

Colville catchment land management resource

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Acknowledgement

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Spatial Information - Waikato Regional Council

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Foreword

Manaakitia te, manaaki te tangata, me anga whakamua
Care for the land, care for the people, Go forward.

Ūmangawha, Cabbage Bay, Colville. This northern catchment's river valleys and bays have been known by various names during human occupation. The area has held cultural and spiritual significance to the mana whenua who have sought safe anchorage in the bay or sought to permanently settle and utilise the various valuable resources in the rohe (area).

Whether it be the collection of kaimoana, the heyday of kauri logging or mining or the more recent opportunities in farming, tourism or community services, the local population's resilience through an ever changing landscape (both social and physical) is very much in evidence.

The Ūmangawha/Colville landscape has seen the most dramatic change within the last century, which has brought both prosperity and loss to the people and the land. The catchment of Colville today is a hub of community groups and individuals working towards the welfare, the maui and the sustainability of both their people and the environment.

This land management resource document is to provide both individuals and community groups with information and connections to current information about the physical landscape, fauna, flora and other key environmental management considerations, to aid them in their aspirations to protect, restore or enhance the Colville catchment.

Rather than duplicate information by writing a sub catchment plan, given several key community groups are already implementing their various programmes within the catchment, Waikato Regional Council has created this resource as a "one stop shop" for information the community may seek to enhance their already successful activities within the catchment or for their own personal knowledge

1 The Colville Catchment

1.1 Introduction

The far north of the Coromandel Peninsula is marked by passing through the catchment and village of Colville. This community is the service centre to the northern most communities of the peninsula. It is the western gateway to the settlements of Waikawau Bay, Port Charles and Port Jackson.

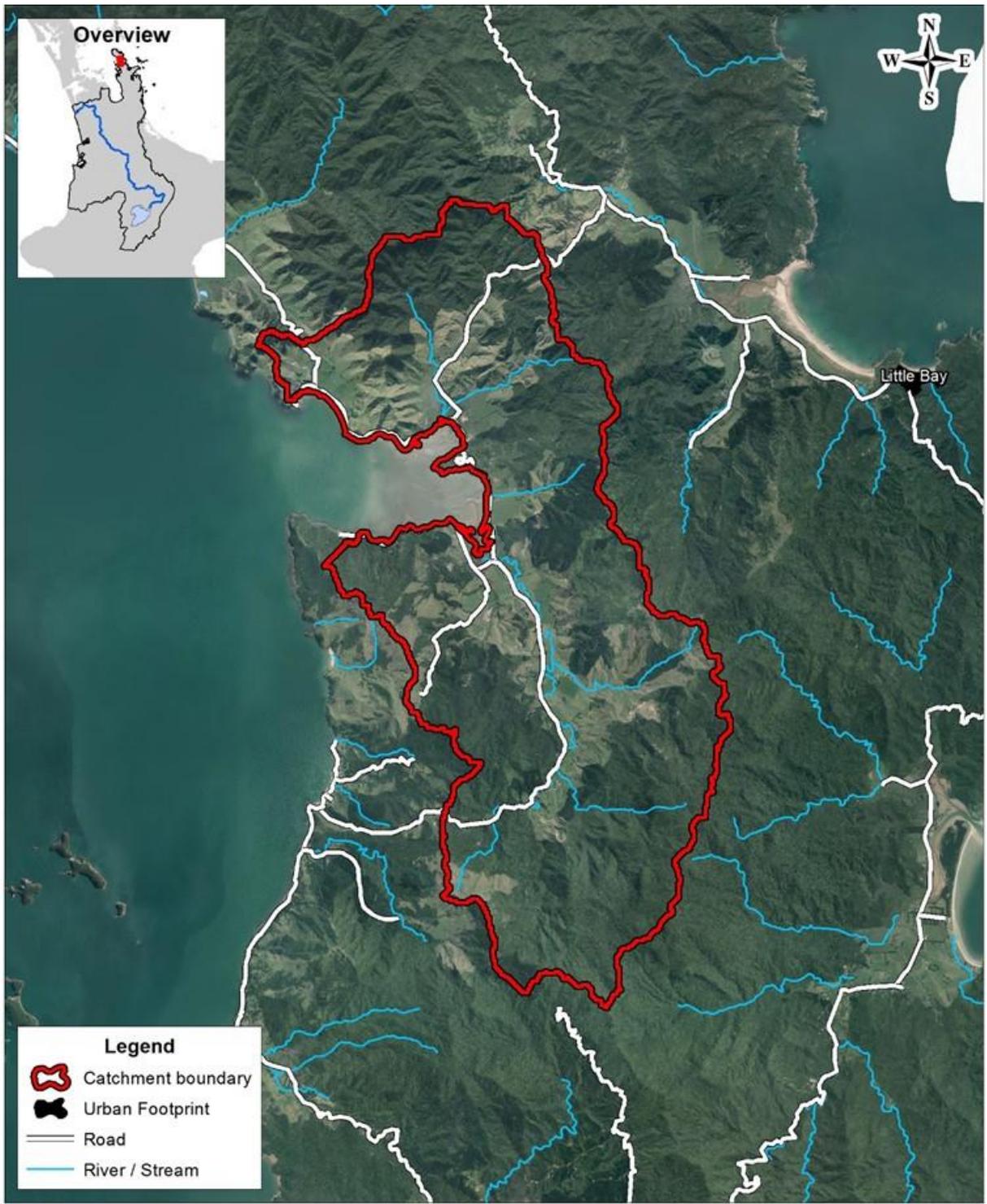
Three main embayment's form the larger Colville Bay. The southern headland is Te Whau Point. The headland of Tokāwhero Point divides Whangaāhei Bay from Colville while Otāutu Bay and Otāutu Point flank the northern limits of the catchment.

The total area referred to in this document is 4313 hectares with the highest point being 541 metres above sea level on the Coromandel Range divide. The "catchment" (geographical area) encompasses all land that drains west from the Coromandel Ranges directly into Colville Bay.



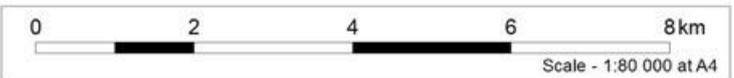
Figure 1. Topographic Map for Colville Area

The main sub-catchments of Colville Bay are Ūmangawha Stream (which includes Ngakuku, Wharetaūa and Wairōre Streams) Kairaūmati Stream, Maurea Stream and Ahiraū Stream. These total approximately to 62 km of stream length.



Aerial Map of Colville Bay Harbour Catchment

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Map 1

1.2 The people

The area has a rich history of human habitation, with early Maori having established numerous Pa sites along this western coast. The large bay was given the name of Te Ūmangawha-o-ngā-waka, *the four waka*, as the bay provided sheltered anchorage for waka travelling along the coast. The bay was also noted for its four distinct channels of the Ūmangawha river delta (which no longer exists).

Ūmangawha is steeped in Māori history... from the first waka that arrived and sought safe harbour a thousand years ago to the hāpū that look after the land, kaitiakitanga (guardianship) is still prevalent today. For further information regarding Iwi and hāpū contact details, contact the Hauraki Māori Trust Board <http://www.hauraki.iwi.nz/>

1.2.1 European settlement

The chart of the H.M.S Coromandel from 1820 had the area named as Cabbage Bay and this is how it was known to European settlers. In 1922 a majority of local residents opted for a name change to the present name of Colville. Captain James Cook had named the northern tip of the peninsula Cape Colville after Admiral Alexander Colville whom he served under, whilst in Canada, though records show Captain Cook never visited Colville Bay itself.

Early European settlers were mainly engaged in the kauri logging industry and mining. The undertaking of large scale tree felling and damming the natural water channels for kauri log transportation has been recorded as the main cause of the Ūmangawha delta's river channels infilling, resulting in its subsequent demise. The significant sediment deposits created by this early European activity are where parts of present day Colville village is situated. Mining for gold ore was also undertaken in this catchment with numerous mines being operated (such as the White Star Mine).

1.2.2 The present

Today the catchment consists of approximately 150 permanent residents. There is a general store in the centre of the village and a local school which has around 30 students a year attending from the wider area. Local industry includes farming, bee keeping, community services, tourist hospitality/activities, a Buddhist centre and a timber saw mill.



Photo 1. The historic Colville General Store.

2 Colville Catchment physical attributes

2.1 How we map physical attributes

Landcare Research NZ Limited maintains a data set known as the New Zealand Land Resource Inventory (NZLRI) that can be applied over areas at a catchment scale (usually a scale of 1:50 000 or greater). This helps to determine what the physical characteristics of that catchment are.

Used in conjunction with this, people who wish to determine the best land management practices can also apply the land use capability (LUC) tool that combines the NZLRI information with the ability or feasibility to cultivate land for pastoral and horticultural use. Classes 1 to 4 are arable land and have the most diverse uses. Classes 5- 8 are non-arable and have decreasing versatility with increase in class number. New Zealand has around half of its land ranked at Class 6 or higher, which is commonly known as extensive or hill country farming when under a pastoral regime.

Refer: http://www.landcareresearch.co.nz/_data/assets/pdf_file/0017/50048/luc_handbook.pdf



Photo 2. A view showing the Colville catchment with its varying land classes – the Ūmangawha river flats (Class 2), hill country pasture (Class 6) and steep lands (Class 7 and 8)

2.2 Geology

Like much of the northern Coromandel Peninsula ranges, the Colville catchment is underlain with a base rock of greywacke formed some 150 million years ago. This has been covered by more geologically recent volcanic rock (Malengreau et al. 2000).

This basement rock of greywacke is a common New Zealand sandstone rock type of many of the main mountain axis such as the Kaimanawa and Ruahine Ranges. It was formed in the Cretaceous period (see Chart One below) and is found from Manaia to the top of the Coromandel Peninsula.

A small area of sedimentary rock from the Paleogene period is also present where the western extent of the catchment is bisected by Colville Road. The NZLRI indicates this is limestone.

The Miocene epoch was when widespread andesite volcanoes were present around the Colville area. Mount Ruapehu is a present day example of an andesite volcano with typical andesitic ash and lava deposits.

These ancient volcanic landforms have been deeply eroded over millions of years, creating the steep and heavily incised landscape we see today. Volcanic tephra (airborne material ejected such as ash) has become weathered over geological time, contributing to the formation of the area's volcanic brown soils.

When the last ice age ended 10 000 years ago, the warmer climate of the Holocene epoch produced the most recent geology. This consists of unconsolidated deposits that dominate the valley floors, stream mouths and foreshores. These are the sands, silts and gravels typical of an active cycle of erosion, deposition and reworking of materials from the older landforms.

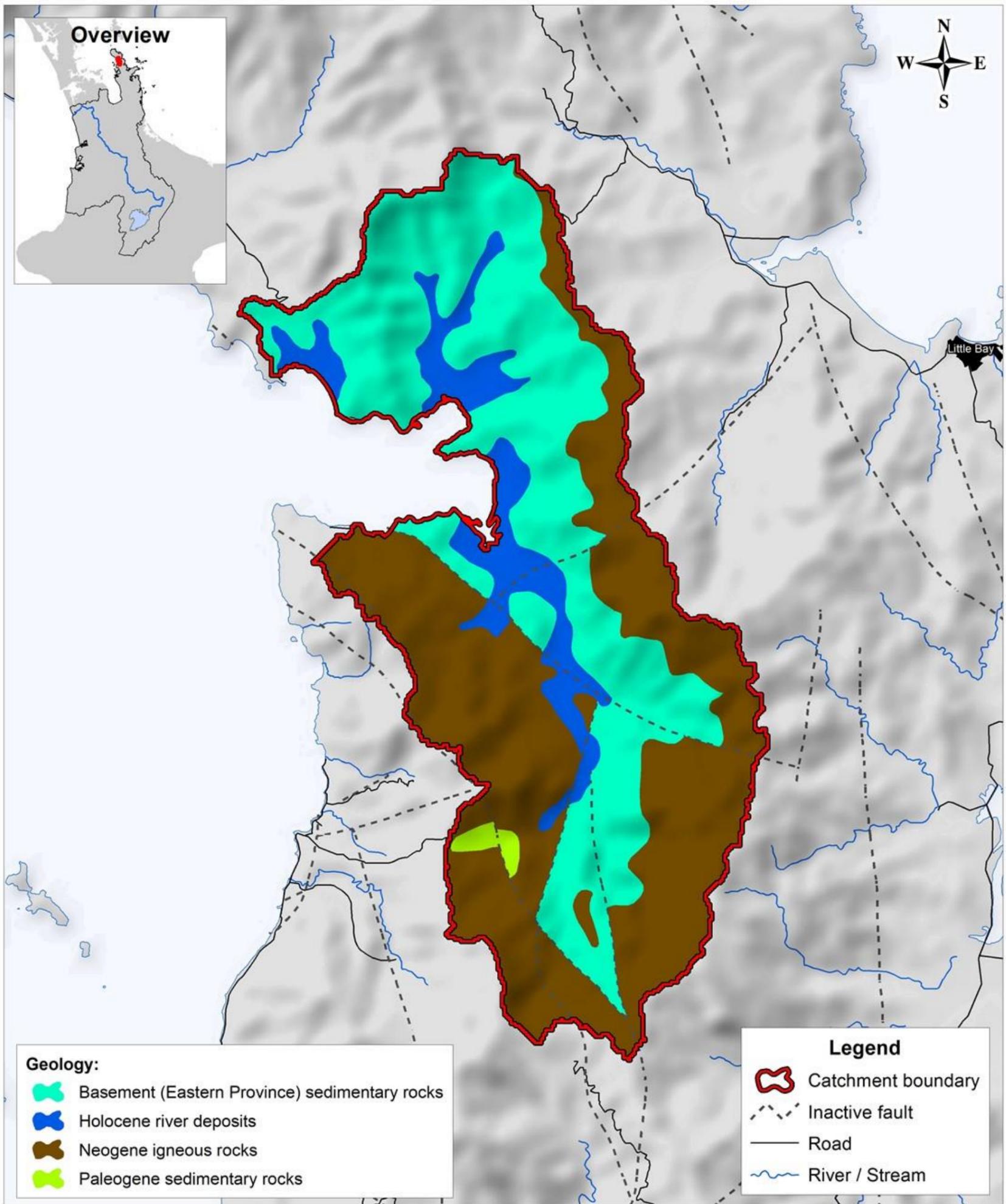
Chart One – Geological Timescales

Geological Period	Million years ago (mya)	Geological Epoch	Colville
Quaternary	Recent to 2.58 mya	Holocene Epoch	Recent - 10 000 ya
Neogene	2.58 to 23 mya	Miocene Epoch	5.33mya - 23 mya
Paleogene	23 to 66 mya		
Cretaceous	66 -152 mya		Early Cretaceous 150 mya

Map 2a. The first geology map shows the broad geological types with reference to their geological age.

Map 2b. Names the more specific geological types within the broader types.
 Colville igneous rock is andesite and tuff (rock formed from volcanic ejections e.g. ash).
 Sedimentary rock is the limestone deposit.
 The Holocene river deposits are the muds.

**Map 2 a & b Geology of Colville Bay Harbour Catchment
 Geology (Main rock) of Colville Bay Harbour Catchment**



Geology of Colville Bay Harbour Catchment

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0 1.5 3 4.5 6 km

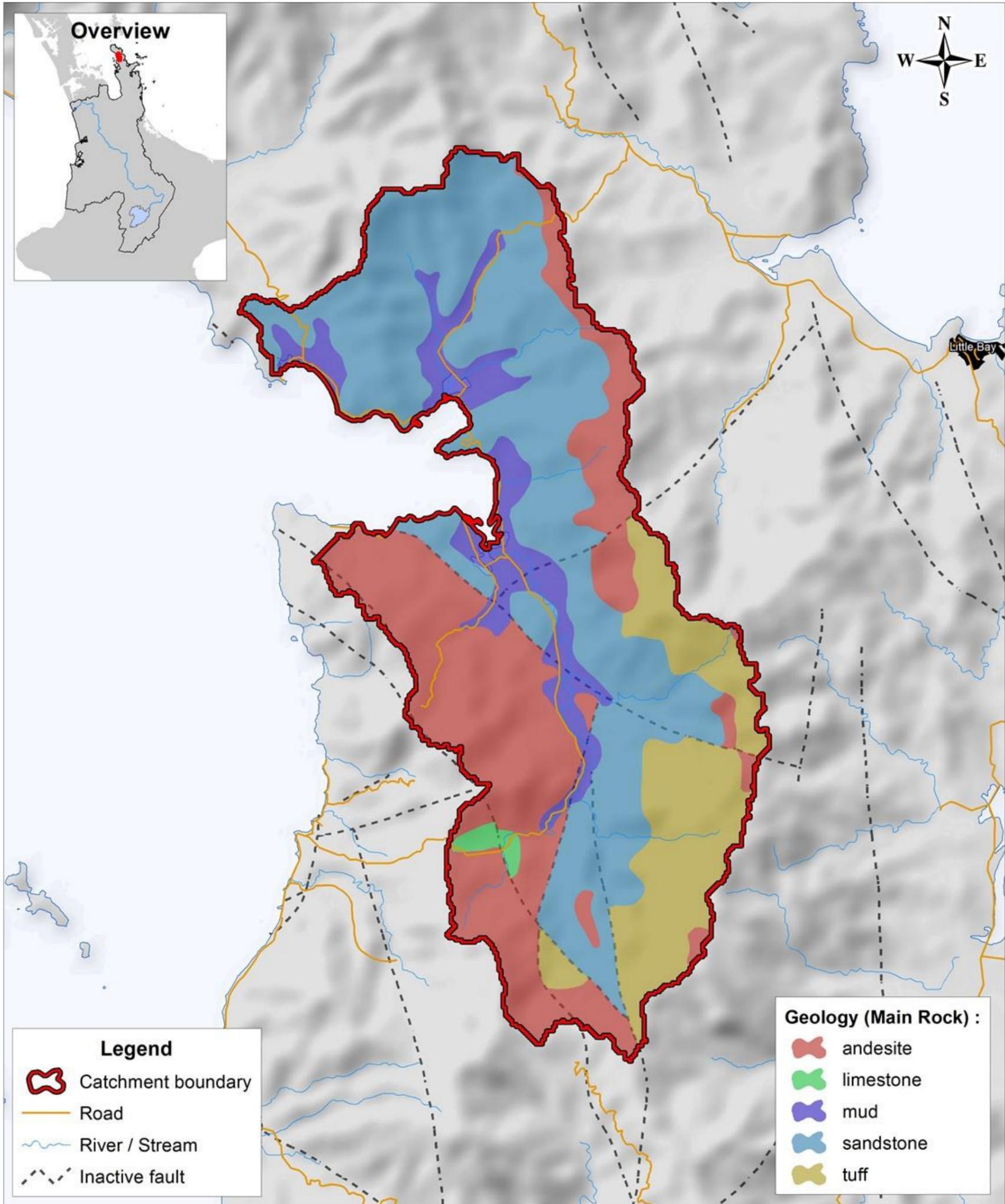
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Geology (Main Rock) of Colville Bay Harbour Catchment

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Map 2b

2.3 Topography

Map 3 Terrain of Colville Bay Harbour Catchment Map

Map 4 Slope Classification of Colville Bay Harbour Catchment

The Colville catchment area is dominated by steep hill country. 59% is ranked as being in the two highest classes for steepness with slopes greater than 26 degrees.

10% is flat to gently rolling and these are the alluvial flood plains (river flats) and 12% is strongly rolling hill country.

Coromandel Peninsula streams are characterised by having steep, short catchments that are usually well within 10km from the upper catchment to the sea. Colville streams are typical of this.

Table 1 Slope Class NZLRI

Slope by Degrees	Hectares	Catchment Percentage
(A) - 0-3 deg - Flat to gently undulating	434.9	10.1
(D) - 16-20 deg - Strongly rolling	511.6	11.9
(E) - 21-25 deg - Moderately steep	804.9	18.7
(F) - 26-35 deg - Steep	2184.8	50.7
(G) - >35 deg - Very steep	360.2	8.4
Total	4296.4	99.8

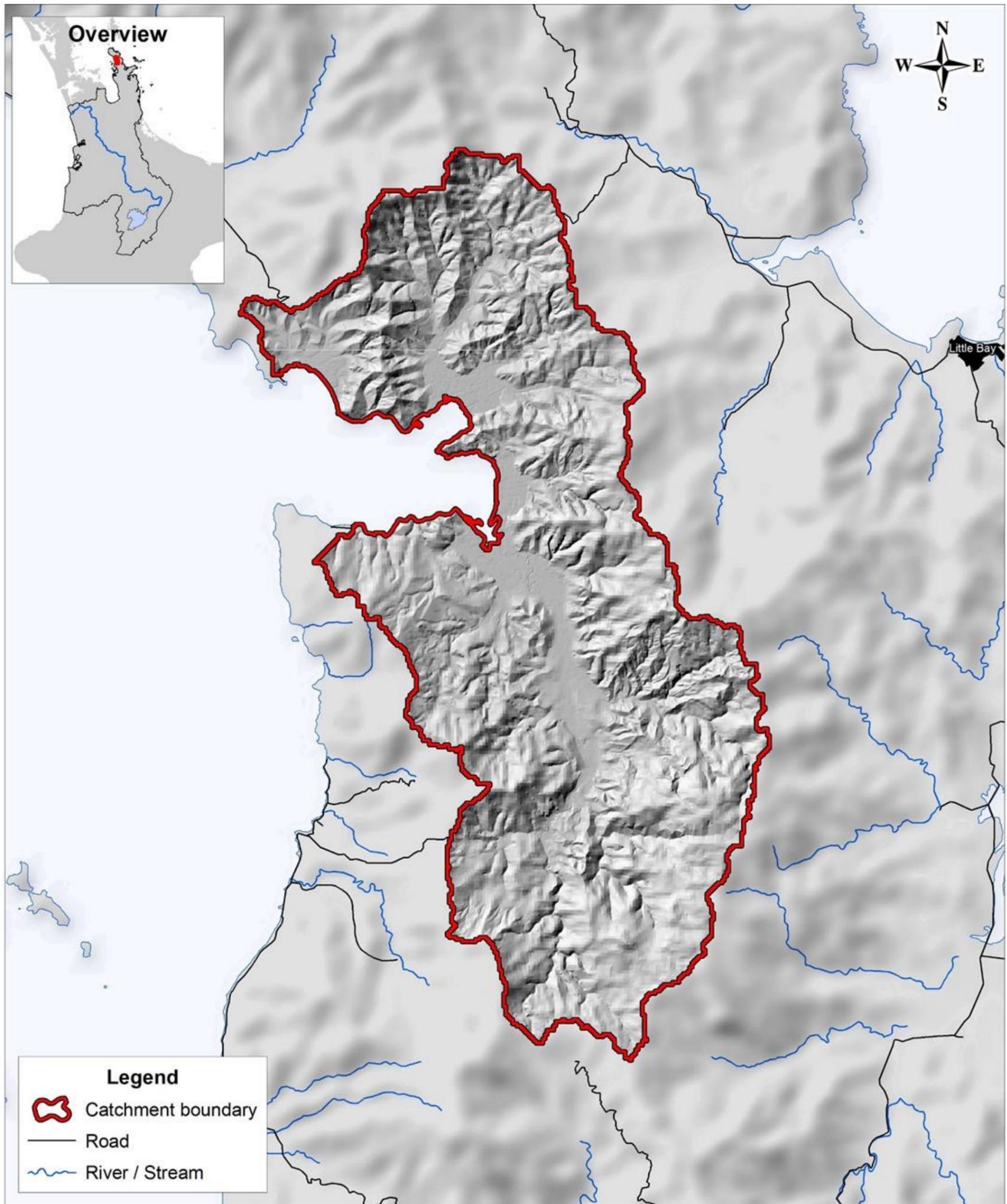
NZLRI data shows that much of the Colville catchment (77.8%) is moderately steep to very steep.

- Land above 21 degrees (classified as steep to very steep - categories E to G) is costly for cultivation and poses difficulties and risks in its management, particularly around soil retention and erosion prevention
- These slopes are rarely cultivated if at all (some pasture renewal may occur)
- Forestry is possible with tracked skidders on slopes up to 26 degrees
- Approximately 10% of the catchment is suitable for ploughing and cultivation without restrictions
- Slopes at 16 to 20 degrees are usually restricted by the number of crop rotations possible on these slopes and therefore lead to longer pasture rotations.¹

Map 5 Contours of Colville Bay Harbour Catchment

Contour maps show the areas of equal land elevation above mean sea level. The map uses intervals of 50 metres between every contour line. The closer the line to the neighbouring ones the steeper the terrain is.

¹ Refer: http://www.landcareresearch.co.nz/_data/assets/pdf_file/0017/50048/luc_handbook.pdf.



Terrain of Colville Bay Harbour Catchment

Created by: KMJ
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 File Name: REQ123648_Land_Form_Terrain_A3.mxd

0 1.5 3 4.5 6 km

Scale - 1:50 000 at A3

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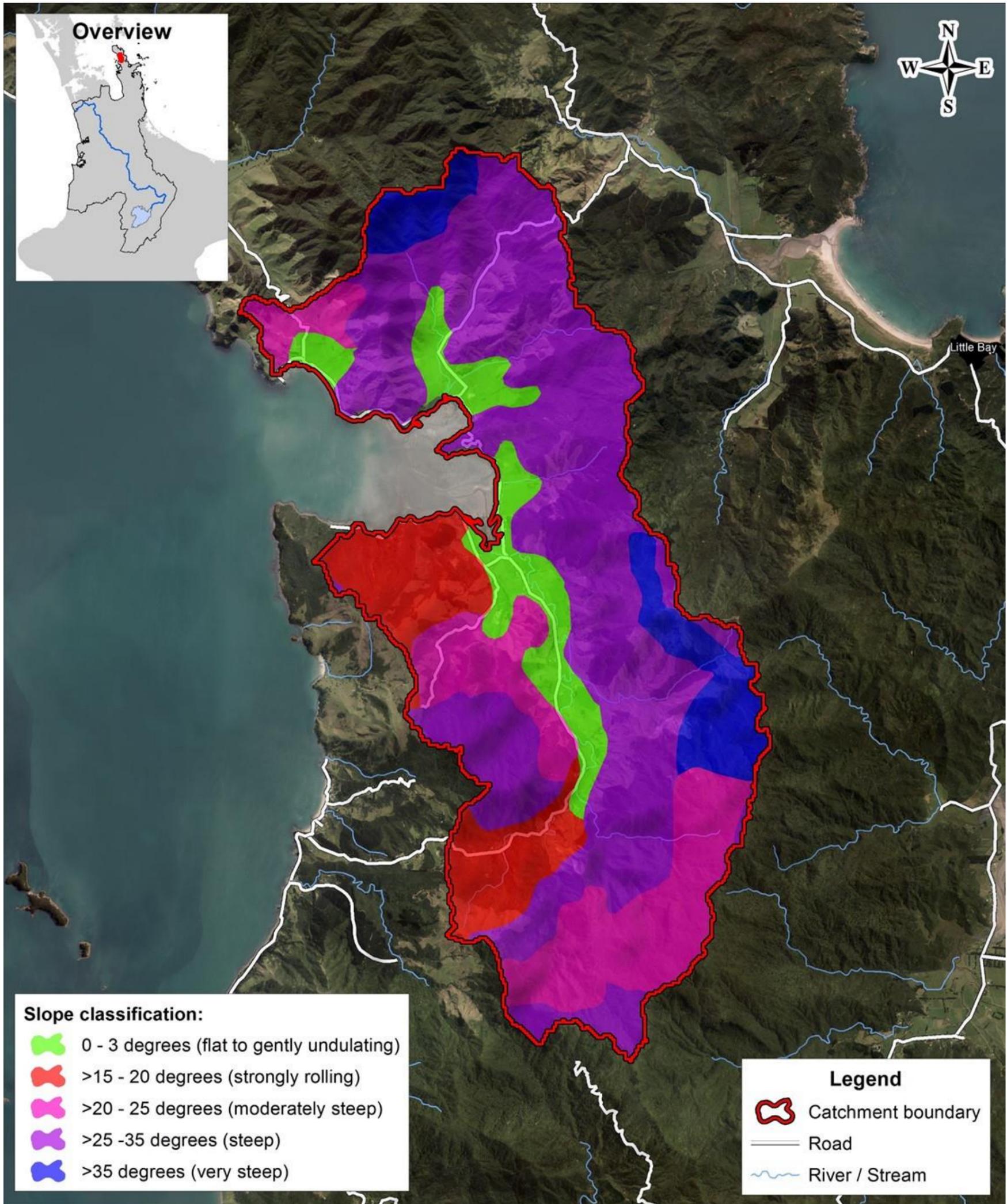
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Map 3



Slope classification of Colville Bay Harbour Catchment

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 REQ123648_Land_Form_Slope_Classification_A3.mxd

0 2 4 6 km

Scale - 1:50 000 at A3

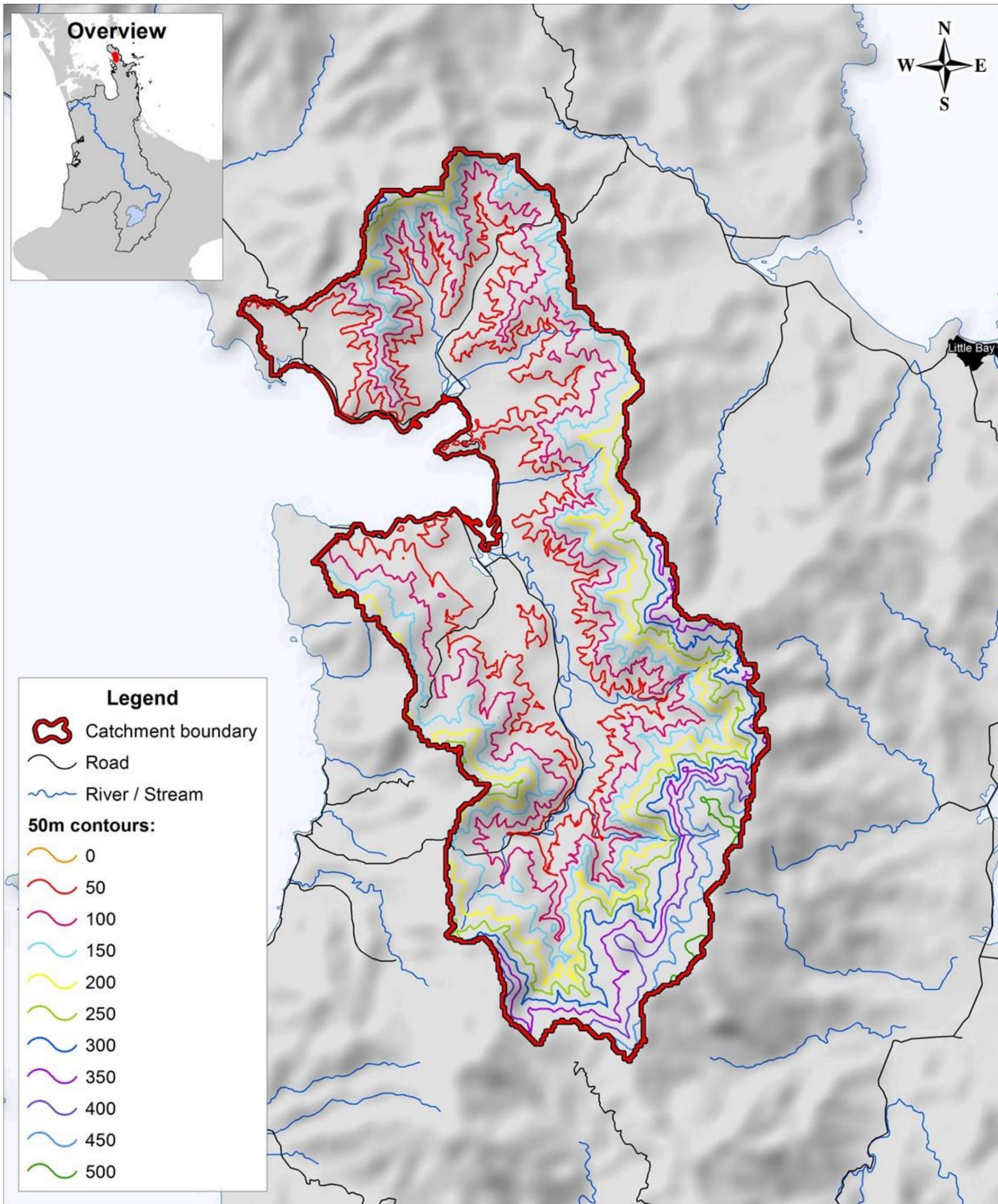
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Contours of Colville Bay Harbour Catchment

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Map 5

0 1.5 3 4.5 6 km

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2.4 Soils

Map 6 Soil Order of Colville Bay Harbour Catchment Map 7 SMAP data for Colville Bay Harbour Catchment

The soil order from NZLRI is at a scale (1:80 000) that maps the overall soil type. Variation will occur when analysing soils at a lower scale, for example at the property level.

Table 2 Soil Orders of Colville Bay NZLRI

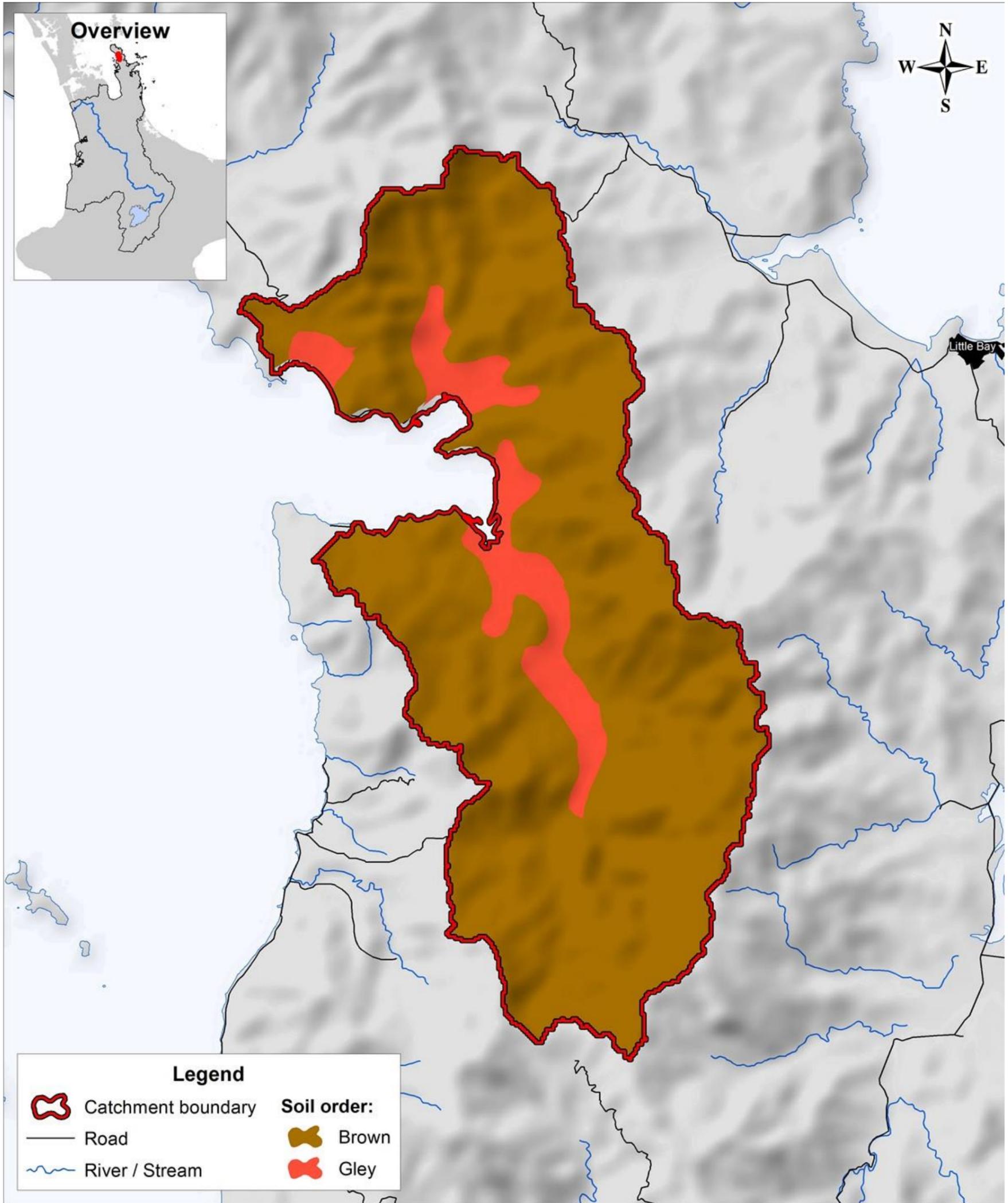
NZ Soil Classification Description	Area (ha)	Catchment Percent
Acidic Orthic Brown Soils	3232.1	74.9
Mellow Mesic Organic Soils	8.9	0.2
Mottled Orthic Brown Soils	32.4	0.8
Mottled Sandy Recent Soils	448.1	10.4
Typic Orthic Allophanic Soils	329.8	7.6
Typic Orthic Brown Soils	257.5	6
Total	4308.8	99.9

The Colville catchment is dominated by brown soils (81.7%) which are volcanic in origin (mostly andesite in this catchment) and have weathered from parent volcanic material or greywacke. The brown colouring is from iron oxides. These soils are typical in areas where total summer dryness is uncommon (rainfall exceeds 1000mm per year). These soils do not become waterlogged in winter, as they are generally well-drained and have moderate amounts of organic matter.

Gley soils (11.2%) are the soils formed from materials that may be waterlogged. They are usually a light grey in colour with distinctive red-brown flecks known as mottling. These soils are typical in areas where high water tables or seepages keep the soils continuously wet, including for example the lower Ūmangawha flood plain. These typically poorly drained soils require management (such as drainage and careful nutrient management) to become productive.

Allophanic soils (7.6%) in the catchment are loam soils derived from old volcanic tephra parent material and contain high amounts of the clay mineral allophane. They range in colour from brown to grey-brown top soils. The soils are favourable for deep root penetration as these soils have a friable profile which is often well-draining. They have between moderate to high organic matter. They tend to have high phosphorus retention thus require careful fertiliser/nutrient management if under a pastoral regime.

Organic soils (0.2%) are associated with swamps, peatlands or wetlands where they are formed from the decomposition of plants. These soils are dominated by organic matter rather than mineral soil material. They are mapped as the lower reaches of Maurea Stream in Whangāahei Bay.



Soil order of Colville Bay Harbour Catchment

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 File Name: REQ123648_Soil_Order_A3.mxd

0 1.5 3 4.5 6 km

Scale - 1:50 000 at A3

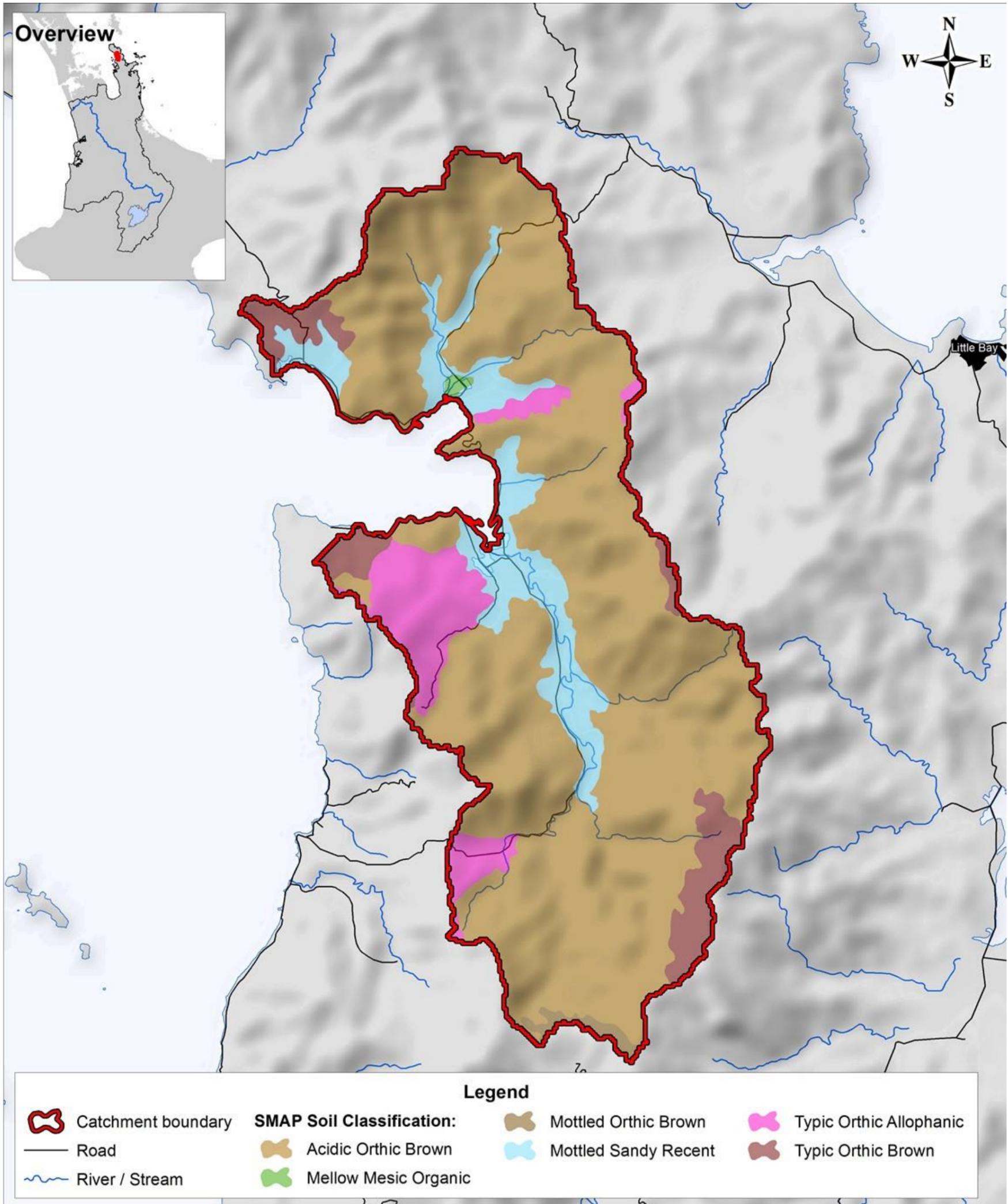
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Legend			
Catchment boundary	SMAP Soil Classification:	Mottled Orthic Brown	Typical Orthic Allophanic
Road	Acidic Orthic Brown	Mottled Sandy Recent	Typical Orthic Brown
River / Stream	Mellow Mesic Organic		

SMAP data for Colville Bay Harbour Catchment

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0 1.5 3 4.5 6 km

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2.5 Land cover

Map 8 Land cover of Colville Bay Harbour Catchment

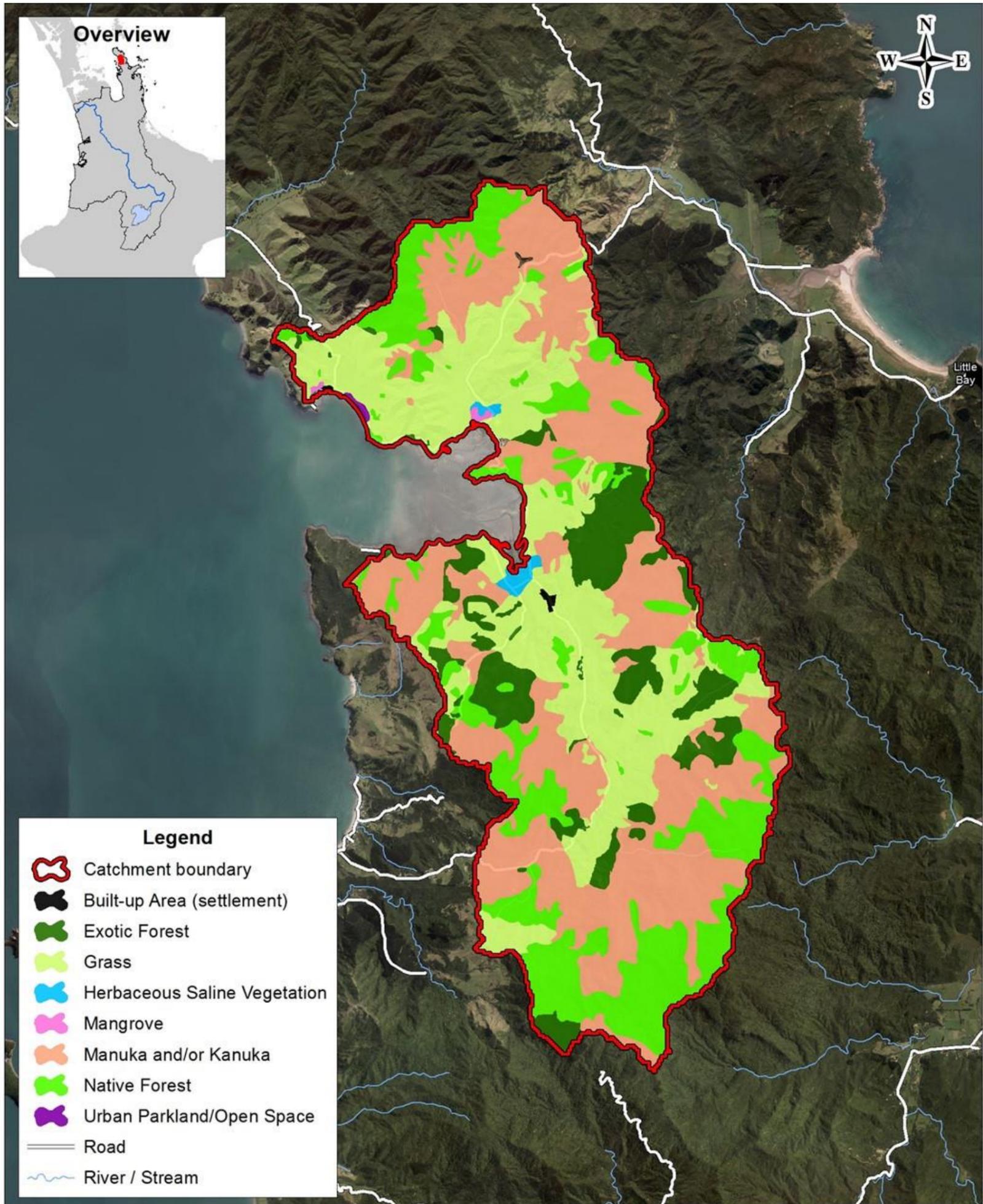
Table 3 Land cover of Colville Bay NZLRI

NAME_2012	Area (ha)	Catchment Percent
Broadleaved Indigenous Hardwoods	270.3	6.3
Built-up Area (settlement)	4.6	0.1
Estuarine Open Water	5.1	0.1
Exotic Forest	418.6	9.7
Forest - Harvested	46.7	1.1
Herbaceous Freshwater Vegetation	2	0
Herbaceous Saline Vegetation	21.8	0.5
High Producing Exotic Grassland	1212.9	28.1
Indigenous Forest	692.9	16.1
Low Producing Grassland	11	0.3
Mangrove	7.7	0.2
Manuka and/or Kanuka	1610.7	37.3
Sand or Gravel	2.8	0.1
Surface Mine or Dump	1.6	0
Urban Parkland/Open Space	4.1	0.1
Total	4312.8	100

The main catchment cover is manuka/kanuka at 37.3%, with grasslands being the second most common cover at 28.1%. Indigenous forest is 22.4% and production forest covers 10% of the catchment.

Land cover can influence the intensity of erosion, flooding and sedimentation. In general an intact vegetation cover particularly in the steeper areas of a catchment will reduce the intensity of these naturally occurring processes.

As recorded in historic accounts the rapid removal of the forest during kauri logging produced an intense period of erosion and sedimentation due to the loss of the catchment's protective vegetation. Today regenerating scrub, appropriate land management of pastoral or forestry activities and retirement of indigenous forest help mitigate the historic scale of changes in land cover.



Legend

- Catchment boundary
- Built-up Area (settlement)
- Exotic Forest
- Grass
- Herbaceous Saline Vegetation
- Mangrove
- Manuka and/or Kanuka
- Native Forest
- Urban Parkland/Open Space
- Road
- River / Stream

Land cover of Colville Bay Harbour Catchment

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 Projection: NZTM
 Date: 15/06/2018
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Map 8

2.6 Erosion types and risk

Map 9 Land use classification Erosion Classes of Colville Bay Harbour Catchment

Table 4 Types of Erosion in the Colville Catchment

EROSION TYPE	Sub Area (ha)	Catchment Percent
0	1143.6	26.5
1Es	67.8	1.6
1Sh	201.3	4.7
1Ss	1138.2	26.4
1Ss1Da	418.4	9.7
1Ss1Sh	17.6	0.4
2Es	149.8	3.5
2Es1Sh	459.7	10.7
2Sh1Ss	27.1	0.6
2Ss	580.1	13.4
2Ss1Sh	77.7	1.8
3Es	15.2	0.4
Total	4296.5	99.7

Es Earthslip; **Sh** Sheet erosion; **Ss** Soil slip; **Da** Debris avalanche
0 negligible; **1** slight; **2** moderate; **3** severe

The above table relates to mass movement erosion and surface erosion over slopes (it does not relate to stream bank erosion).

Soil slip (**Ss**) is the most common type of erosion in the catchment. These are shallow slips (less than 1 metre deep) but can vary in length and leave highly visible slip scars.

Earth slip (**Es**) is a deeper type of soil slip (greater than 1 metre deep).

Debris avalanches (**Da**) are defined by having longer run outs and have deep narrow scars. These are common on steep mountain terrain.

Sheet Erosion (**Sh**) is a type of surface erosion involving the movement of individual soil particles downslope. Raindrop impacts on each individual soil particle. Bare ground such as on damaged pasture or farm tracks, drought, heavy rainfall events and cultivation can all increase sheet erosion. As it occurs across the landscape as a sheet rather than in channels it is often not as visible as other types of erosion, yet can be a significant contribution to sedimentation in catchments.

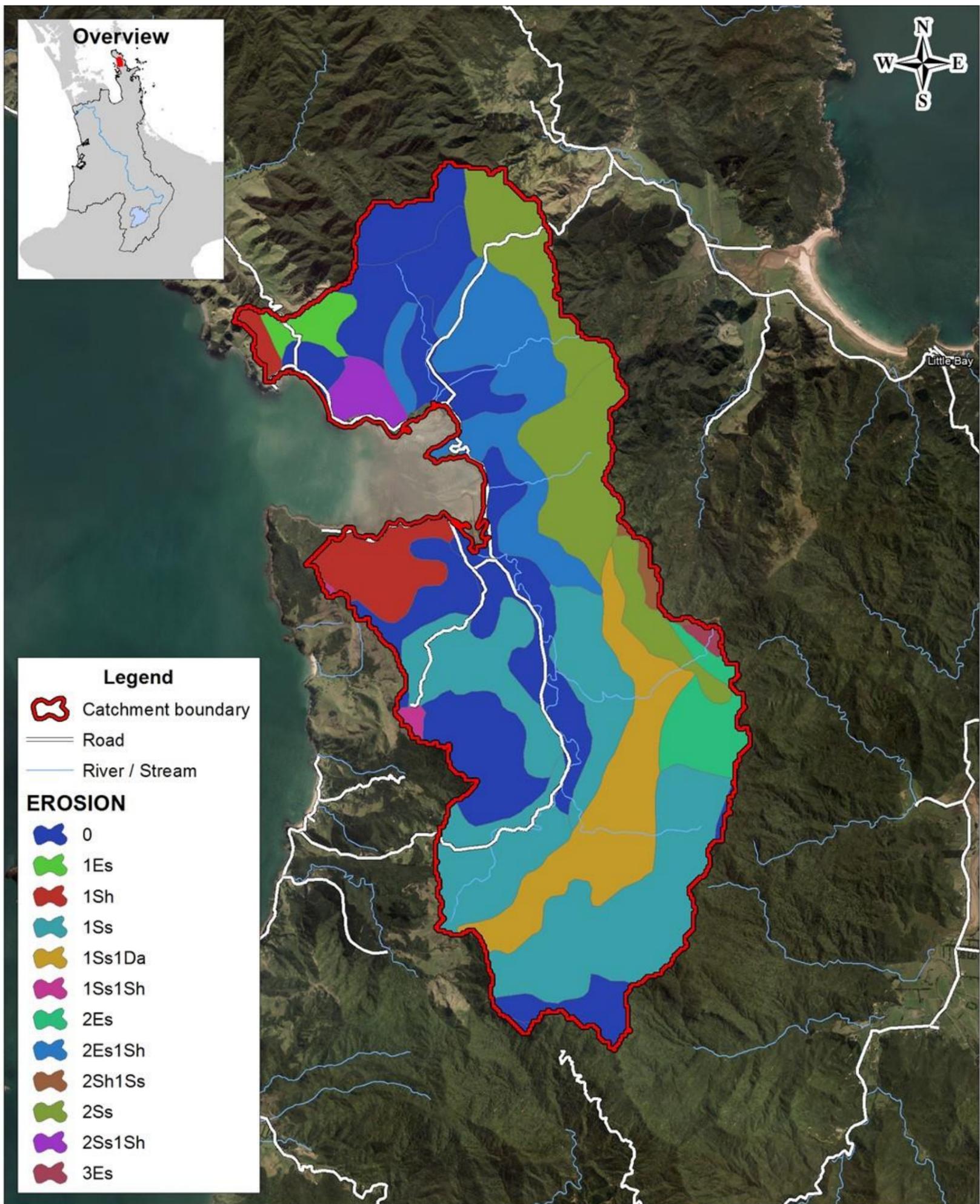
In the above table the large amount of land ranked 0 (26.5%) reflects the areas of deposition such as the lower areas of the sub catchments, the wetlands and the flood plain where eroded material accumulates.

Colville is dominated by steep slopes. The impact of vegetation cover or lack thereof, as well as the Coromandel's typical high rainfall and intense weather events can influence the severity of soil erosion in a catchment. Soil type and land use also influence rates of erosion.

Erosion is an important natural and continuous process. Even under forest cover erosion such as soil slips still occurs. The issue of managing land to lessen the impact of erosion or to avoid exacerbating it through activities such as clear felling steep slopes has led to the Land Use Capability classification system. Slope and erosion rates are important limiting factors for land use.



Photo 4 Shallow soil slips are a common form of erosion on the hills around Colville



Legend

- Catchment boundary
- Road
- River / Stream

EROSION

- 0
- 1Es
- 1Sh
- 1Ss
- 1Ss1Da
- 1Ss1Sh
- 2Es
- 2Es1Sh
- 2Sh1Ss
- 2Ss
- 2Ss1Sh
- 3Es

**Land use classification
Erosion Classes of Colville
Bay Harbour Catchment**

Created by: KMJ
 Projection: NZTM
 Date: 08/06/2018
 File Name:
 REQ123648_Land_Use_Capability_Erosion_A3.mxd

0 2 4 6 km
 Scale - 1:50 000 at A3

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Map 9

2.7 Land Use Capability

Map 10 Land use classification of Colville Bay Harbour Catchment

By considering the previous attributes such as erosion type, terrain (slope and topography), vegetation cover, soil type etc. we can determine the Land Use Capability.

Table 5 Land Use Capability of the Colville Catchment

LUC (Land Use Capability) Class	Area (ha)	Catchment Percent
2s	434.9	10.1
6e	1302.8	30.2
7e	2462.5	57.1
8e	96.3	2.2
Total	4296.5	99.6

In the above table e is for erosion and s is for soil. Classes 1-through to 8 signify land versatility and arability with 1 being the most versatile and 8 having severe limitations.

- e** signifies the main limitation to diversity of land use and cultivation is the soil erosion risk. Both steep land and flat land can be limited by a high erosion risk. For example 8e is assigned to both extremely steep hill country and land such as sand spits or back dunes. Even though sand spits may be flat land, wind erosion of the sandy soils may severely impact on that land's uses.
- s** signifies the main limitation to diversity of land use and cultivation is the soil type.

Colville is a catchment dominated by steep hills and stream gullies which limits the versatility of the land for production purposes.

Class 2 indicates high performance sheep and beef production on alluvial flats is possible. In the Colville catchment this is limited by soil type (2s). The gley soils are partially limited by the wetness these soils characteristically have and their issues with pugging etc.

The 30% that is Class 6 land is a mixture of pastoral farming, exotic forest (pines) or scrub.

At present what was considered marginal productive pastoral land is now being considered productive for new commercial ventures based around the manuka honey industry. This is an ideal land use as the establishing vegetation is an appropriate land cover for such erosion prone terrain.

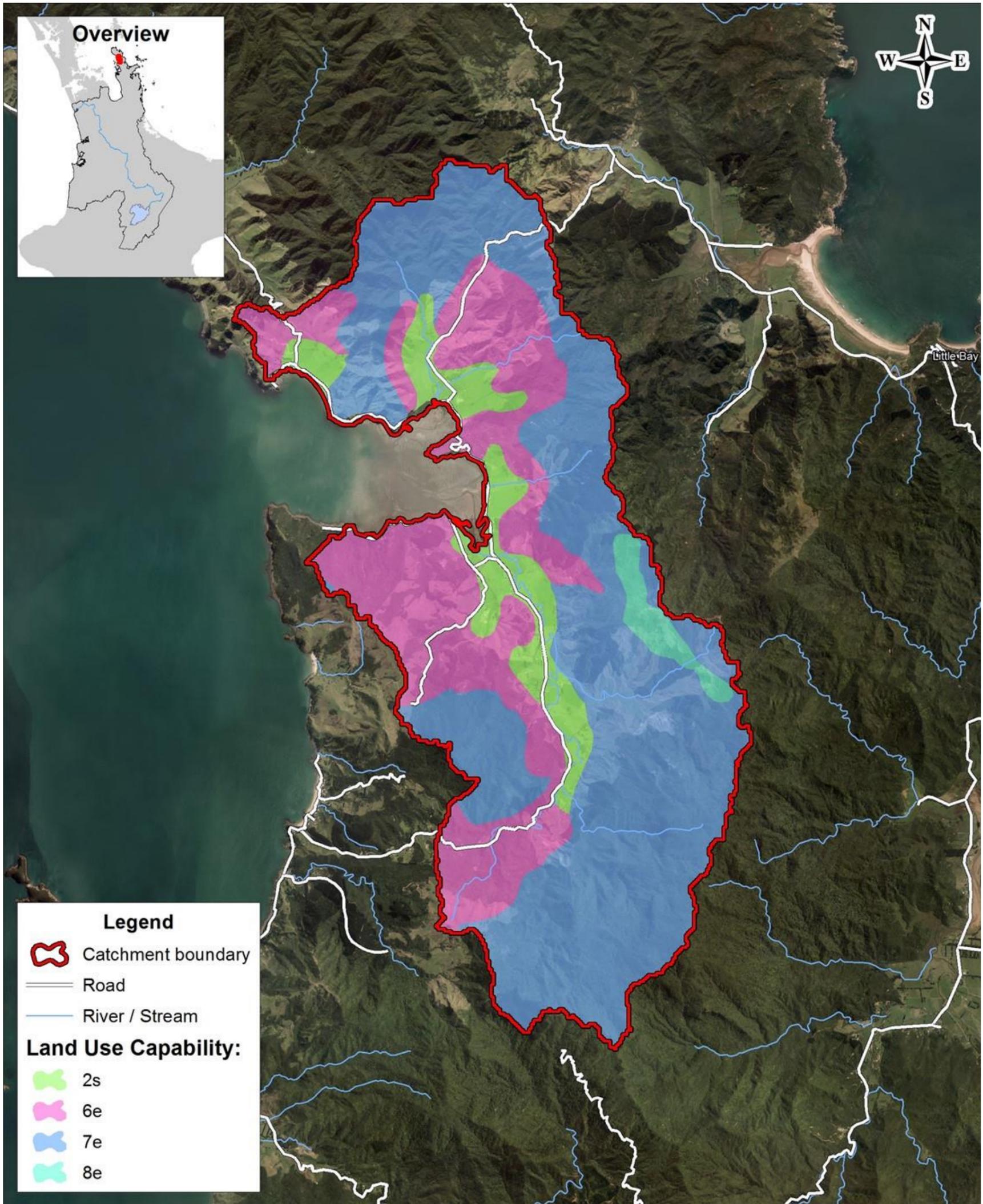
Land that is Class 7e or 8e is unsuitable for production purposes and should be retired from such activities.

To learn more about the LUC of land refer:

http://www.landcareresearch.co.nz/_data/assets/pdf_file/0017/50048/luc_handbook.pdf

Key issues facing the management of land in this catchment and possible management options include:

- Land use activities need to be suited to the land characteristics (as identified through LUC system), in particular steep areas with a high erosion risk need to be managed carefully, and may need to be retired from productive uses, in order to protect soils and water.
- Erosion is a natural process and while vegetation cover can lessen the potential for erosion, it does not preclude it from occurring. Management approaches need to recognise natural processes and mitigate the potential effects as much as possible.
- Vegetation clearance and land use practices have led to accelerated sedimentation within the catchment. Soil loss reduces land productivity and increases the level of nutrients and turbidity of waterways. This has been identified as a priority issue for the catchment.
- Restoration of natural ecosystems such as wetlands or riparian vegetation can assist in the management of sediment over land, act as a store for soil water (especially in times of soil water deficit such as drought) and provide buffer areas such as wind shelter for stock.



Land use classification of Colville Bay Harbour Catchment

Created by: KMJ
 Projection: NZTM
 Date: 08/06/2018
 File Name:

0 2 4 6 km
 Scale - 1:50 000 at A3

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Waikato
 REGIONAL COUNCIL
 Te Kaunihera ā Fiohe o Waikato

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3 Biodiversity

3.1 What is biodiversity?

Biodiversity is the term for the *diversity* of the *biological* components within a defined area (large or small). It includes all plants, animals, micro-organisms and fungi. It is a measurement of the various lifeforms, both individual and species abundance, their inter-connections with each other (such as food webs) and the communities they form e.g. marine or coastal forest ecosystems. For the purposes of this publication biodiversity refers to that of the New Zealand indigenous species.

A good introduction on the concept of biodiversity can be found in the introduction of the NZ biodiversity strategy in the link below.

<https://www.doc.govt.nz/nature/biodiversity/nz-biodiversity-strategy-and-action-plan/new-zealand-biodiversity-strategy-2000-2020/part-one-a-strategy/>

3.1.1 Colville Ecological District

The Colville Ecological District (ED) is one of nine ecological districts that make up the Coromandel Ecological Region. It encompasses the Moehau Range and its southern boundaries are Whitianga on the eastern side and Tapu on the western side.

“The Colville Ecological District covers the northernmost portion of the peninsula, where it narrows considerably, as well as Cuvier Island. Two distinctive features of this ED are the exposure of relatively large blocks of greywacke and common occurrence of taraire.

The Colville ED has not suffered the same amount of clearance as other ecological districts in the Waikato Region. With a relatively large amount of scrub, regenerating forest, and (albeit heavily logged) remnants of forest remaining - the ED is remarkable for its diversity of high quality wildlife habitat.

Rapanga/ Cuvier Island is a dormant volcanic island and is managed primarily for historical, scientific and species protection purposes by Department of Conservation, hence access is restricted to those with permits.” (from *Significant Natural Areas of the Thames-Coromandel District* – see the link on page 30)

Species that either no longer exist, are rare/threatened or have fragmented populations in other parts of New Zealand can be found in Colville. North Island brown kiwi, pateke (brown teal), gold striped gecko, Archey’s and Hochstetter’s frog, kaka, banded rail and fernbird populations are present in this catchment.

Ecological habitats found within the Colville catchment are coastal forest, lowland forest, saltwater marsh and wetlands. Threatened or naturally uncommon plant species such as *Pittosporum virgatum* are also present. The catchment is below the montane habitat found further along the ranges such as on Moehau Mountain.

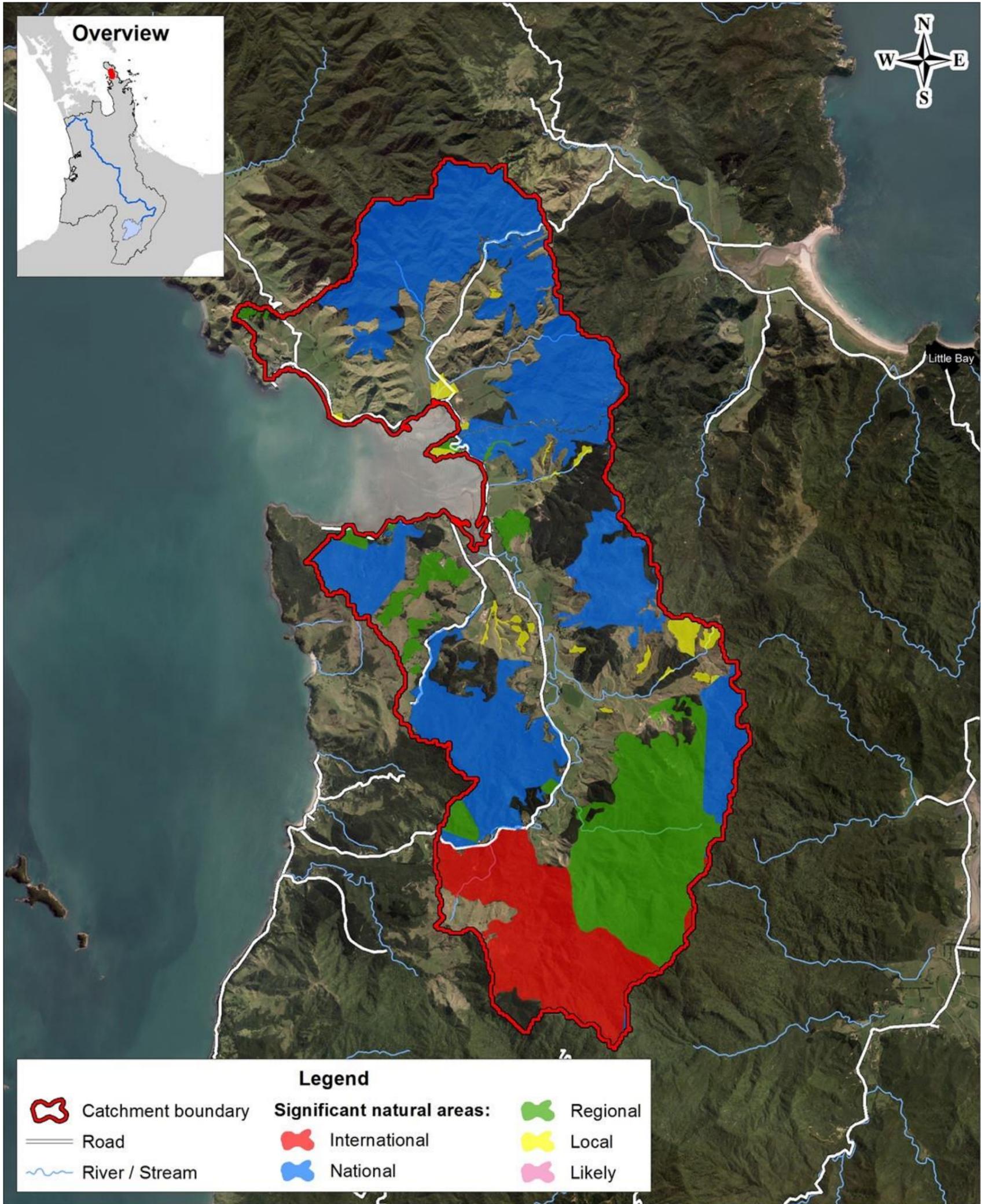


Photo 5 Pateke are now a regular sight at Ahirau Stream. They were introduced back onto the northern tip of the peninsula in 2002. They have since spread out across the northern Coromandel from this original release site, due to continuing predator control from community groups and government agencies.

3.1.2 Significant natural areas (Sna) of Colville Bay Harbour Catchment

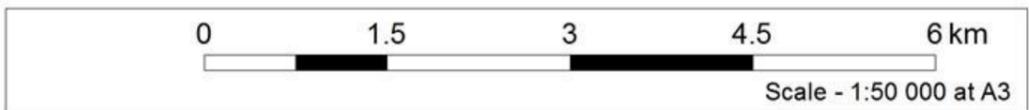
Significant natural area (Sna) mapping is useful for considering biodiversity values. It helps to identify significant habitat or populations of indigenous fauna and flora which allows agencies, council and communities to consider what management tools are needed to maintain or improve these populations.

Map 11 Significant natural areas of Colville Bay Harbour Catchment



Significant natural areas of Colville Bay Harbour Catchment

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Map 11

Table 6 Significant natural areas of Colville Bay

SIGNIFICANCE	Sub Area (ha)	Catchment Percent
International	428.6	9.9
Likely	0	0
Local	65.6	1.5
National	1405.9	32.6
Regional	604.2	14
Total	2504.3	58

The international significant forest is the northern part of Sna TC112a, Papa Aroha Block which lies mostly in the adjacent catchment.

The Nationally Significant Snas are (clockwise from the south)

- TCO90 Te Kauae o Maui
- TC064 Opuhi Forest
- TCO66 Waikanae Forest

6% of the Colville catchment (260 hectares) is in conservation management and 0.4% is scenic reserve/stewardship (15.3 hectares).

The Sna maps help us determine where connections between Snas can be re-established or maximised.

The link to the full technical report - *pg 15 Significant Natural Areas of the Thames-Coromandel District: Terrestrial and Wetland Ecosystems Environment Waikato Technical Report 2010/36*
<https://www.waikatoregion.govt.nz/assets/PageFiles/20481/TR%202010-36.pdf>

Waikato Regional Council and other organisations encourage landowners to retire areas from grazing and/or restore significant areas of biodiversity. There are various funding grants available for restoration of fauna and flora.

Check out Waikato Regional Council's funds in the below link.

<https://www.waikatoregion.govt.nz/community/whats-happening/funding-and-scholarships/>

3.2 Restoring native habitat biodiversity

To help improve habitat biodiversity in catchments Waikato Regional Council and other organisations assist landowners and communities to invest in planting native species suitable for the ecological area by

- Providing information, fact sheets, booklets etc. for how to plant or what to plant such as Dairy NZs riparian planting guide
<https://www.dairynz.co.nz/publications/environment/getting-riparian-planting-right-in-the-waikato/>
- Through projects such as Waikato Regional Council's Native Plant Supply Scheme or Colville Harbour Care providing eco-sourced plants with shared costs for eligible landowners and one on one advice on what is suitable to plant.
- Through national or regional planting projects such as the Million Metres Streams Project
<https://millionmetres.org.nz/>

By restoring the native plant cover we are:

- Creating corridors and linkages between SNAs and/or habitat types. This may be connectivity between large fragmented habitats such as coastal forest areas or small scale connections such as a stream with a wetland in proximity but no existing native vegetation linking the two.
- Restoring species that may have been present in the past but are now absent for various reasons. For example northern rata are susceptible to possum browse so may have died out from an area of bush.
- Planting to help create more diverse habitat such as providing different available food sources year round for insects, lizards and birds.
- Creating and/or preserving carbon sinks while acknowledging that intensive pest animal browsing diminishes the potential carbon sink of existing native vegetation.

The guide to what is appropriate in the Colville Ecological District is found in the 'What to Plant in Coromandel Ecological Region' publication available on line.

<https://www.waikatoregion.govt.nz/Environment/Natural-resources/Biodiversity/Planting-guides/What-to-plant-in-the-Coromandel-ecological-region/>

3.3 Native vegetation and soil erosion

By protecting and/or restoring native vegetation such as bush blocks for biodiversity reasons, landowners are helping to address soil erosion and sedimentation issues within a catchment. These processes are both part of the natural cycle of erosion and deposition as landscapes change over time.

The issue for New Zealand is that the significant and widespread removal of vegetation cover in a short period of time has seen an acceleration in the rate of erosion. This in turn has seen many harbours and estuaries infill with sediment and left hill country scarred with soil slips etc. These areas can become vulnerable to further large scale erosion, particularly during intense storm events.

Even where vegetation cover and bush canopy are present, the lack of understory in many bush blocks, due to browsing of foliage and seeds by introduced mammals, such as possum, goats, pigs and rats, leads to an increase in surface water runoff and soil erosion. A healthy understory beneath the bush canopy allows for better water uptake and better filtration of sediment.

Pest control therefore is a crucial part to maintaining a healthy bush block, as it allows the understory to persist. Recruitment of species is also enhanced when seedlings are able to establish without browsing pressure. Fencing off existing vegetation from browsing stock also addresses the above issues.



Photo 6. A lack of understory decreases the land's ability to absorb and filtrate both water and soil run-off whereas an intact understory aids filtration.

4 Stream bank erosion and restoration

Stream bank erosion is a natural process as is channel movement/change across the flood plain over time. With the rapid deforestation of New Zealand catchments over the last 150 years, higher sediment yields and accelerated bank erosion have occurred. Where stock have free access to the stream sides (known as the riparian strip), the continual pugging and stock tread damage occurring along the edges, further increases the erosion rate of the banks and increases sediment yield into the water channels.



Photo 7. An unfenced part of the Ūmangawha Stream showing typical bank erosion accelerated by stock tread.

4.1 Regional Plan Stock Exclusion

It is a requirement of the Waikato Regional Council Plan that water bodies which are ranked and mapped as stock exclusion are fenced or managed so stock cannot enter waterways.

See the Waikato Regional Plan for more detail particularly Section 4.3.5.

A mixture of environmental education, working with landowners to avoid future adverse effects and at times if necessary, enforcement, is used to protect water ways mapped as stock exclusion.

<https://www.waikatoregion.govt.nz/Council/Policy-and-plans/Rules-and-regulation/Regional-Plan/Waikato-Regional-Plan/4-River-and-Lake-Bed-Module/43-River-and-Lake-Bed-Disturbances/4-3-5/>

4.2 Riparian Restoration

Research has shown that New Zealand waterways should have an optimum 15 metre riparian strip or buffer zone, between the active stream bank and its flood plain, complete with vegetation cover, to provide;

- the best filtration of sediments/ soil particles
- the best filtration of nutrients such as nitrogen and phosphorous
- the best soil stabilising effect through root structure
- canopy cover to depress common weeds through shading
- habitat for native fauna and flora as well as connectivity to other areas by creating wildlife corridors
- shade for water thus reducing in stream temperature. Cooler water temperatures increase oxygen levels, benefits instream fauna populations and decreases the likelihood for algae blooms (which prefer warmer temperatures and higher light levels).

<https://www.niwa.co.nz/publications/wa/vol14-no1-march-2006/sustainable-riparian-plantings-in-urban-and-rural-landscapes>

The reality for many waterways is often no fencing or fencing that is too close to the bank to provide the needed buffer zone between the active stream channel and its catchment area.

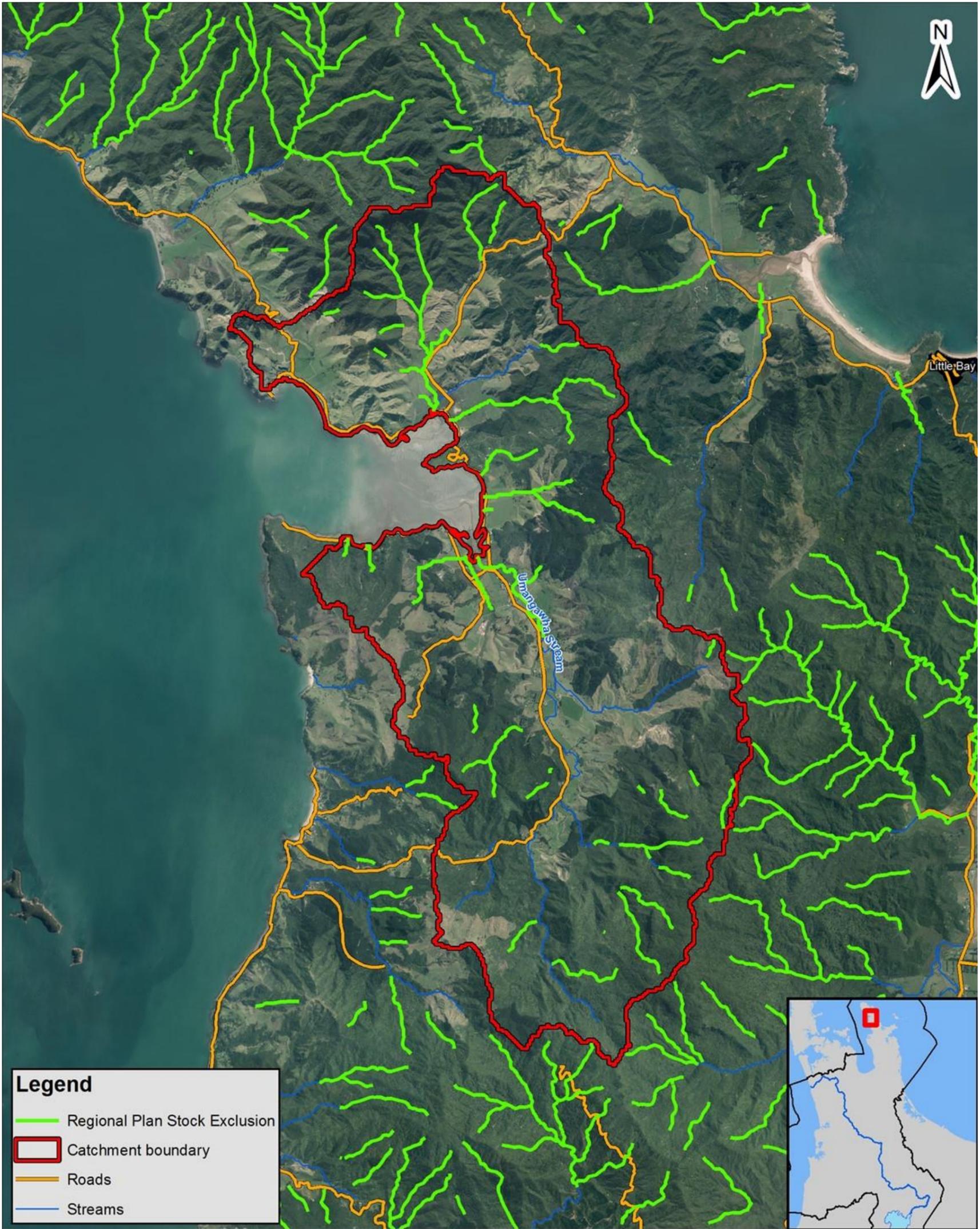
Waikato Regional Council provides funding for riparian fencing and re-vegetation with the minimum distance for a buffer zone being 5 metres from the stream channel.

Setting back the fencing by at least 5metres allows adequate space for planting of native species as well as sterile willow hybrids and poplar poles within the riparian strip if needed. The fast growing and interlocking root systems of willow and poplar are used to stabilise the most active erosion sites along stream banks on the outside bends.

Having a more extensive riparian strip planting area can be multi-purpose. Native grasses and plants such as cabbage trees provide shade and riparian habitat immediately along the channel, trees and shrubs can be planted behind these to provide wind breaks. Closer out to the fence, tree crops for firewood or timber can then be planted e.g. eucalyptus species. This sequence also provides better nutrient cycling e.g. the higher input of carbon in the form of woody material aids filtration of excess nutrients and de-nitrification (removal of nitrogen).

A mixture of poplar/willows, other exotic species and natives provides both long and short term solutions to the health of the riparian strip.

The head waters of the Ūmangawha, Kairaumati, Maurea and Ahirau Streams are already covered in regenerating native bush which is ideal for this steep catchment. It is highly recommended that landowners fence and/or plant the lower reaches of these streams to the stream mouths to improve overall catchment health.



Legend

- Regional Plan Stock Exclusion
- Catchment boundary
- Roads
- Streams

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 File: REQ123648_Stock_Exclusion_A3.mxd

Colville Catchment Regional Plan Stock Exclusion

0 1 2 3 km
 Scale at A3
 1:50 000

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 Version: 1
 Job No.: REQ123648



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Map 12 Colville Catchment Regional Plan Stock Exclusion

4.3 Waterway connectivity

Many native fish species require mountain to sea connectivity over their life cycle and improving/restoring waterway connectivity between the upper and lower reaches is crucial to the health of a stream catchment. Best practice when undertaking in stream works is one way of ensuring connectivity of water ways from the source to the lower reaches.

WRC can advise what works can be carried out in streams, if a consent is required for intended works, when it is appropriate to carry out works (to avoid impacting on native fish spawning) and best practices when installing infrastructure such as crossings or culverts. Good design is crucial to sustain stream flow and also lessen the likelihood of scouring or increased bank erosion downstream. For example:

- good culvert design will decrease scouring around the outlets;
- avoid creating perched culverts (culverts that are above the water table/stream bed at their outlet);
- ensure the culvert is correctly placed in the stream bed.

4.4 Fencing and planting assistance for landowners

Waikato Regional Council works with landowners to permanently fence off areas from stock access. This may be for a variety of reasons though the two most common ones are to reduce grazing of streamside vegetation and reduce damage done by stock tread.

Waikato Regional Council will fund grants up to 35% of the labour and material costs when a landowner carries out fencing and planting. Planting may be native species or exotic soil conservation species e.g. poplar trees, eucalyptus or pin oaks.

An environment programme agreement outlines what the works are that a landowner wishes to undertake with WRC funding. This may be:

- Retirement of bush blocks so native species regeneration can occur once grazing of the understory is prevented.
- Retirement of wetlands or seep areas for habitat restoration or simply to keep stock out of areas where they become bogged or cause pugging which accelerates soil erosion.
- Retirement of stream banks to improve water quality by reducing stock tread and direct contamination of the water through stock effluent.
- Retirement of steep slopes and gullies to make stock management more efficient and to decrease the impact stock tread has on soil slip and erosion.
- Planting steep slopes and soil slips with species that help reduce the impact of soil slip erosion, sheet erosion and sedimentation into water channels.

WRC and the landowner may also work with other funding agencies if the landowner chooses to do so. Organisations include:

- Queen Elizabeth II Trust (QEII) - <https://qeiiinternationaltrust.org.nz/>
- Ministry of Primary Industry - Afforestation Grant Scheme <https://www.mpi.govt.nz/funding-and-programmes/forestry/afforestation-grant-scheme/>

Other organisations financial contribution helps reduce the landowner's overall financial outlay for retirement/restoration works on their land.

4.4.1 Costings for an example stream retirement project

An example of how the costings for retiring a portion of a stream between a landowner and Waikato Regional Council may look, is given on the following page.

An estimate of costings is calculated to help the landowner plan their works over an agreed number of years required, to carry out the works. An agreement called an environment programme agreement (EPA) is written to outline the issues, solutions and advisory information for the property.

Example: A landowner grazes cattle and wants funding support to fence a 290 metre section of the Ūmangawha Stream.

- In discussion with the landowner, we consider what type of fence is best suitable. Waikato Regional Council funds permanent fencing with posts and wires (as opposed to waratahs, tapes etc.) A two wire electric fence suits the location on the more dynamic area of the flood plain, it is less likely to suffer damage in a flood than say a conventional post and batten fence.
- A two wire electric fence also suits the type of stock being grazed. In this example we will say cattle. The fence is to be at least 5 metres back from the stream channel to be eligible for funding. Some parts may be more than this as the landowner may want to establish more extensive planting areas along its length.
- Waikato Regional Council takes into consideration the labour/time contribution of landowners when carrying out these types of works. This landowner contribution is called "**in kind**" and standard rates are used to reimburse landowners 35% for their time through the grant claiming process. Any contractor invoices the landowner has paid can also be reimbursed at 35% if the tax invoices are provided to WRC at the time of grant claiming.

Waikato Regional Council also partially funds the necessary irrigation (troughs and lines) needed for stock watering once stock access to the stream water is fenced off. Culverts may also be funded to help reduce stock in waterways.

If the landowner wants to plant the stream banks as well, this is also added to the agreement. WRC recommends planting small areas at a time with spacing's no more than 1.5m by 1.5 metre. This is the maximum recommended gap between plants to achieve quick closure of the new canopy. Once the plantings create canopy it helps suppress rank grass/weeds through shading. Native grasses e.g. toe toe and sedges can be planted at 90cm spacing's.

- As a general guide 66 plants are needed per 100 hundred metre row. To plant up three rows along our example bank of 290 metres, we would estimate 600 plants are required.
- WRC recommends the plants be of the size known as PB3 (plant bag size 3), a plant that is at least 60cm high in the bag with a decent root mass and usually costs around \$3 - \$3.50. Smaller plants may be unable to out compete less desirable vegetation that will grow once grazing is removed. Larger plants are less likely to survive due to drought stress or wind rock unless considerable time is spent protecting them until they are fully established in their new site.

- To ensure plants survive and thrive, it is recommended that in the first year, two releases are carried out. Releasing is the removal of other competing vegetation such as grass and weeds from around the plant. Trials show this can increase a plant's survival by 90% in the first year.
- These labour costs for planting and releasing are added into the funding agreement as well. An Example of a funding/costs spreadsheet that WRC develops when writing up an EPA with the landowner is below.
- For our example of a 290 metre fence, two wire electric, with plantings along 300 metres of stream and a couple of water troughs the spreadsheet would be as follows. If the landowner carries out the labour themselves we calculate the value of that labour as an "in kind" financial contribution to overall costs and this is claimed back at 35%.

Example of EPA funding table

Name:	Joe Blogs
File:	Z21 P200
Zone:	Coromandel
Funding:	PeninsulaProject - Catchment New

Year One 1st July 2017 to the 30th June 2018

No.	Compartment	Activity	Type	Units	Cost per Unit	Total Cost	Catchment/stream	Area retired(ha)	Streambank retired(m)
1	Riparian Retirement	Electric Fence	2 w e	290	\$4.00	\$1,160.00	Umangawha	0.145	290
1	Riparian Retirement	Indigenous Planting	PB3	600	\$5.00	\$3,000.00			
1	Riparian Retirement	Water Troughs		2	\$300.00	\$600.00			
Total:						\$4,760.00			

Funding Summary

Sources of Funding	% of Cost	Year 1	Total
Soil Conservation			
Property Owner	65%	\$3,094.00	\$3,094.00
Waikato Regional Council	35%	\$1,666.00	\$1,666.00
Total Soil Conservation		\$4,760.00	\$4,760.00
Total		\$4,760.00	\$4,760.00

<i>Potential In-kind (fencing labour, planting labour, disposal of willows (burning), followup re-growth spraying labour)</i>	Amount
Fencing labour at half the total cost of the fence	\$1,222.00
Planting and two releases from weeds in the first year labour 600 plants @ \$2.00 per plant;	\$1,200.00
Total	\$2,422.00

Total Project Cost	\$4,760.00
Property Owner Share (before In-kind)	\$3,094.00
Waikato Regional Council Share	\$1,666.00
Estimated Property In Kind Contribution	\$2,422.00
Estimated nett Property Cost (after In-kind)	\$672.00

Note:

- All costs are GST exclusive
- If actual costs are less than estimated costs - refund will be based on actual costs.
- If actual costs exceed estimated costs - refund will be based on estimated costs. However, actual costs may be considered if reasonable and depending on budget constraints.

Waikato Regional Council also has provision to assist with river works and bank erosion. This can be up to 50% of river and stream works with the other 50% being landowner contribution (either in-kind or financial). Common examples of works carried out in partnership with the landowners are channel blockages and erosion control.

5 Invasive species

Several government agencies are involved with regulations such as Acts of Parliament, control programmes and public awareness campaigns to limit the extent or impact of invasive species.

Ministry for Primary Industries (MPI), Department of Conservation and unitary authorities such as Waikato Regional Council are organisations involved with invasive species issues.

With 223 species of New Zealand fauna and flora currently under threat of extinction, strategies around ongoing invasive species control is vital.

New Zealand's native fauna and flora has evolved in the absence of land mammals (aside from native bats) over geological time. The decline throughout New Zealand of our native fauna, due to vulnerability to introduced mammalian predators, and the decline of our native flora due to introduced browsing mammals is well documented.

For more detail on Waikato Regional Council's pest strategy see the <https://www.waikatoregion.govt.nz/services/regional-services/plant-and-animal-pests/>

5.1 Animals

Introduced animals that have readily naturalised in New Zealand (often in the absence of their natural predators from their land of origin) have had a significant impact on indigenous fauna and flora.

The introduction of mustelids (e.g. stoats) brush tail possums, rats, cats, hedgehogs, feral pigs, and goats have all impacted on Colville's biodiversity.

Uncontrolled dogs are a particular threat to adult kiwi as well.

Mammalian predators reduce the likelihood of successful breeding seasons for our native birds by preying on eggs and chicks. If adult birds are sitting on nests they are vulnerable to these attack as well.

There are several community groups within the catchment of Colville addressing this issue and have trap lines for pest animal species to help protect indigenous species, mostly focused around increasing the Brown kiwi population resident in the upper north Coromandel.

In 2016 a wild Eastern long necked turtle (*Chelodina longicollis*) was found in the neighbouring Waitete Catchment. Wild turtles impact on our natural stream systems by predated on threatened native fish species and fresh water invertebrates such as koura, the fresh water crayfish.



The Eastern long neck turtle found in Waitete Bay, October 2016 (Photo courtesy of Elaine Iddon)

The Indian ring neck parakeet spotted in Colville (photo courtesy of Venerable Nangsel, Mahamudra Centre)

A wild Indian ring neck parakeet, a species, classified as an Unwanted Organism by MPI, was photographed in Colville in 2016. This species is a threat to our native birds and also a pest to agriculture by destroying crops. For more information check the link to MPI.

<https://www.mpi.govt.nz/protection-and-response/responding/alerts/indian-ringneck-parakeet/>

If either of the above species is sited please call **MPI 0800 80 99 66**

5.2 Plants



Photo 8 Boneseed at the Whangaahei Bay Saltmarsh roadside is an invasive species from South Africa.

Invasive pest plants are a significant threat to the decreasing and fragmented native ecosystems/habitats within the Colville catchment. Many of these habitats are already under pressure from disturbances both historic and current. Pest plants are able to colonise vulnerable areas further reducing native vegetation. These pest plants can also cause loss of habitat for the fauna that is being protected by the animal pest control. The importance of controlling pest plants as bird numbers increase due to predator control is crucial. Birds are a vector for spread of seed of plant pests such as climbing asparagus and wild ginger that are ecosystem transformers.

The key pest plants that have been identified are

Boneseed	<i>Chrysanthemoides monilifera ssp. monilifera</i>
Climbing asparagus	<i>Asparagus scandens</i>
Mignonette vine	<i>Anredera cordifolia</i>
Moth plant	<i>Araujia hortorum</i> (formally <i>A. sericifera</i>)
Pampas grass	<i>Cortaderia selloana</i> and <i>Cortaderia jubata</i> (purple pampas)

Use the web link below to find the difference between native toetoe and the two invasive pampas species.

<https://www.waikatoregion.govt.nz/services/regional-services/plant-and-animal-pests/plant-pests/pampas/>

Salt water paspalum

Paspalum vaginatum

Wild ginger

Hedychium gardnerianum and *H flavescens*

Woolly nightshade

Solanum mauritianum

For more detail see the

<https://www.waikatoregion.govt.nz/services/regional-services/plant-and-animal-pests/plant-pests/>

Invasive willow species are also present in wetland areas (these are not the sterile hybrids used for soil conservation/streamside stabilisation)

6 Recent threats to Coromandel

6.1 Kauri dieback

Kauri are susceptible to a killer disease caused by a microscopic organism *Phytophthora agathidicida* (kauri dieback). Kauri dieback is found across parts of kauri lands including in the Waitakere ranges, Waipoua, Great Barrier Island, and on the Coromandel Peninsula in Whangapoua and Hukarahi. Scientists are working hard to find control tools for the disease, but there is currently no known treatment and once a tree is infected it will not survive.

The disease may be spread through as little as a pin prick of soil, therefore reducing soil movement in and near kauri on properties is the best defense. Soil movement can be reduced by:

- fencing out stock
- controlling pests such as pigs and goats
- ensuring anyone heading into native forest has cleaned all gear thoroughly as well as their dogs, and
- ensure machinery coming onto or leaving a property is dirt free.

For more information on kauri dieback visit www.waikatoregion.govt.nz/kauri

6.2 Myrtle rust

Myrtle rust is a new “unwanted organism” that has been present in Australia and was detected in New Zealand in 2017.

It affects plants in the myrtle family such as pohutukawa, rata, manuka and ramarama. This disease will potentially put more pressure on species that are already threatened by pest animal browsing e.g. possum browse on rata tree populations, or through habitat loss such as swamp maire losing suitable wetland habitat.

Myrtle Rust has been confirmed to be present in the greater Colville area and Whitianga. Vigilance is vital. **If you think you've seen myrtle rust, don't touch it, take a photo, and call MPI on 0800 80 99 66.**

For more information on Myrtle Rust, what it looks like, what it infects and what to do if you suspect you have seen it visit the Ministry for Primary Industry website.

<https://www.mpi.govt.nz/protection-and-response/responding/alerts/myrtle-rust>

7 Coastal habitat

The Colville catchment has a diverse range of coastal habitats. The catchment has a mix of estuaries, rocky headlands and more open coastal areas such as Otautu Bay. The sequence of coastal vegetation from tidal flats to estuarine areas and/or coastal forest is well represented in this catchment.

The tidal flats have populations of sea grass (*Zostera capricorni*) and mangroves (*Avicennia marina subsp. australasica*) changing into areas of saltmarsh (a mixture of rushes, sedges and shrub species) and sea meadow species (ground cover species). This sequence occurs to the upper reaches of the salt water/fresh water boundaries in the streams or water tables. In some areas the sequence develops into coastal forest, such as found at Tokawhero Point.

These sequences of coastal and estuarine vegetation are important habitat for fish species, shellfish and coastal invertebrates such as crabs.

These areas are also important habitat for wading birds and shore birds.

Although not restricted to just the coastal marshes, the destruction or degradation of freshwater wetlands by 90% through human activities, has meant many of our native wetland species have been “squeezed” into remaining areas, which include the coastal wetlands. The Colville area has populations of some of the rarer New Zealand bird species present in these wetlands and the seashore.

Bird Common Name	Species name	Conservation status
Banded rail/Mohopereru	<i>Gallirallus philippensis</i>	declining
Bittern/Matuku	<i>Botaurus poiciloptilus</i>	nationally – critical
Brown teal/Pateke	<i>Anas chlorotis</i>	recovering
New Zealand fernbird/Matata	<i>Bowdleria punctate</i>	declining
New Zealand dotterel/Tuturiwhatu	<i>Charadrius obscurus</i>	recovering

A technical report on the vegetation in estuaries in Colville Bay was undertaken by ecologist Meg Graeme of Natural Solutions for Waikato Regional Council in 2013. To read more about the vegetation survey undertaken the report is available on the council website at the below link.

<https://www.waikatoregion.govt.nz/assets/PageFiles/25907/TR201306.pdf>



Photo 9. Otautu Bay looking over to the estuary and causeway.

Local authorities and coastal communities often collaborate to determine the impacts that have occurred with past practices such as the large scale deforestation of catchments, coastal development such as housing, drainage and roading as well as the impact of introduced pests.

Some key considerations for positive change in coastal areas that communities and local authorities may consider are as follows;

Aspirations

- People wish to protect the high recreation and natural values of the coast
- The need to recognise the inter-linkages between land, water, biodiversity and coastal issues, along with the high recreation and natural values held by people
- The need to protect and restore coastal ecosystems, such as native saltmarsh areas, fish populations, shellfish beds and shorebird areas
- The dynamics of mangrove populations and the ability of coastal vegetation to sequester and store carbon.

Concerns

- Coastal vegetation changes including the spread of saltwater *paspalum*
- The impact of elevated sediment inflows into the bays, while recognising that this is also a natural process in the overall life of a harbour
- The decline in kai moana due to water quality issues
- The dynamics of mangrove population expansion e.g. around key navigation channels

7.1 Mangroves

Mangroves in New Zealand comprise of a single native species (*Avicennia marina subsp.australasica* - also known as Manawa) that has been present in New Zealand for some 19 million years. Mangroves grow along sheltered coastlines in the northern part of the north island. Their distribution is geographically limited by cold temperatures.

New Zealand mangroves:

- provide shelter and food for several species of fish (predominantly at high tide), shellfish, insects and rare birds
- can protect and stabilise land
- form a buffer, in some areas, to absorb floodwaters, as well as protecting shore areas from wave action, erosion and flooding. (WRC website 2017)

For more information the link to the council's mangrove page is as below.

<https://www.waikatoregion.govt.nz/googlesearch/?q=mangroves&ctl00>

National Institute of Water and Atmospheric Research Ltd (NIWA) published in 2017 a feature on the potential of coastal mangrove and coastal vegetation to have an estimated rate of carbon sequestration that is 100 times faster than terrestrial forests. It is estimated that mangroves may store 120 tonnes of carbon per hectare. For further reading the link to the article is as follows.

<https://www.niwa.co.nz/news/muddy-sinks>

NIWA also produced a publication outlining the guidance needed if communities are concerned about mangrove expansion and what best practices may be undertaken if such action is considered necessary.

It also helps explain the role of mangroves in the coastal ecosystem and the importance of mangroves for fish and bird habitats etc.

<https://www.niwa.co.nz/freshwater-and-estuaries/management-tools/managing-mangrove-expansion>

Management of mangroves can be appropriate in some areas for the purpose of maintaining stream flow or where they are encroaching on other significant habitat such as seagrass beds (*Zostera capricorni*) or saltmarsh.

7.2 Immediate threats for the Colville Coastal Marine Area (CMA)

The CMA is defined as the area below mean high water springs. In Colville this area has a variety of coastal habitats that the community through Colville Harbour Care have identified for restoration projects.

Three key threats to these habitats are as follows.

7.2.1 Grazing

Stock intrusion and grazing was evident in the 2013 survey of the coastal vegetation in places. Stock grazing destroys fragile plant communities and opens up the area for invasive weed species.

The exclusion of stock with appropriate, well maintained fencing, stock floodgates across waterways and crossings where needed is a significant step in helping to protect the coastal habitat. It also improves water quality by decreasing pugging and stock tread in these vulnerable areas as well as decreasing direct faecal contamination.

Under section 16.2.9 of the Waikato Regional Coastal Plan grazing in the coastal marine area or the CMA is a prohibited activity.

16.2.9 Livestock in Sensitive Areas (Prohibited Activity)

The presence of livestock in or on mangroves, saltmarsh or eel grass, or on muddy substrata, in the CMA is a prohibited activity for which no resource consent shall be granted.

Principal Reasons for Adopting: *The presence of livestock in estuarine areas may damage or even destroy existing vegetation and stop regeneration, e.g. mangroves and saltmarsh. The destruction of fish spawning habitat can also be a result of livestock grazing and trampling. Archaeological sites and waahi tapu can also be damaged.*

<https://www.waikatoregion.govt.nz/Council/Policy-and-plans/Rules-and-regulation/Regional-Coastal-Plan/Regional-Coastal-Plan/APPENDIX-VI-Glossary/>

7.2.2 Introduced predators

Predators such as hedgehogs, rats, mustelids (stoats etc.) wild or domestic cats and dogs, impact on shore bird populations. Not only do these predators disturb birds from carrying out their normal life cycle activities such as feeding on the tidal flats or roosting, they also reduce the likelihood of successful breeding seasons. Ground nesting shorebird eggs and chicks are especially vulnerable. Also if adult birds are sitting on the nest they are vulnerable to predation as well.

For example hedgehogs will prey on New Zealand dotterel nests for eggs. Predation along with other threats saw a sharp decline in NZ dotterel numbers. With intense trapping programmes and other strategies such as patrolling dotterel nests, the species has increased (enough to be classed as in recovery) to a population of approximately 1700 birds.

<http://www.doc.govt.nz/nature/native-animals/birds/birds-a-z/nz-dotterel-tuturiwhatu/>

7.2.3 Salt water paspalum

The Estuarine vegetation survey for Colville Bay lists salt water paspalum (*Paspalum vaginatum*) as the major invasive plant threat to the estuarine habitat.

This is a tropical to sub-tropical grass that grows in salt water with rhizomous roots. It has the ability to change the hydrology of an estuary as well as creating a thick sward of grass that becomes a monoculture once established.

Waikato Regional Council has undertaken control trials with Natural Solutions Marine and Terrestrial Ecologists Ltd. After these trials, areas on the Coromandel Peninsula that have high value biodiversity values and also had high community engagement were identified. Control work of salt water paspalum at six sites has been undertaken, including nearby Waikawau Bay.

By using a selective herbicide (with active ingredient Haloxyfop) that targets grass species but does not affect species such as remuremu (*Salliera radicans* – a sea meadow species) control of SWP is underway in estuaries where practical.

This work is done under a consent held by WRC (any herbicide spraying within the CMA requires a consent).

Haloxyfop controls the two invasive pampas species which are also targeted in the estuaries during spray operations.



Photo 10 Remuremu (*Salliera radicans*) emerging through salt water paspalum that has died off after being sprayed with the grass selective herbicide Haloxyfop.

For more information on salt water paspalum follow this link.

https://www.waikatoregion.govt.nz/assets/PageFiles/43988/Saltwater_paspalum_Mar08.pdf

7.2.4 Mediterranean fanworm (*Sabella spallanzanii*)

This invasive species, which is well established in Waitematā Harbour, was confirmed in Coromandel Harbour in 2013. Waikato Regional Council works with MPI to help protect coastal waters from this species around the Coromandel.

For more information follow the below link to the WRC Sabella website.

<https://www.waikatoregion.govt.nz/services/regional-services/plant-and-animal-pests/more-about-mediterranean-fanworm/>

8 Funding

There are a variety of organisations that can help with funding for various projects.

The Biodiversity Forum is an agency that informs and helps groups with applications to these various public funds when available. Their website is useful for allowing community groups to see what is available and what may fit their project in regards to the various private or government agencies.

<http://www.waikatobiodiversity.org.nz/>

Waikato Regional Council has funds for individual projects such as the Catchment New Works funding discussed earlier, to community projects such as the Small Scale Initiative Fund for community groups wishing to undertake pest control for up to \$5000.00.

The very active community groups within the Colville catchment have been successful in acquiring funding for predator control, biodiversity restoration works and community advocacy.

Moehau Environment Group, Te Kauae o Maui Ltd, the Colville Social Service Collective and Colville Harbour Care have all successfully received funding from various government agencies, including Waikato Regional Council, non-government organisations (NGOs) such as World Wildlife Fund and private trusts. The work in the catchment these groups are undertaking through volunteer and/or paid staff sees the Colville catchment well serviced for many of the environmental considerations in this document.

Waikato Regional Council will help fund individual landowners through the river management and catchment new works programmes as required as discussed in Section 4.

9 Communicating your projects

9.1 Communication avenues

A key factor into the success in any community project is being able to tell the story demonstrating outcomes and achievements with the learnings along the way both positive and negative.

For example Colville Harbour Care and other groups can be involved with various organisations such as NIWA's riparian restoration database project, to share their environmental programmes.

<https://www.niwa.co.nz/freshwater-and-estuaries/research-projects/national-riparian-restoration-database-project>

[Other avenues could include](#)

- catchment newsletters
- field days and other one off events such as the Conservation Week, Waikato Regional Council weed swap and drop in afternoon
- signage at key sites
- social media

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