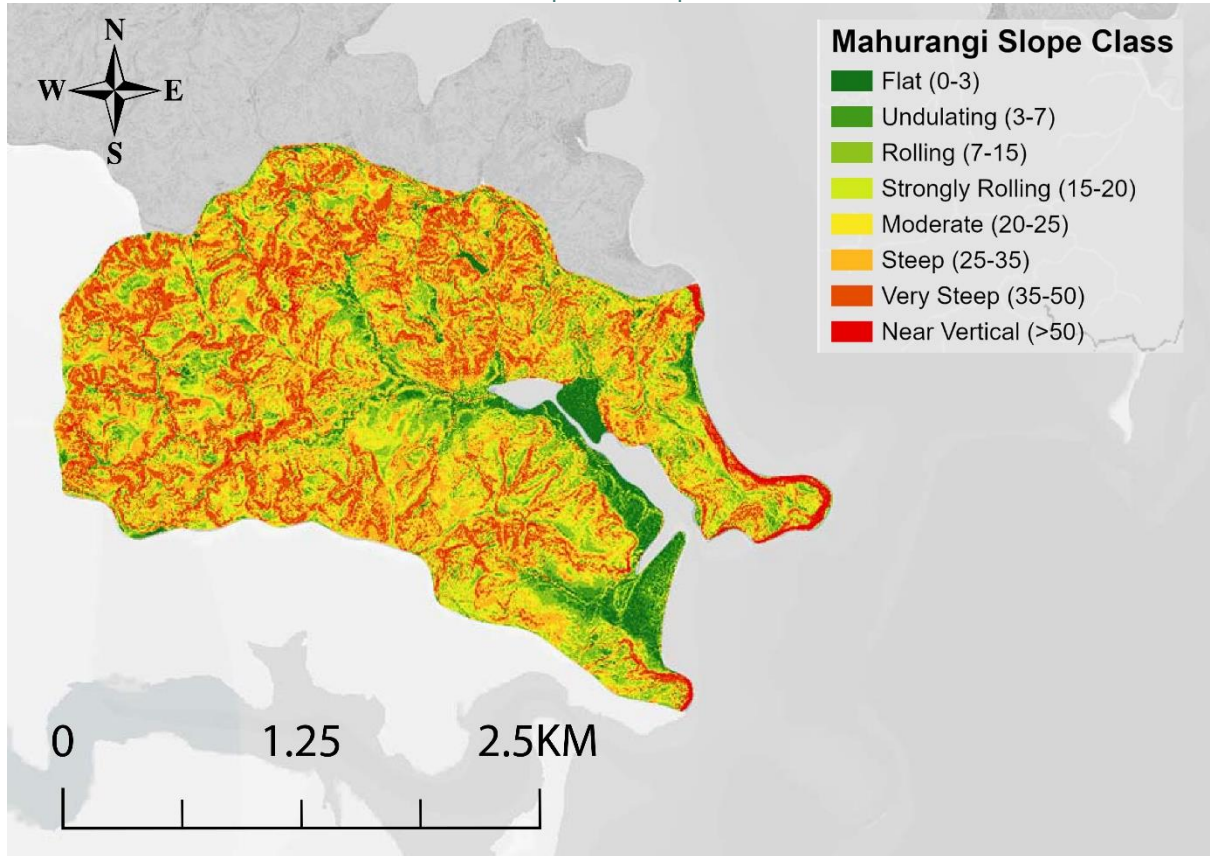
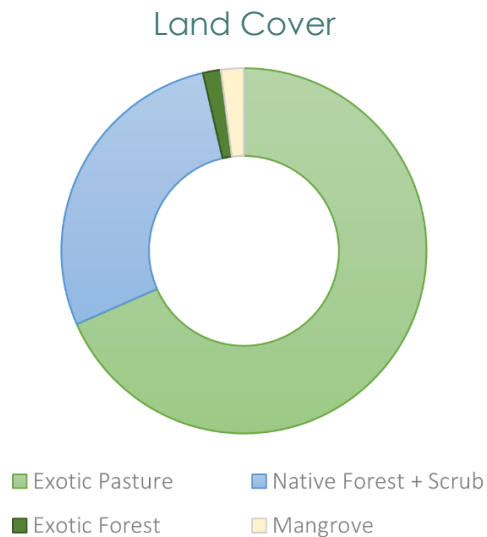


Photo showing surface erosion on hill country, exacerbated by cyclones in summer 2023

Land Use

Drystock farming (sheep and beef cattle) is the main land use in the catchment and the dominant land cover is exotic pasture (437ha), accounting for 68% of the total catchment area. Just under a third of Te Muri (28%) is under indigenous forest and scrub (179ha) followed by mangroves and coastal wetlands (13ha) with a small amount under exotic forest (10ha) each accounting for 2% of the total catchment area.



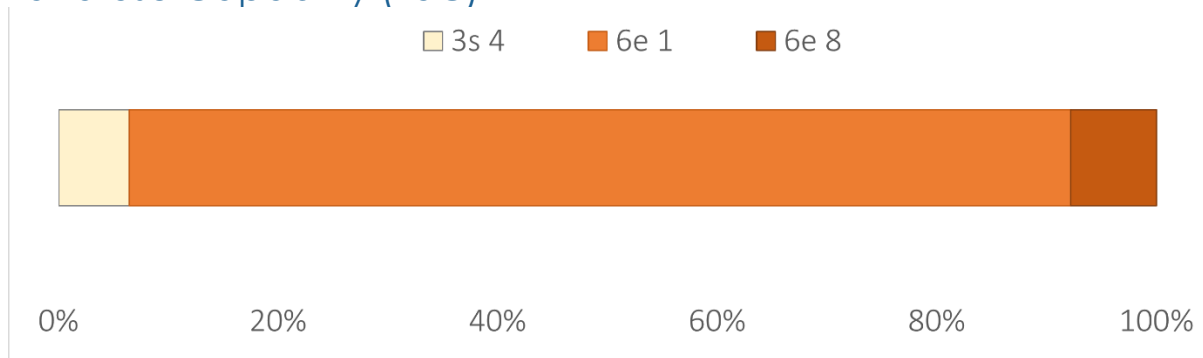
Changing Land Cover - Te Muri Regional Park has significant areas managed under low intensity drystock farming. Over the last seven years, approximately 100 ha of steep, erosion-prone land has been retired from grazing and planted in mixed native vegetation. This land use change is not well represented by national land cover data but is clearly visible from in the below satellite imagery of a Te Muri Stream tributary.





Photos from Te Muri Regional Park showing livestock grazing outside retired gullies.

Land Use Capability (LUC)



LUC land use limitations table

Table from Harmsworth (1996)

↓ Increasing limitations to use ↓	LUC Class	Arable cropping suitability†	Pastoral grazing suitability	Production forestry suitability	General suitability
	1	High ↓ Low	High ↓ Low	High ↓ Low	Multiple use land
	2				
	3				
	4				
	5	Unsuitable	Low ↓ Unsuitable	Low ↓ Unsuitable	Pastoral or forestry land
	6				
	7				
8	Unsuitable	Unsuitable	Unsuitable	Conservation land	

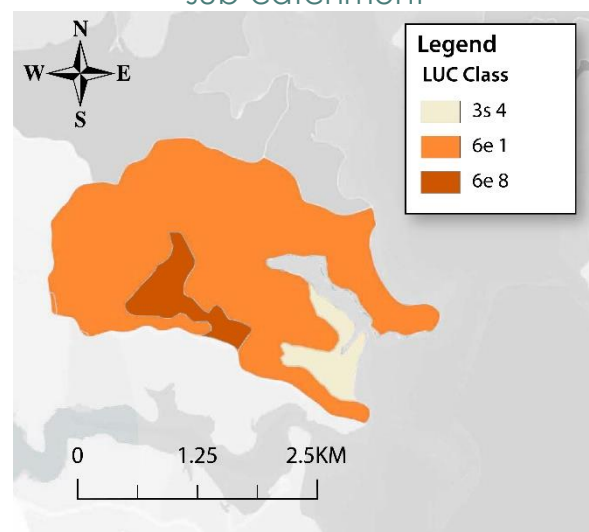
Managing land sustainably and within its natural limitations allows the productive potential of the land to be realised whilst simultaneously reducing erosion and maintaining healthy waterways. Land use capability (LUC) is a classification system of the lands productive potential in consideration of its inherent limitations. Classification is assessed using five physical factors; rock type, soil type, slope, erosion type and severity, and vegetation cover. It comprises eight classes of land (1 to 8) with higher numbers indicating greater land use limitations, see the LUC limitations table above.

The dominant land use capability in Te Muri is 6e1 (86%) followed by 6e8 (8%), then 3s4 (6%). According to the land use limitations table 6e1 and 6e8 are generally suited to low-intensity pastoral or forestry production, given the following

limitations. LUC 6e1 is classed as strongly rolling to moderately steep land (21° - 25°) on sedimentary hill country. LUC 6e8 is classed as moderately steep to steep land (21° - 35°) on interbedded and massive sandstone and mudstone hill country. Both LUCs are associated with Ultic and Brown soils and the main limitation is erosion. Key types of erosion include, tunnel gully, gully, earthflow, earth slip, sheet, slump and soil slip erosion (Manaaki Whenua, 2023).

LUC 3s4 is associated with flat to undulating swale and interdune sandplains and is subject to drying and has the potential for slight wind erosion if soils are exposed (Manaaki Whenua, 2023).

Map 6 – Land Use Capability (LUC) sub-catchment



Key Catchment Risks and Restoration Actions

Based on the local geology, slope, climate and land use, the main contaminant risk in the Te Muri SC is sediment. Land use and management practices have the potential to either mitigate or exacerbate contaminant loss. Controlling livestock access to waterways, retiring and planting riparian margins and steep, erosion-prone slopes, and having well designed and maintained farm infrastructure (water troughs, stream crossings, tracks and laneways) are key actions to target sediment loss.

Monitoring in Te Muri SC

Te Muri SC has two freshwater monitoring sites, established in 2014, TM Upper and TM Lower. Both sites are situated along a tributary of the Te Muri Stream within Te Muri Regional Park, as shown on Map 7.

Sediment loss (aka yield) during storm events is monitored at TM Lower. The site is one of eight streams monitored for sediment loss during storm events across the Auckland Region. Sediment is measured continuously during “storm events” in the stream by automatic samplers as described by (Hicks, et al., 2021). The tributary is fully stock excluded and is planted with native plants which are becoming established. Monitoring at Te Muri stream seeks to measure the effects of stock exclusion on sediment loss on moderately steep rural land.

Between 2014 and 2019 Te Muri stream lost 172 tonnes of sediment per km² of catchment area per year. This was the highest rate of sediment loss of all the 8 catchments in the regional sediment event monitoring programme. The high sediment yields recorded at Te Muri

coincided with several consecutive years of higher-than-average rainfall from 2016 to 2018 (Hicks, et al., 2021).

Freshwater macroinvertebrates and stream habitat are monitored at both sites. Freshwater invertebrates are widely used indicators of ecological health because they respond predictably to physical and chemical changes in their environment. The Macroinvertebrate Community Index (MCI) was developed in New Zealand as a monitoring tool for streams and shallow rivers.

In Te Muri stream median freshwater MCI scores recorded over five years (2015-2019) were ‘Poor’ (D band) at both sites. With less than 10 years of monitoring data, trends over time were not calculated for either site. The % EPT taxa refers to the proportion of taxa in the families Mayflies (Ephemeroptera) Stoneflies (Plecoptera) and Caddisflies (Trichoptera). EPT taxa are generally more sensitive to pollution and land development and are therefore, indicative of healthy and pristine stream environments. The lower site had 4.8% EPT taxa, while the upper site had 6.9% taxa.

Stream habitat, as reflected by Stream Ecological Valuation Scores (SEVs), are also measured at each site. SEV scores range from 1 to 0 with higher numbers reflecting more pristine habitats. Stream ecological valuations for the two sites had similar scores and were both graded as fair. The lower site had a median 5-year score of 0.47, which was slightly higher than the upper site which had a median 5-year score of 0.43.

Auckland Council freshwater monitoring results are presented in Tables 1 and 2 and Map 7.

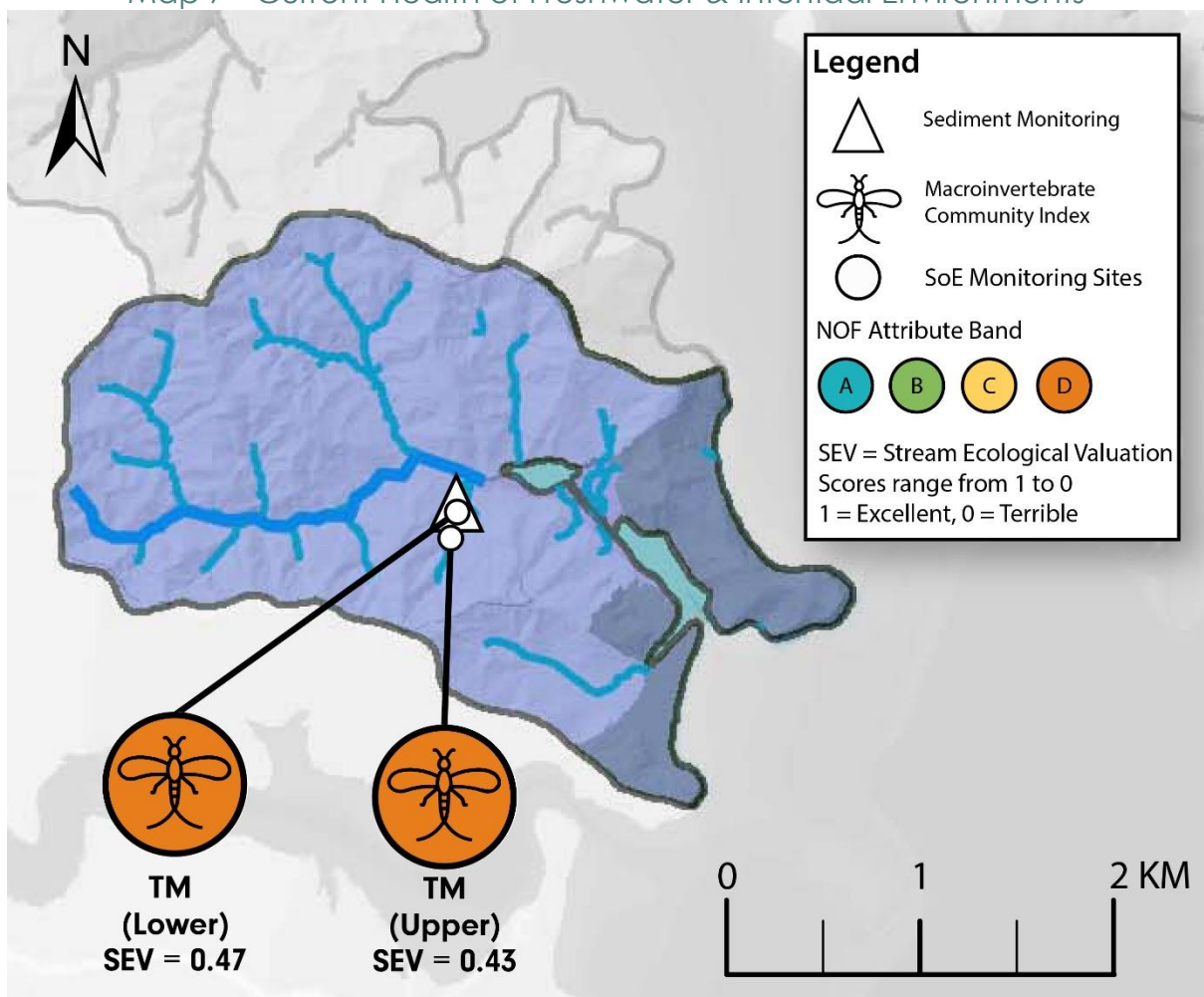
TABLE 1. AUCKLAND COUNCIL STATE OF THE ENVIRONMENT MONITORING – FRESHWATER INVERTEBRATES

Site Name	Year First Sampled	Number of Taxa	% EPT Taxa	Freshwater Invertebrate (MCI)	
				5-year Median (2015 – 2019)	Attribute Band
TM Lower	2014	27	4.8%	78.6	D
TM Upper	2014	25	6.9%	70.9	D

TABLE 2. AUCKLAND COUNCIL STATE OF THE ENVIRONMENT MONITORING – STREAM ECOLOGICAL VALUATION (SEV)

Site Name	Main Land Cover	Upstream Catchment Area (km ²)	Year First Sampled	Overall SEV Score out of 1	
				Median (2015 – 2019)	Grade
TM Lower	Rural, Pasture (94%)	0.3	2014	0.47	Fair
TM Upper	Rural, Pasture (93%)	0.2	2014	0.43	Fair

Map 7 - Current Health of Freshwater & Intertidal Environments



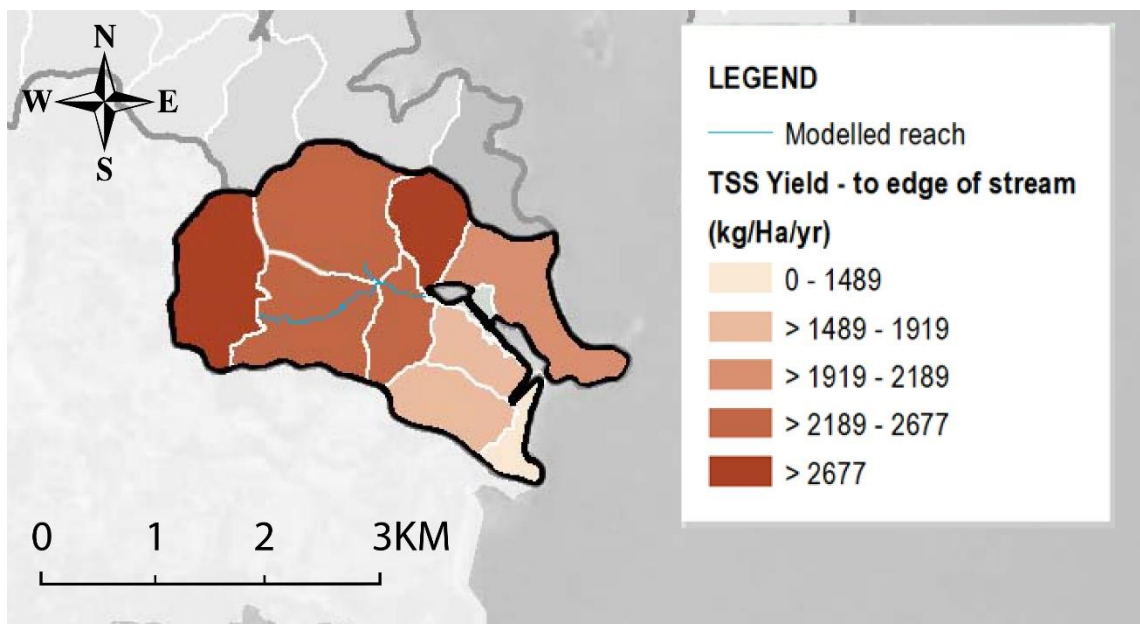
Freshwater Management Tool

The Freshwater Management Tool (FWMT) has been designed by Auckland Council to support decision-making, community engagement and integrated catchment management throughout the Auckland region. The tool can estimate contaminant loads by processing information from landscape characteristics, rainfall, river flow and freshwater monitoring data. Sediment yield across Te Muri is estimated to be greatest (>2,677

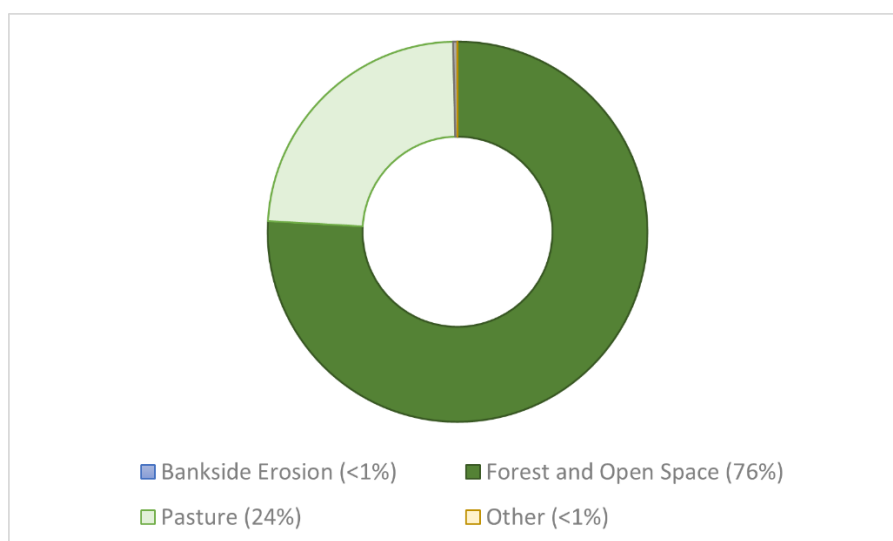
kg/Ha/yr) in the west and north east of the catchment.

Te Muri has the fourth highest estimated average annual sediment yield (799 tonnes/km²/yr) of all sub-catchments surrounding the harbour. In relation to land cover, forests and open space accounts for the highest sediment contribution (76%) followed by pasture (24%) with a small amount attributed to bank erosion and other sources (<1%).

Map 8 - Estimated Sediment Yield Across Te Muri



Estimated Average Annual Sediment Load by Land Cover (Tonnes/year)



What Are We Doing About It?

The MELR team is working with mana whenua, private landowners and the wider council family to identify positive actions to reduce sediment loss and enhance the mauri of the catchment. Key actions being taken include:

- Excluding livestock from waterways, erosion prone gullies and slopes.
- Establishing permanent native vegetation cover.
- Protecting and enhancing natural wetlands.
- Funding alternative stock water supply on farms.
- Retiring critical sediment source areas on farms.
- Removing barriers to native fish migration.
- Implementing a catchment-wide monitoring programme to track our progress and learn as we go.
- Mitigating stream bank erosion

Cultural Monitoring and Tikanga Māori

Relates to the mauri of the awa and its taonga species. Acknowledges the natural rhythms of maramataka and mahinga kai. Weaves together knowledge from pūrākau and te ao

mārama with scientific methods by applying the appropriate scientific tools and methodologies.

Landowner and Community Engagement in Mahurangi West

As at the end of 1 July 2023, 378 landowners have been engaged in the catchment work and of these, 33 landowners have received additional advice or support to identify restoration opportunities. To date 29 funding agreements have been signed, resulting in the completion of 15 restoration projects on private land. This funding has contributed to 7,800 m of stream and 33 ha of land protected. At the time of writing 114,492 native plants have been planted and 8.3 km of fencing has been completed on private land.

As of 1 July 2023, 100% of community groups and 75% of schools were supported through the funding of planting days on parkland across the wider Mahurangi catchment. To date, MELR Programme support has contributed to the enhancement of 9 ha of land by planting 55,250 native plants within Regional and Local parkland across the catchment.

Local Legends – Harjit and Nasha Sidhu



Harjit and Nasha have been grazing sheep and cattle on Kauri Ora Farm since 2018. They also have a horticultural production area. The farm covers 88 ha and they operate a low input system by applying organic and regenerative principles. We caught up with Harjit and Nasha to talk to them about the environmental work they do.

Q. What environmental changes have you seen since farming in the area?

Previously eroded slopes are becoming revegetated and the shelterbelts we've planted around the farm are maturing.

Q. What achievements are you most proud of on the farm?

We're proud of the sheer number of native trees (20,000+) we've planted in a short time and appreciate the support and funding we've received to help achieve this.

Q. What inspires you to protect waterways and what benefits have you observed from doing this work?

Most of the farm had been deforested in the past to create pastures. The remnant areas of native bush are lush and full of life. We've seen kōura, eels and whitebait (kōkopu) in the forested streams. This inspires us to restore the native biodiversity.

Even just by fixing gaps in fences without necessarily planting, the livestock are no longer entering the forest and the undergrowth is growing again. We hope that by doing this work, our food production area will be more sheltered from wind, and we will have cleaner water to grow healthy food.

Q. How has getting involved with the MELR project helped you to achieve your environmental goals on the farm?

Without advice and funding from the project, we would not have been able to plant the number of native trees or build the amount of new fencing that we have. We hope that by doing this work, the biodiversity and ecosystem services on the farm will increase and help us produce nutritious food for ourselves and the community in a way that is harmonious with the natural environment.

Q. Do you have any advice for other landowners who wish to do similar work on their farms?

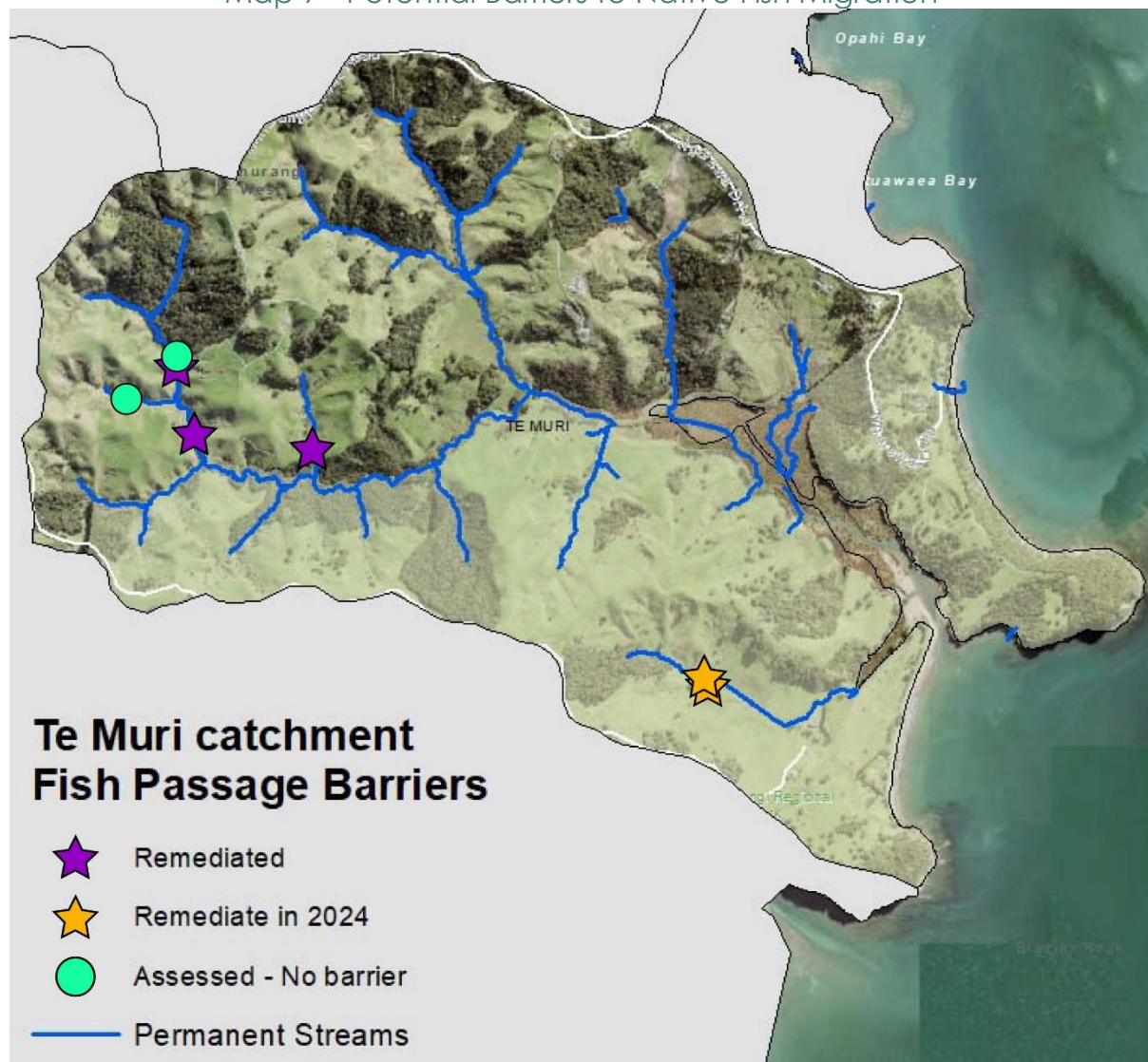
Establishing proper fencing is the first step and priority. Even if you don't plant, the land can regenerate itself naturally by preventing livestock from entering and grazing native bush areas. The project team members we've been working with have also been very helpful in giving advice and guiding us through the entire process.

Barriers to Native Fish Migration

Many of our native freshwater fish species migrate to marine environments to complete their life cycle. Navigating their way up or downstream can be hampered by structures like perched culverts, weirs or undersized pipes with high velocity water flow. These can act as barriers, preventing fish migration. A desktop analysis was conducted in 2022 to

determine potential barriers to native fish migration. In total 7 potential barriers to fish migration were identified from aerial imagery. 5 barriers were identified during a ground survey of stream reaches in the catchment. Three barriers have been remediated using artificial fish ramps to mitigate a drop at perched culverts and two barriers will be remediated in 2024. The below map below provides the location of potential, identified and remediated barriers in the Te Muri SC.

Map 9 - Potential Barriers to Native Fish Migration



Stream Channel Restoration Project

A stream in Te Muri Regional Park has been identified for remediation to address stream bank erosion and enhance ecological habitat. The Te Muri Regional Preliminary Planning Assessment (Malcon, 2022) proposes to remediate approximately 400m of stream with the following goals:

- Improve instream habitat for fish and other aquatic life
- Reduce the occurrence of stream bank erosion
- Restore the natural character of the tributary by remaindering and creating different instream habitats (e.g. runs, riffles and pools).
- Improve recreation opportunities for the public to interact with and enjoy the stream.

The concept design and principles are shown in Figure 1, below.

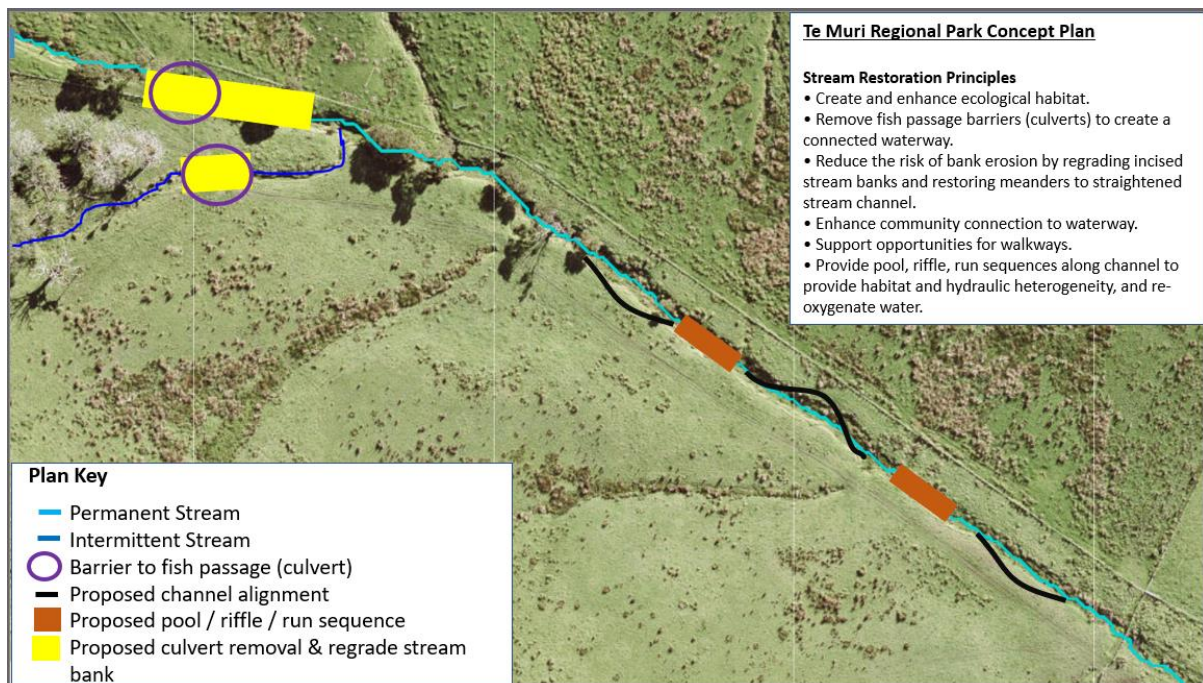


Figure 1. Concept for stream channel restoration in Te Muri Regional Park. Sourced from Te Muri Regional Park Preliminary Planning Assessment, Jacobs T. Malcon (2022)

Te Muri Regional Park

The content of this section has been summarised from the Regional Parks Management Plan (2022).

Te Muri Regional Park covers 444 ha, extending 3km inland from Te Muri Beach and is bounded by Te Muri-ō-Tarariki Stream (Te Muri Stream) in the north and the Pūhoi River to the south. About one third of the park is managed farmland grazed by approximately 600 head of sheep and 30 head of cattle. Farm management aims to provide a source of income to the park alongside the protection of the numerous cultural heritage sites in the landscape and enhancing the natural environment. This involves running lighter livestock, keeping stock off sensitive sites during wetter months

and permanently retiring erosion-prone areas and waterways from grazing and establishing native plants in these areas.

Cultural heritage

The park contains many significant and highly valued cultural heritage sites, including several prominent and well preserved pā, undefended kāinga / settlements sites and the historic Te Muri urupā / cemetery where both Māori and Europeans are buried. The urupā was established in the 1860s alongside two tapu / sacred pōhutukawa.

The land has been farmed since the 1820s. Successive generations of the Schischka family farmed the Puhoi block from 1885 until this part of the park was purchased in 2010. The land contains a historic woolshed, a garage, two houses and a small historic cottage on the northern side of the Puhoi River. Archaeological excavation by the council in the vicinity of the Puhoi Cottage found extensive evidence of occupation and use by Māori and later European settlers.

Ecology

The park consists of a mix of regenerating native forest and open pasture, with a central east-west ridge that culminates in a large area of flat land in the east behind the sandy beach. The minor ridges running off the central ridge contain areas of native forest and small woodlots. The valley flats contain several streams and wetlands.

Te Muri has a diverse range of native ecosystems, including coastal pōhutukawa forest, kauri podocarp broadleaf forest, kānuka shrublands, freshwater wetlands, dunes and estuarine areas with mangroves, saltmarsh and salt meadows.

The intact ecological sequence extending from the beach up Te Muri Estuary to the freshwater wetlands in Te Muri Stream is significant. There are few remaining ecological sequences of this quality in the Auckland region. Over 300 plant species have been recorded in the park, of which a handful are nationally or regionally threatened.

The vegetation provides habitat for a range of native birds and reptiles, including forest gecko and copper skink, kererū, morepork, kingfisher, shining cuckoo, fantail, grey warbler, silvereye and tūī. The saltmarshes and wetlands support banded rail, pūkeko, spotless crane and fernbird. Paradise shelduck, swamp harrier, spur-winged plover and welcome swallow occur in the open country. Variable oystercatcher and New Zealand dotterel breed on Te Muri beach. Kakariki, kaka, and kookaburra from the Hauraki Gulf Islands, are also occasional visitors to the park.

Climate change and coastal erosion

Te Muri beach is vulnerable to coastal erosion, exacerbated by sea level rise and increased frequency of storm events. There are many precious cultural heritage sites situated near the coastline including Te Muri urupā / cemetery. Replanting native vegetation and undertaking weed control will enhance and strengthen fragile foredunes.

Targeted Monitoring of Sediment Impacts and Actions Under the MELR Programme

Sediment impacts and actions will be monitored in Te Muri under the MELR programme. Actions implemented under the MELR programme are linked to the programme goal and focus primarily on rural land management opportunities.

Programme Goal

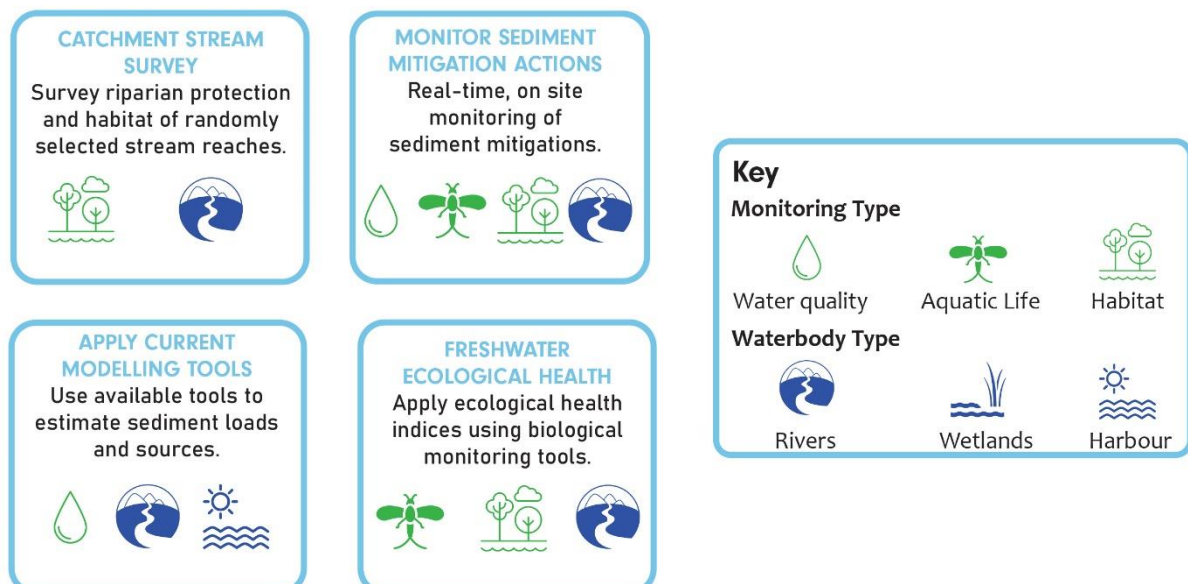
To increase the mauri of Mahurangi Harbour and its waterways, by achieving measurable reductions in sediment from human related activities such as rural land management and urban development, forestry and roading. The programme goal builds on earlier work in the catchment implemented under the Mahurangi Action Plan (MAP).

Research Questions

To determine if sediment actions implemented in the Mahurangi catchment are achieving measurable reductions in sediment derived from rural land, the following research questions have been identified:

1. Is there evidence that sediment actions implemented prior to the MELR programme have reduced erosion and/or sediment transportation rates in the catchment?
2. Are sediment mitigation actions implemented during the MELR programme contributing to a reduction in erosion and/or sediment transportation rates in the catchment?
3. To what degree is bank erosion contributing sediment to the Mahurangi Catchment?

Monitoring Approach & Tools



Actions – Completed Across the Entire Mahurangi Catchment as of 1 July 2023

Actions	Milestones – by June 2026, unless otherwise stated	How we're tracking	Who is involved
Rural private and public land <ul style="list-style-type: none"> Landowner engagement Riparian protection and Riparian planting Community group engagement Regional Parks 	<ul style="list-style-type: none"> 90% of landowners are engaged At least 90% of community groups and Regional Parks are supported to undertake activities that assist the reduction in sediment loss in the catchment 45km of new riparian fencing is constructed with a minimum setback of 3m 250,000 native plants have been planted. 	<ul style="list-style-type: none"> 378 Landowners contacted (100%) 29 Funding agreements signed 15 Projects completed 18 Landowners have completed the engagement survey 8.3 km fencing completed 42.1 ha of land protected 169,742 native plants have been planted 7,800 m waterway protected 100% of community groups have been engaged 50% Regional Parks are supported 75% of Schools are being supported 	<ul style="list-style-type: none"> Landowners Community Groups Auckland Council Ngāti Manuhiri Settlement Trust
Unsealed roads	<ul style="list-style-type: none"> Launch a pilot project using Environmentally Sensitive Maintenance to manage stormwater on up to 500m of unsealed road 	<ul style="list-style-type: none"> Pilot project launched on Ridge Rd towards Scotts Landing. to reduce the amount of sediment entering the harbour. 	<ul style="list-style-type: none"> Auckland Transport MERRA Auckland Council Ngāti Manuhiri Settlement Trust
Small construction sites	<ul style="list-style-type: none"> 100% of small construction sites in the catchment will be compliant with existing regulations to prevent sediment loss from sites 	<ul style="list-style-type: none"> 391 small scale construction sites have been visited by compliance officers. 71% are compliant. 	<ul style="list-style-type: none"> Auckland Council Ngāti Manuhiri Settlement Trust
Forestry	<ul style="list-style-type: none"> 100% of forest landowners in the catchment will be engaged to improve harvest practices 		<ul style="list-style-type: none"> Forestry Landowners Auckland Council Ngāti Manuhiri Settlement Trust
Māori outcomes and cultural monitoring	<ul style="list-style-type: none"> A co-governance agreement is formalized with Ngāti Manuhiri Settlement Trust A cultural monitoring programme is developed and implemented 		<ul style="list-style-type: none"> Auckland Council Ngāti Manuhiri Settlement Trust
Sediment Action Plan & Monitoring Framework	<ul style="list-style-type: none"> A Sediment Action Plan is finalised by 2023 A monitoring programme is implemented to measure the effectiveness of sediment actions 	<ul style="list-style-type: none"> Sediment Action Plan is completed. A catchment wide monitoring and evaluation plan has been drafted. Land-based monitoring programme has been developed & implemented. 	<ul style="list-style-type: none"> Auckland Council Ngāti Manuhiri Settlement Trust

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