Environment Waikato Technical Report 2009/12

Wharekawa Harbour and Catchment Management Plan

Vision - Wharekawa

The Wharekawa catchment will be enhanced through the protection of waterways and land by implementing sustainable land use and land management practices. Ensuring a healthy environment that provides a sense of community pride and promotes the preservation of the harbour for generations to come.

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Executive summary

The Wharekawa Harbour and Catchment Management Plan was created from a desire by the community to protect and enhance social, cultural, environmental and economic values in the community. It was done with the foresight of future generations so that they too would be able to live, work and play in the catchment.

This document has been prepared to provide a snapshot of the condition of the catchment at the time of inspection. It aims to provide sound recommendations for landowners, stakeholders and interest groups to remedy issues identified. The plan is not statutory but is influenced by local and national policies and plans.

Significant features of the catchment include:

- landscape values
- recreational values and access
- cultural and historical sites
- flora and fauna – including threatened and rare bird species
- coastal wetland areas
- generally good water quality
- a proactive community.

Key issues current and potential are:

- the perceived and actual impact of forestry activities
- potential for urban development
- declining aquatic and terrestrial
- evidence of a general decline in water quality
- changes in harbour vegetation – encroachment of mangroves into sea grass habitat and the expansion of salt water paspalum
- impact of animal and plant pests.

Recommended actions and implementation methods are:

- retirement of riparian margins wetlands, forest fragment and harbour fringe
- soil conservation and habitat enhancement planting in retired areas
- pest control – both plant and animal pest as identified in the Regional Pest Management Strategy
- river management and maintenance
- vegetation management in the harbour.

Estimated total cost of works is $628,000.00 actual costs will depend on the uptake of work, landowner contribution and industry price increases.

The success of this plan relies on the up-take and good will of the landowners and interest groups within the Wharekawa catchment. A number of projects and initiatives

are well underway within the catchment already, so, if a plan is only as good as the community that drives it then this plan and its community, are destined for great things.

1 Introduction

The Wharekawa catchment sits between the Tairua catchment to the north and the Whangamata catchment to the south on the lower east coast of the Coromandel Peninsula. Two small communities exist in the area: Opoutere and Ohui settlements.

The catchment is home to a strong pastoral farming and horticultural community as well as important aquatic and terrestrial biodiversity. To a large extent this community has not felt the development pressures like other coastal areas, but has concerns around the decline of the harbour and the impact of land use practices on the receiving environment.

In 2005, the Wharekawa community approached Environment Waikato out of concern around the infilling of the harbour with sediment and the perceived impact of forestry activities on the catchment. From here a Catchment Care Group was formed. This catchment is fortunate to have a passionate and proactive community who wish to preserve the natural characteristics of the catchment as well as the livelihoods of those who inhabit it.

The intention of the plan is to provide an assessment of current pressures and issues in the catchment, then provide a practical implementation strategy to alleviate these. Detailed plans will be developed in conjunction with landowners and land managers for specific works and issues on their properties.

1.1 Objectives and outcomes

A number of key objectives came from the community through discussions at hui, meetings and one on one discussions. These, in conjunction with the vision and objectives form the basis for the Harbour and Catchment Management Plan.

The community's wants and vision along with their dedication to protecting the catchment as well as Environment Waikato's commitment through the Peninsula Project for catchment protection are the driving force for this document.

1.1.1 Vision

The Wharekawa catchment will be enhanced through the protection of waterways and land by implementing sustainable land use practices. Ensuring a healthy environment that provides a sense of community pride and promotes the preservation of the harbour for generations to come.

1.1.2 Objectives

An integrated approach to the protection and enhancement of the Wharekawa catchment, from the mountains to the sea.

Promotion of 'best practice' techniques for the management of land and water, whilst ensuring social, economic, cultural and environmental prosperity.

1.1.3 Outcomes sought

- Improved water quality and biodiversity.
- Reduced hill slope and stream bank erosion.
- Reduced sediment and nutrient input into the waterways.
- Improved flood and stream management as well as identification of appropriate measures for works and restoration.
- Integration of existing works and initiatives.
- Greater links between groups and organisations in the catchment.
- Greater awareness of issues and the need to protect the environment.

- An engaged and involved community.

Additional aspirations that were raised and are addressed elsewhere in the document are to:

- protect the estuarine environment
- create a stable and healthy catchment
- decrease the spread of mangroves in the harbour
- identify opportunities for salt water paspalum control
- have forestry companies taking responsibility for adverse effects of forestry practices
- have a better relationship and working partnership with forestry companies
- protect and enhance recreational values.

1.2 Intention of the plan

The intention of the plan is to provide a current snapshot of the condition of the catchment and harbour and an implementation strategy to address the issues. Comparisons will be made over time as a result of recommended works.

This plan is non statutory and will provide a strategic and operational implementation framework. It will have the capacity to inform statutory documents such as district and regional plans. Its success relies on the uptake and goodwill of landowners and land managers within the catchment.

Environment Waikato staff will work with the Wharekawa Catchment Care Group, Iwi, interested landowners, agencies and stakeholders to implement this plan.

2 Background

Over the past three years Environment Waikato has been developing Harbour and Catchment Management Plans in two catchments; Whangamata and Wharekawa. It is proposed that this form of planning in conjunction with the Coromandel Peninsula Blueprint project continue.

The Wharekawa Catchment Management Plan will be implemented predominantly through the Peninsula Project with support from Thames-Coromandel District Council (TCDC), the Department of Conservation (DoC), the Wharekawa Catchment Care Group and Iwi.

2.1 The Peninsula Project

The Coromandel Peninsula is known for its beautiful environment. However, river bank erosion, debris blocking rivers and streams, the effect of animal pests on forest health and storms have caused widespread problems for communities.

The Peninsula Project aims to improve these issues. It is a collaborative project between Environment Waikato, Thames Coromandel District Council, the Department of Conservation and Hauraki Māori Trust Board established in 2004. Over the next 20 years, the project will have far-reaching benefits for both the environment and the people who live and holiday on the peninsula. It will:

- better protect people, property and essential services from flooding
- reduce sedimentation in rivers, harbours and estuaries
- improve water quality
- reduce pests such as possums and feral goats
- improve the diversity of flora and fauna
- improve and stabilise catchments
- sustain the mauri of the peninsula from the mountain ranges to the sea.

2.2 An integrated approach

Catchment Management has become a catch phrase in recent years with agencies and communities keen to get involved and to be thinking about catchments from the mountains to the sea. The idea being that whether you are working upstream or down, you need to be aware of the implications land use activities have, not only for the immediate area, but also for the surrounding catchment.

For the Peninsula Project, Catchment Management is based on principals of Integrated Catchment Management (ICM) philosophies, namely those developed and encouraged by Landcare Trust in particular studies carried out by Dr Nick Taylor. A fundamental difference between the two is that ICM is generally research focused whereas catchment management for the Peninsula Project is outcome and works focused.

Catchment Management is seen as a holistic approach to natural resource management. It seeks to integrate the relevant uses of a catchment (e.g. farming, forestry, conservation) in order to maximise their long term sustainability.

The receiving environment from any land use in a catchment is water and as such the success of catchment management is ultimately seen in water bodies such as rivers, streams and harbours. Catchment management extends beyond land and includes the communities that inhabit them and those that live or work on the land.

A successful catchment management project will result in healthy waterways both in terms of its environmental health and the wellbeing of the surrounding catchment and community.

The aim of catchment management plans is to link environmental issues and functions as well as engage with the communities that live and work within catchments. Catchment management works with the support of four key principles in mind. These are the consideration and support of economic, social, environmental and cultural outcomes.

The guiding factor behind Catchment Management planning is the involvement of communities. Environment Waikato, under its Regional Plan, states the need for communities to actively participate in preserving our environment and communities.

Community based management initiatives are encouraged as people who live, work or have a strong connection to an area have a greater sense of ownership.

2.3 Wharekawa community process

Over the last 20 years members of the Wharekawa community have noticed a decline in water quality and the health of the harbour in the Wharekawa Catchment. Groups such as the Opoutere Ratepayers and Residents Association (ORRA) have lobbied Environment Waikato for tougher rules on forestry harvesting practices and techniques out of concern about the amount of sediment entering the Wharekawa harbour.

More recently ORRA and community members sought advice from The Department of Conservation, Thames Coromandel District Council and Environment Waikato on how to best protect the catchment and preserve it for future generations to enjoy.

At this time Environment Waikato encouraged landowners to form a Catchment Care Group to support and promote existing Environment Waikato initiatives and encourage landowners to take part in protecting and enhancing “their patch”.

In October 2005, the Wharekawa Catchment Care group was formed and provides the primary contact for Environment Waikato with this community.

While this group provides a good link back to the greater community there are a number of other key stakeholders and groups that have been contacted or engaged in this project. They are:

- Opoutere Residents and Ratepayers Association
- Iwi
  - Ngati Hikairo
  - Ngati Whanaunga
  - Ngati Hako
  - Ngati Pu
  - Ngati Tamatera
- Thames Coromandel District Council
- The Department of Conservation

3 Legislative and planning framework

A number of legislative frameworks exist that guide and direct Environment Waikato in its various roles and functions. Additional statutes also govern and direct other agencies who have an interest in this catchment.

The key acts or plans that drive agencies in their work are the:

- Soil Conservation and Rivers Control Act (1941)
- Resource Management Act (1991)
- Waikato Regional Policy Statement
- Waikato Regional Plan
- Regional Coastal Plan
- Wild Animal Control Act
- Conservation Act
- Reserves Act
- Conservation Management Strategy for the Waikato
- Protected natural Areas Programme
- Whaia to Mahere Taiao a Hauraki – Hauraki Iwi Environmental Plan
- Thames Coromandel District Council Community Plan

Information on theses documents and the components that relate to this plan can be found in Appendix 1.

4 Catchment description

4.1 Location

The Wharekawa Catchment is located on the east coast of the Coromandel Peninsula in the southern part of the Coromandel Zone (see figure 1 and 2). The catchment contains 200 km of stream channel. The main waterway flowing into the harbour is the Wharekawa River.

For the purpose of this catchment plan, the catchment area is based on the catchment zoning that was developed for the Peninsula Project. The catchment not only includes the Wharekawa River but also includes sub catchments and lands that surround the Wharekawa Harbour. For this purpose the Wharekawa Catchment extends over an area of 10,168 hectares.

Figure 1: Wharekawa catchment boundary and location

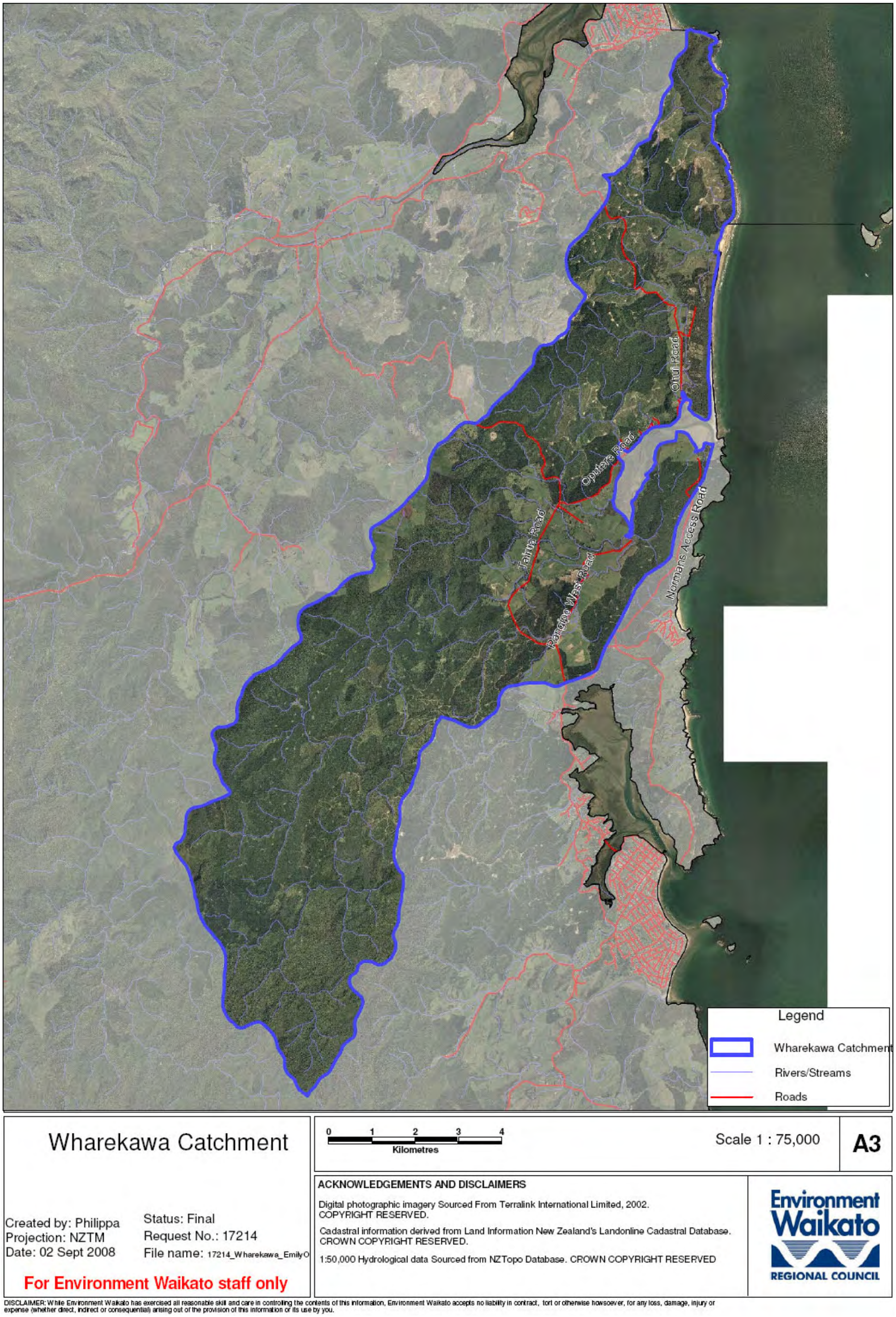

Figure 2: Aerial imagery of catchment with main roads identified.

4.2 Physical characteristics of the catchment

4.3 Geological features

The Wharekawa catchment is part of the Hauraki volcanic area with some influence from Mayor Island eruptions. The catchment is dominated by Whitianga group rhyolite and ignimbrite with very little Jurassic Greywacke as basement rock. This class is dated between 3-6 million years old. Parent material has been altered by geothermal activity but fresh (un-altered) andesite can be found on McBeths Road.

Aerial Image Looking South of Opoutere Beach and Wharekawa Harbour.

The Wharekawa catchment was included in the 1975 land inventory survey as part of the Coromandel Thames Counties area. The soil classification was carried out by the then Department of Lands and Survey. This record continues to be the most complete and relevant record of soils and land use capabilities in New Zealand.

Table 1: Soil classification of the Wharekawa Catchment

Soil Name	Soil Classification	Limitations for Use	Area (%)
Pinaki Sand Wet Phase (Brock)	Yellow to Brown Sands	Low nutrients and poor moisture retention	0.6
Puketui Hills Soil	Yellow to Brown Earth	Subject to sheet erosion	16
Whangamata Sand Loam and Gravely Sand Loam	Yellow to Brown Loam	Poorly developed soils, poor moisture retention	41
Tangatera Steep land soils	Yellow to Brown Earth	Low nutrient status, liable to severe sheet and slip erosion	33
Te Kie and Aroha Steep land soils	Brown Granular Clay	Soils of medium to low nutrient status, liable to erosion	0.9
Ruakaka Peaty Loam and Loamy Peat	Organic Soils	Uneven shrinkage, problems with water table control	3.3
Ohinemuri Loamy sand to Clay Loam	Recent Soils	Weakly developed soil. Soils of high nutrient status, subject to flooding	5

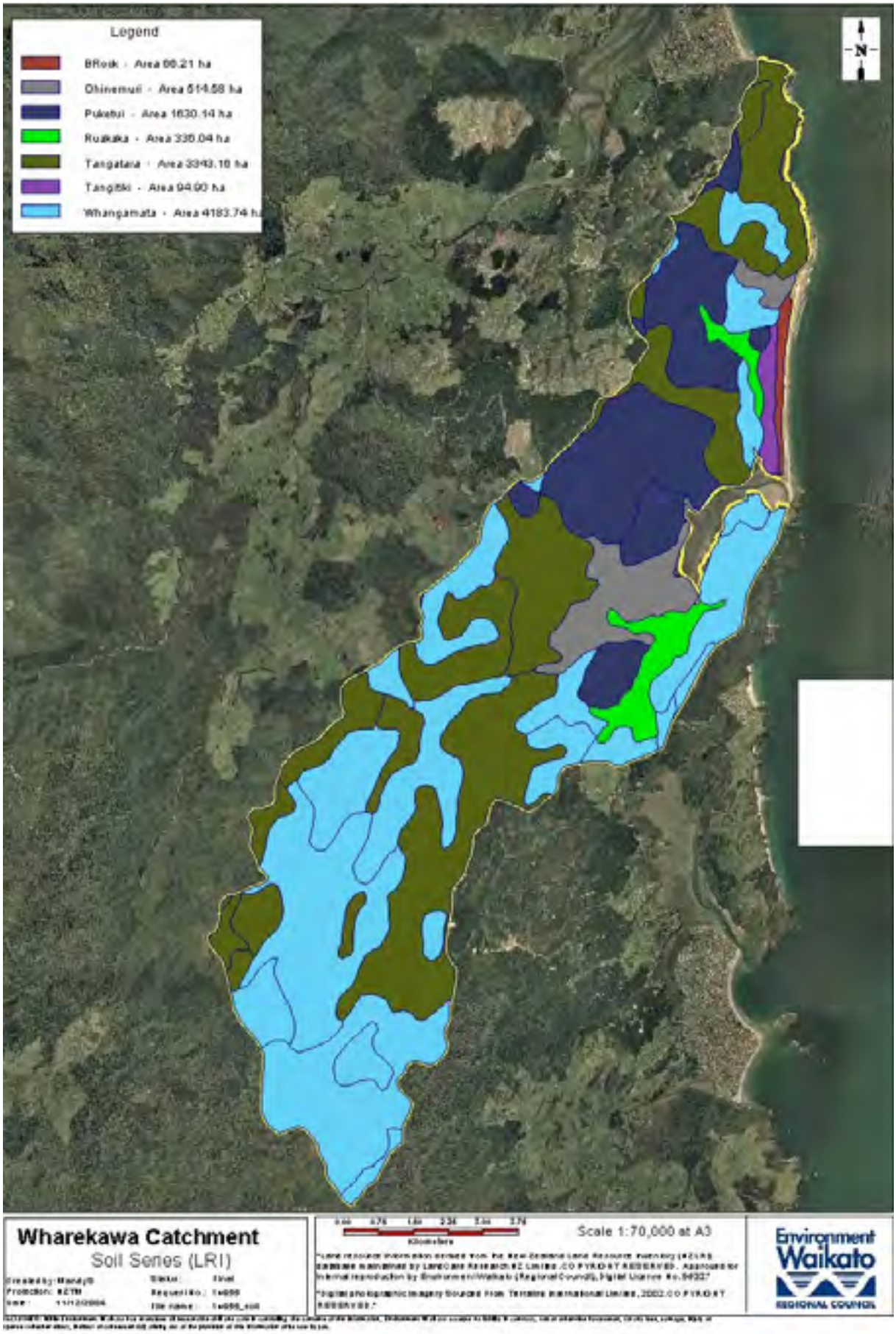

Figure 3: Soil classification map

4.3.1 Land use and land cover

Currently only 12% of the Wharekawa catchment is managed under a pastoral farming regime. This has declined in recent years with land being subdivided to lifestyle blocks. Unlike the neighbouring Whangamata catchment there is intensive dairy farming occurring, with 5 dairy farms still remaining. The remaining pastoral land is managed through beef and sheep farms.

The floodplain provides highly fertile soils, but production is limited by a weakly developed soil structure and being subjected to regular flooding.

Table 2: Land use and land cover - area

Land cover	Area (Ha)	Area %
Farmland / Grasslands	1222.71	12
Quarry / Mine	5.67	0.05
Plantation Forest (pine)	5284.69	52
Residential / Built up	13.86	0.13
Coastal	19.13	0.18
Orchards	14.17	0.13
Gorse / Broom	40.38	0.40
Indigenous Forest / Scrub	3564.46	35

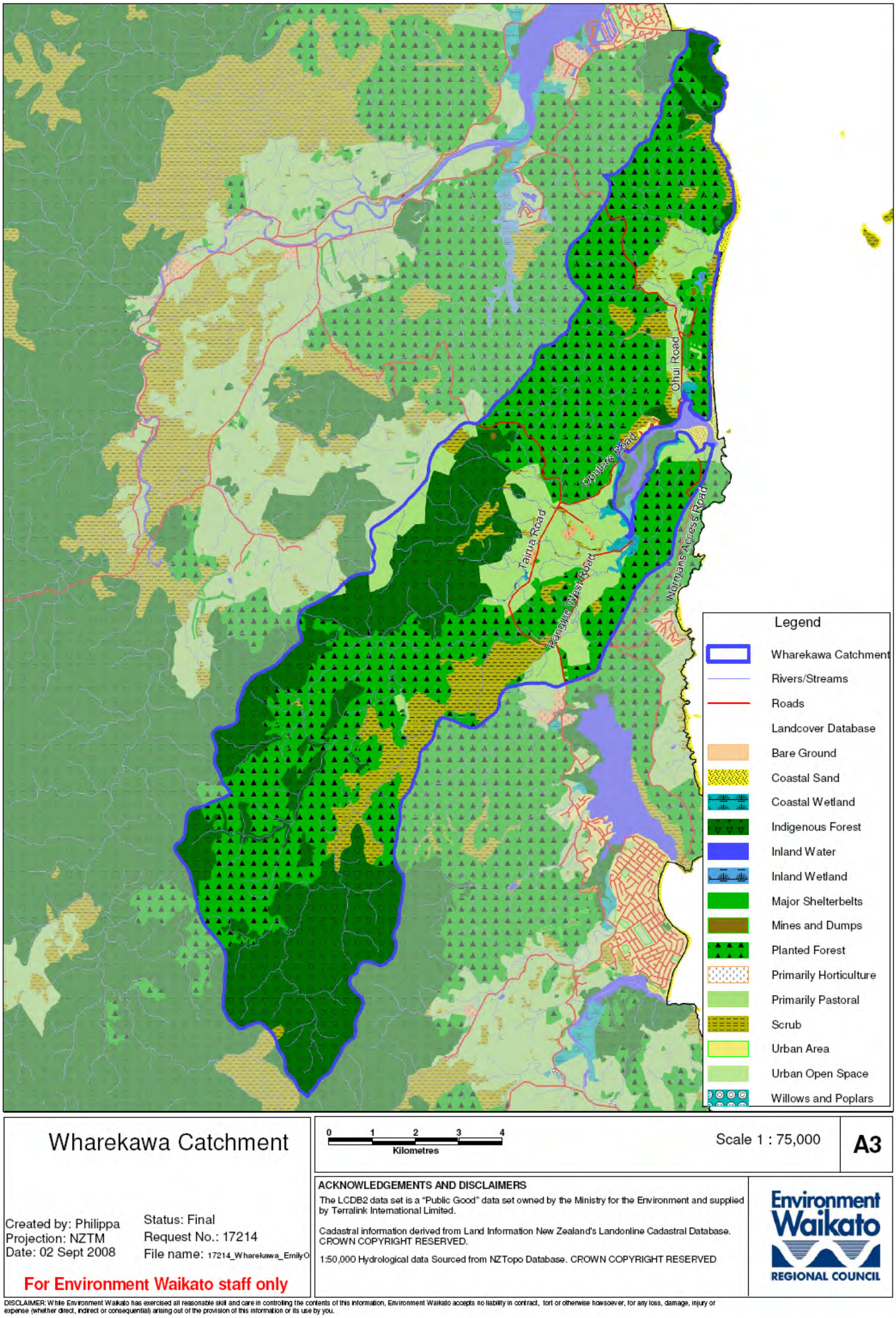

Figure 4: Land use and land cover

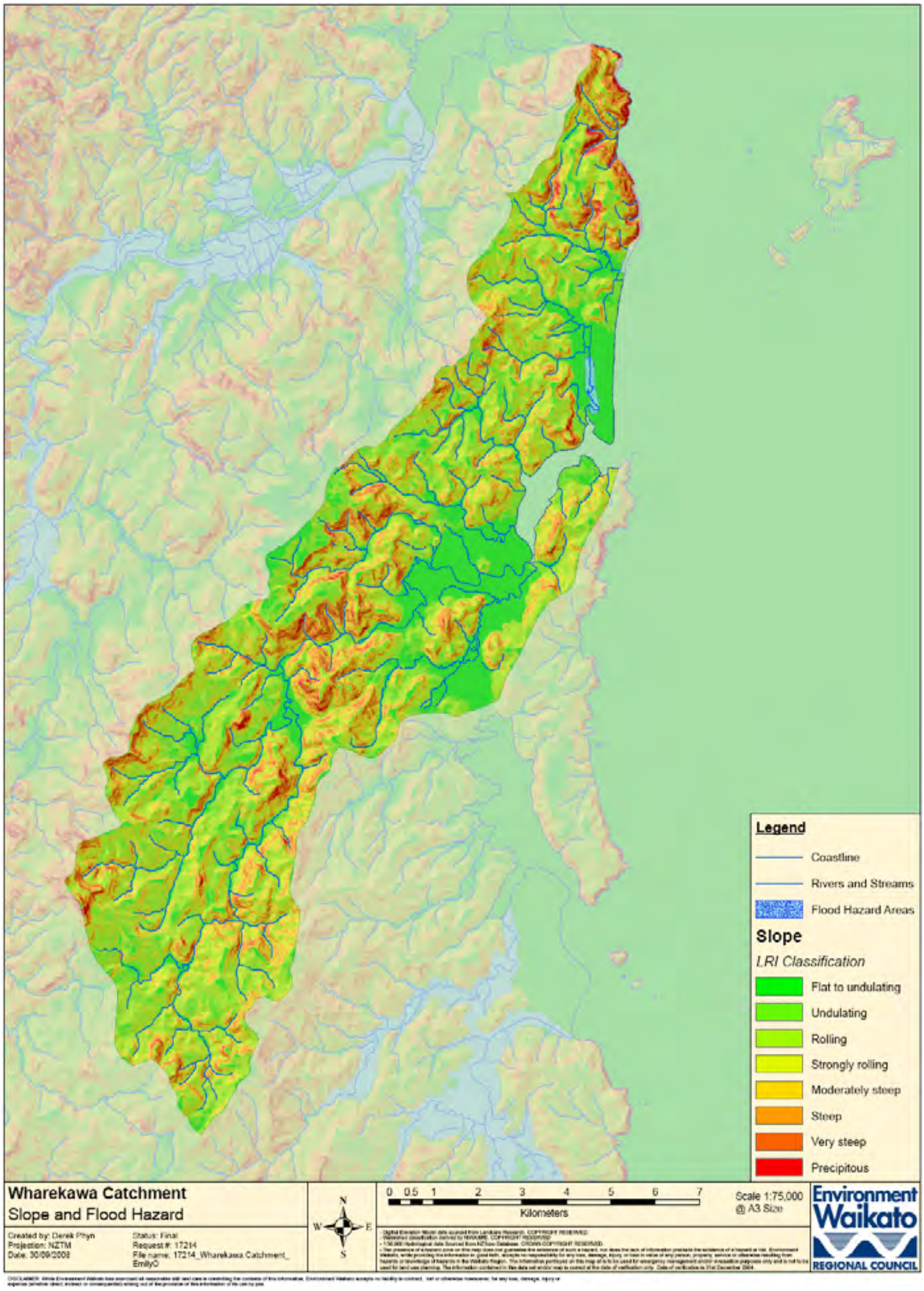

Figure 5: Slope classification

The steep sided catchment and rugged terrain lends itself well to plantation forests (52% of total catchment area) like both its neighbouring catchments Tairua and Whangamata. Similarly the domination of Radiata Pine has caused some concern for these communities. The steep land soils are limited by erosion, poor soil fertility and poorly developed soils. Between harvesting events the forests provide good cover and root structure to bind soils. Issues arise post harvest, when isolated weather events cause land slips and movement of slash and debris onto roads and neighbouring grasslands. The land is vulnerable to erosion and sediment run off for a seven year period between harvesting and the establishment of a new crop.

The rugged head waters of the Wharekawa catchment are predominantly in indigenous cover (35% of the catchment). The steep land, poor forest structure and damaged forest canopy leave this area vulnerable to weather events, with slipping common.

Like many areas of the Coromandel this catchment is still impacted on by historical activities (i.e. gold mining and kauri logging) that have disturbed the land and its stability.

Possum damage and high pig and rat numbers effect the regeneration and root structure of the forest leaving it frail.

4.3.2 Forestry

Forestry activities are carried out in close proximity to other landowners and the Opoutere community making them highly visible. This makes forestry companies an easy target for their role in sediment entering the harbour.

Research carried out by Eyles and Fahey 2006 included a comparison of sediment yield from forestry and pasture catchments. The study determined that over a 12 year period 'the farmed catchment produced almost four times more suspended sediment than the catchment in mature forest'. This means there was substantially less sediment produced from undisturbed pine or native forest than pasture on similar sloping land. However the same study also found that 'during harvesting sediment yields from the forested catchment were two and a half times more than the farmed catchment and six times higher than before harvesting". In summary most sediment run off caused by forestry operations, occurs over a short period of time (during harvesting) causing peak sedimentation and run off.

The communities best opportunity to influence forestry processes and activities is when the application for harvesting consent is lodged or by liaising with Environment Waikato's Resource Use Group to ensure appropriate conditions relating to managing

the harmful effects of run-off and sedimentation during forestry harvesting are implemented and monitored.

Environment Waikato also relies on communities to be their eyes and ears and to report any activities that raise concerns.

It is hoped that through the harbour and catchment management plan process greater interaction between the forestry company and the community will occur, allowing the communities concerns to be heard as well as providing an opportunity for the forest managers to educate community members on logging practices and techniques.

4.4 Ecology

The majority of the significant ecological features in the Wharekawa catchment are found in the harbour or coastal margins. However, it is important to note that Kiwi has been heard calling from the van Leeuwen property and there are regular sightings of Kaka, Banded Rail and Bellbirds.

For more information refer to 4.5.1 *Ecological features of the Wharekawa Harbour.*

4.4.1 Ecologic region

The Wharekawa catchment falls into the Tairua Ecologic District Classification (as defined in “What to Plant in the Coromandel Ecological Region”, Karen Denyer, Environment Waikato).

Recognising and understanding the ecologic region is important, as this highlights the poorly represented vegetation types and species. While there is plenty of native vegetation in the Wharekawa Catchment, it generally represents only one vegetation zone: the sub montane – montane zone. Coastal low land zones which support a range of plant and animal life have declined due to development and land use pressures.

4.4.1.1 Characteristics of the Tairua Ecologic District

The district is 90,703 hectares in size with 50% remaining in indigenous vegetation, only 4% is primary forest. This is the lowest of the four ecological districts that make up the Coromandel. The highest points of this district are Table Mountain (832m) and the Pinnacles (759m)

4.5 Water quality

Regional river monitoring shows the Wharekawa River is on average, satisfactory or better than minimum ecological standards. Stream temperature reached unsatisfactory levels for about one third of the monitoring events, and turbidity for about one tenth of the monitoring events.

In comparison to other Coromandel rivers the Wharekawa ranks in the lower top half where most of the rivers have similar levels of unsatisfactory results. The remaining results are evenly split between satisfactory and excellent.

The monitoring shows the Wharekawa River to be predominantly satisfactory for swimming standards. Unsatisfactory levels were reached for approximately one quarter of the bacterial results and approximately one fifth of the clarity results. Very few samples reached excellent levels.

The Wharekawa River ranks in the lower half of other Coromandel rivers in terms of swimming standards. On average about 20-25% of the results are unsatisfactory with most of the remaining result at a satisfactory level. There were very few (less than 5%) results returned that were considered to be of an excellent standard.

Data shows there to be an increase in total nitrogen levels (over an 11 year period), although the amounts have levelled out in the last 3 years. Despite the increase, levels still remain low.

Whilst the water quality is generally satisfactory, there is an overall decline in the water quality due to an increase in bacteria and nutrients. Experience shows that it is easier to protect and improve water quality while still in a relatively good state, rather than waiting for total decline.

4.6 Harbour and estuary

Coromandel harbours and estuaries were formed when sea-level rises inundated the land, which stabilised at about its current level 6,500 years ago. The original formation was very different to what we see today, as they have since filled with sediment.

Estuaries have a life; they are born, they age and then they die. Examples of the last stage in the aging process are seen at Hot Water Beach or at Waikawau estuary where the upper reaches of the estuaries are farmland and the lower reaches so choked with marine sands that the sea only enters at high tide.

The Wharekawa Harbour is very shallow, with 90% being inter-tidal. Sediment core studies show that the sedimentation rate has increased from 0.1 mm/year pre-European settlement to between 5 and 8 mm/year from 1945 to the 1990s. Given the characteristics of the estuary, it is most likely that almost all sediment input has been from the catchment.

Sediment deposition at Wahitapu Stream mouth

Harbours are the transition zone between the land and the coast. They are dynamic and complex systems, subject to change. As harbours are the receiving environments for runoff from land, activities in the surrounding catchment can result in changes to estuarine systems and ecology.

The health of the harbour relies on the management of the surrounding catchment and minimising detrimental inputs such as excess nutrients, sediment, faecal mater and bacteria. This in turn has negative impacts on the harbour area by:

- smothering shell fish beds
- increased weed growth i.e. salt water paspalum which impacts on the hydrology of the area and smothers native plant species
- increased mud leading to an increase in mangrove growth and a decrease in sea grass habitat
- infilling which reduces fish passage, spawning grounds and feeding sites
- causing algal blooms resulting in loss of access for recreational use and bans of shell fish gathering
- increasing bacteria levels and muddying water making it unsafe for swimming.

Through discussion with the community some harbour specific goals were identified. They include:

- productive pipi and cockle beds
- open water for recreational activity
- protection of the harbour fringe from grazing, weed infestation and erosion
- protection and diversity of coastal habitats
- a clean healthy harbour where people can interact with the environment.

4.6.1 Ecological features of the Wharekawa Harbour

Wharekawa Harbour is one of the more ecologically significant harbours on the Coromandel, especially from a wading and shore bird perspective, and is a Recommended Area of Protection under the Coromandel Protected Natural Areas Programme. It has some of the most extensive Zostera (sea grass beds) relative to its size on the Coromandel.

The Opoutere sand spit, a waahi tapu site, is a recognised significant site for shore bird nesting. To compliment this there are dune protection programmes in place between Ohui and Opoutere.

The harbour contains one of the most productive breeding sites for New Zealand Dotterel on the Coromandel and is in the top three New Zealand sites. Currently the predator control programme for Dotterel covers 200 hectares.

There are currently 14 Dotterel breeding pairs at Opoutere. The population started at 6 in 1995 and peaked in 2000 at 17 (information provided by Jason Roxburgh DoC). It was felt this peak was due to 'over managing' (dotterel were so well managed natural predation and losses were not occurring, which lead to the area carrying more dotterel than it would naturally in the area). The present day number is a suitable carrying capacity for the size of the area.

Small degraded wetland areas have been reported to host a number of bird species including threatened Australasian Bittern, Banded Rail and North Island Fern-bird. These systems are under threat from salt water paspalum.

The harbour area is diverse in natural vegetation and for its relatively small size, has a good representation of vegetation associated with estuarine systems in the Tairua Ecologic District.

4.6.2 Habitat in the harbour

Coastal habitats are important as they provide feeding, shelter and breeding grounds for fish, shellfish, birds and other species. They provide the base of the food web and aid in improving water quality by trapping sediment pollutants and nutrients draining from the catchment.

Wharekawa Harbour and Opoutere Sandspit were identified by NIWA as areas of significant conservation value, in the report: Lundquist, C.; Chiaroni, L.; Halliday, J.; Williston, T. (2004) Identifying Areas of Significant Conservation Value in the Waikato coastal marine environment. The Opoutere Sandspit is included in the Coromandel New Zealand dotterel watch programme and is run in partnership between the Department of Conservation, Newmont Waihi Ltd and local communities.

Wharekawa Harbour area supports a wide variety of plant and animal life, as illustrated in the two diagrams below. Any decline or degradation of habitat will affect these communities, potentially decreasing biodiversity and productivity. A decline in species abundance and habitat degradation has already been observed, and has been linked with sedimentation.

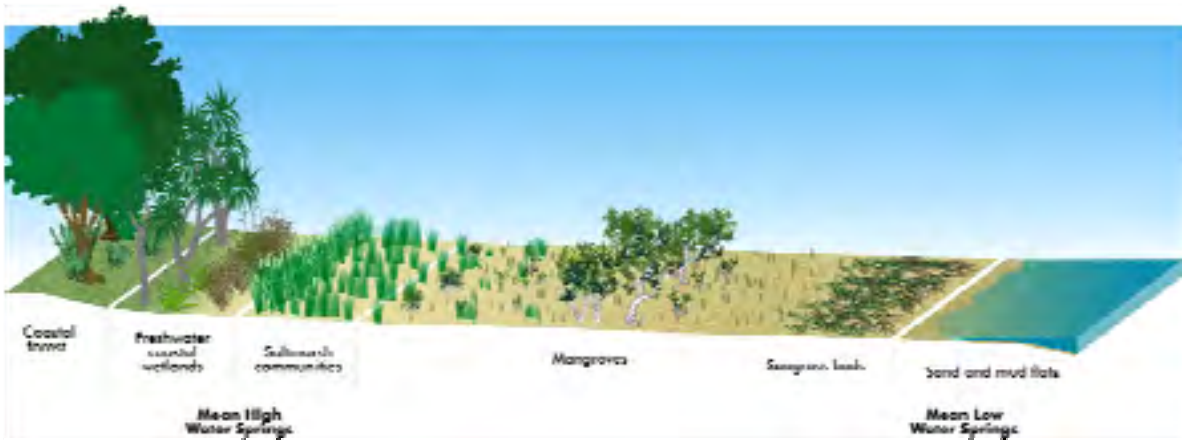

Diagram 1: Typical plant habitats of a Waikato estuary

The diagram above shows the range of plant habitats the Waikato region's estuaries typically feature at each tidal level.

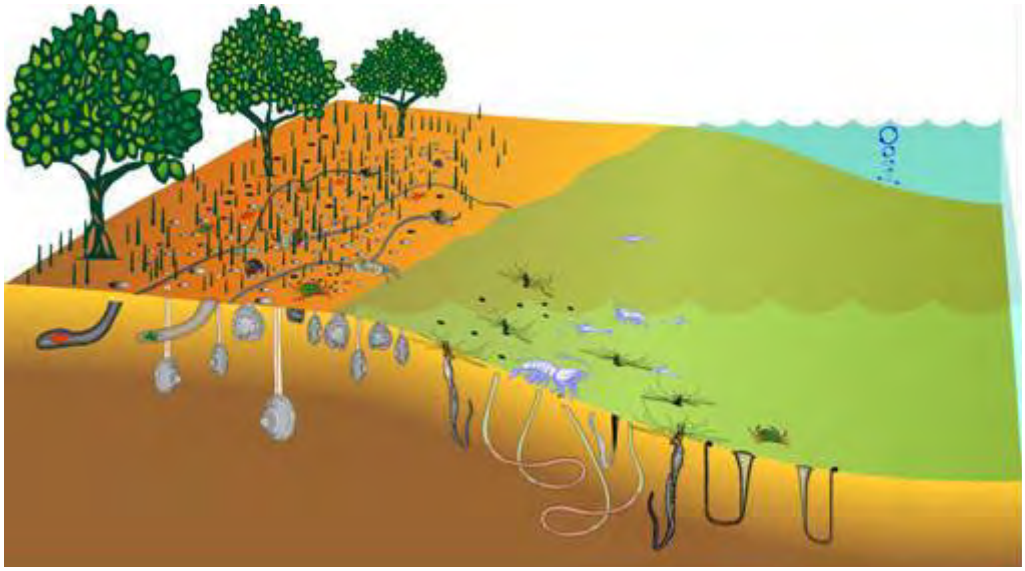

Diagram 2: Estuarine mud animal examples. Graphic by NIWA

4.7 Social

4.7.1 Tangata Whenua interests

The Wharekawa Catchment is etched in a rich cultural history that does not seem to be well documented. The haunting spirits of the people who once lived there still remain, brooding over their gardens, homes and sites of ancient battle. The maori culture that must have flourished here for some 700 years has passed away, leaving only signs of past glories the ruins of ancient defences, some of which are obscured by plantations of exotic pine.

Five iwi have been identified as having a interest in the catchment area. They are:

- Ngati Hako
- Ngati Hikairo
- Ngati Pu
- Ngati Tamatera
- Ngati Whanaunga.

A number of external factors have influenced the involvement and consultation of the iwi and associated hapu in the Wharekawa Catchment. This now leaves a crucial part of the document incomplete.

Steps are in place to gain further information from a maori perspective in relation to this catchment and to seek additional information to support this document.

4.7.1.1 Concerns and outcomes

Outlined below are some of the concerns raised to date. The key outcomes will come about if the relationship between tangata whenua and the community is strengthened and when work in the catchment is carried out in a holistic manor that recognises the intrinsic values of maori.

Concerns

- Recognition of the relationship which tangata whenua has with the natural and physical resources.
- Potential threats to the preservation of mauri.
- Partnership between tangata whenua, Wharekawa community and agencies not as strong as it could be.
- Greater recognition for role as kaitiaki to taonga such as kaimoana and waahi tapu sites.

Outcomes sought

- Outcomes to accommodate cultural and spiritual values held by tangata whenua.
- Tangata whenua satisfied that their concerns in regards to the mauri of water are being recognised and are being appropriately addressed.
- The relationship of tangata whenua with water and the coastal environment is better understood.
- Significant ancestral sites protected and value recognised.

4.7.2 A brief European history

The following information was kindly supplied by historian Louise Fury. This provides a brief history on the Wharekawa catchment and harbour from the arrival of Europeans to the catchment.

Changes to the natural environment of the Wharekawa Harbour area began hundreds of years ago when Polynesians arrived in New Zealand. Over the next few hundred years people fished, collected shellfish, hunted birds and cleared bush for gardens. Early historic maps show the bush clearance only extended about 1 km inland in the vicinity of the harbour. Re-growth was identified on maps as tea tree and fern.

European influences in the catchment prior to the 1870s were minimal. This was probably due to the fact that the river entrance was small and shallow, and the timber ships were unable to enter the harbour. However by the early 1870s there was interest in the kauri timber, and gold had also been discovered.

The ownership of the Wharekawa East Block which encompasses the catchment of the river was established in the Maori Land Court in 1872. The total land area was 23,714 acres. This was subsequently divided into five blocks of varying size: Wharekawa East Nos 1 and 2 cover the majority of the catchment area. Wharekawa East No. 1, taking in the headwaters of the river down to the river flats, was sold to the Crown in 1878 for £1000. There was an existing timber lease to take kauri at the western end of the block adjoining the Tairua Forest. This lease was on sold several times until Leyland O'Brien, an Auckland-based company, obtained the lease at auction in the 1890s. The upper catchment had previously suffered from two major fires but Leyland O'Brien still managed to recover a large amount of timber.

Wharekawa East No. 2 (6921 acres) encompassed the northern part of the catchment including the harbour, Wahitapu Stream and to the ridge separating the Tairua from the Wharekawa watersheds. In 1886 this block also became Crown land (gazetted 1887). At the time there was also an existing timber lease, and the early maps indicate old logging tracks through the hills behind the coastal flats.

Land in the lower catchment identified as suitable for pastoral use was leased under a system of pastoral leases from the late 19th century. These areas were principally around Ohui, Tawatawa and Paritu. Residential licenses were also issued from the same period for settlement at what is now Opoutere.

Kauri was felled in the upper Wharekawa catchment and transported to the coast by water released from behind the timber dams. During the period of Leyland O'Brien's lease there were up to 35 dams on tributaries of the river. The logs were collected behind a timber and chain barrier, known as booms, situated about 1 km upstream from the mouth of the river where they were tied together and rafted down the estuary to the scows waiting outside the entrance. The log raft was then towed to Auckland, a trip which took several days. Logging ceased in the 1920s when all the accessible timber was taken out.

Gumdiggers were also very active in the area, and many of the resident Maori families added to their income by collecting and selling kauri gum which they would either take to Whangamata and sell to Harry Watt, or it would be taken away by the steamer which brought supplies in once a month.

In the 1920s and 1930s, locals used to fish for snapper well up the estuary. There was sand (not mud) as far up as what was then Durrant's property at the mouth of the river. Stingrays and sharks were also taken from there in large quantities.

The majority of the area covered by Wharekawa No 1 and Wharekawa No 2 was gazetted as State Forest in 1930 and 1931, and plantings of pine and other species commenced at the same time.

4.7.3 Residential information

The Wharekawa catchment at the 2001 Census showed a permanent resident population of approximately 147 people, a 2-3% increase from 1991. The population peaks over the summer months with bach owners, camping and Parana Festival goers coming to the catchment. During the 2003/04 summer period its population reached four times its usual number.

Between 1991-2001, residential dwellings increased by 22% (from 138-168). Numbers are on the increase but slowly with only seven building consents issued between March 2001 and December 2005 (information sourced from TCDC website).

The community has no service centre of its own other than a local orchard and relies on the surrounding communities for goods and services.

4.7.4 The Coromandel Peninsula Blueprint Project

The Coromandel Peninsula Blueprint project is about planning where, what and how people can do things in and on the land and waters of the Coromandel Peninsula. The project, lead by Environment Waikato and Thames Coromandel District Council, is about determining what is 'appropriate growth' particularly in light of the projected growth for the district. A significant challenge is managing the growth demands and pressures whilst still protecting important community values. The district's communities have already told Thames Coromandel District Council what they want through initiatives such as community plans and community outcomes. The Coromandel Peninsula Blueprint Project will build on these community visions.

Basic community wants are:

- natural backdrops
- clean water
- healthy harbours
- good riparian management.

The Opoutere and Wharekawa area is not identified as a major growth area under the Blueprint project. However, it will potentially be impacted on by development pressures depending on the growth strategy chosen for the Coromandel Peninsula.

4.7.5 Key stakeholders

The number of interested stakeholders relative to population size in the Wharekawa area made this an attractive option for catchment management works as the interest and want already existed.

- Iwi
- Hauraki Maori Trust Board
- Local Community Interest Groups
- Wharekawa Catchment Care Group
- Department of Conservation
- Thames-Coromandel District Council
- Landowners and Residents
- Forestry – Rayonier
- Opoutere Ratepayers and Residents Association
- Opoutere School
- Forest and Bird

5 Catchment assessment

5.1 Values

A number of biodiversity and cultural values were identified through discussions with groups, individuals and stakeholders with an interest in the Wharekawa catchment. Some of these values are highlighted throughout the document, they are identified as follows:

- Recreational use and access: fishing, boating, kayaking, tramping, camping etc.
- Community: sense of pride, of place and of belonging.
- Harbour: both physical and aesthetic value.
- Kaimoana (seafood) gathering grounds in harbour.
- Cultural and historical sites.
- Native bush in the headwaters and fragments through out the catchment.
- Water quality: being able to swim and drink in the waters of the streams and rivers.
- Presence of rare or threatened birds: Dotterel, Bittern, Banded rail and other shore and wading species.

Even though these were identified as values, it does not mean that they are necessarily in a desirable state. Often the higher the value placed on them, the greater the desire to enhance and protect.

5.2 Key issues

The key issues for the Wharekawa catchment are listed below:

- Stream bank erosion and lack of appropriate vegetation.
- Decline in water quality.
- Invasive willow on stream margins.
- Forestry practices during and post harvest.

- Decline in forest health and structure due to high animal pest numbers resulting in increased erosion.
- Increased presence of weeds.
- Infilling of the harbour.
- Change in coastal vegetation particularly in the harbour – increase in mangroves and salt water paspalum.
- Nutrient application to land and potential run off effects.

5.3 Assessment

A ground based inspection was carried out on the physical characteristics of the Wharekawa Catchment on two occasions. Firstly the Wharekawa River inspection during October 2006 to commence development of a river works and maintenance programme, then in March 2008 to complete. A more detailed account of the condition of the catchment and potential remedial works required can be found in Appendices 5 and 6.

Ten streams and tributaries plus one river make up the catchment. For the purpose of the inspection the catchment was broken into six areas;

- Ohui and Opoutere – consisting of both settlements, the Wahitapu, Ohui and Kapakapa streams
- Tawatawa block – including the Paritu and Tawatawa streams
- Wharekawa River catchment – including tributaries
- Rangipo catchment – above and below the state highway just north of the Onemana turn off
- Southern headland – land adjacent to the southern side of the harbour entrance
- Harbour and estuary.

River and stream systems as well as surrounding land was the main focus for the inspections and made up the majority of recommendations for works. An assessment of the privately owned steeper land outside of forestry management was made, with only minor works recommended.

Harbour specific works have also been outlined but less of a focus has been placed on this as the recommended land management techniques, when applied, will have significant benefits to the health of the harbour.

Figure 6: Inspection area

5.3.1 Ohui and Opoutere

The Opoutere and Ohui area is more densely populated than the rest of the catchment area, with a greater number of residential, holiday homes and lifestyle blocks. The land to the north and to the west is managed by Matariki Forests Ltd and makes up more than two thirds of the block.

5.3.1.1 Ohui Stream

Access could not be gained to the properties surrounding the Ohui stream at the time of inspection. It is hoped to make contact with the interested landowners and to arrange to meet with them at a later date to look at developing a farm plan for this property.

Potential works may include:

- fencing off wetlands, streams and dunes from cattle access
- planting of retired areas
- erosion control planting
- possum control.

5.3.1.2 Waahi Tapu Stream

Issues

- Cattle access to tributaries and wetlands causing erosion and degradation to the stream bed.
- Un-fenced stream – mainly below Wahitapu road through agri-forestry block.
- Debris and silt coming off forestry onto pasture land during rain events.
- Weeds – pampas, broom and wattle. No major issues, more of a management/maintenance requirement.
- Minor work to remove vegetation and blockages in streams.
- Self propagating pine invading native areas.
- Salt water paspalum camp ground end, smothering vegetation.

Proposed actions

- Fencing to stock class standard.
- Minor digger works to improve channel and remove blockages, up to three days.
- Weed control on riparian margins and in native areas.
- Management of salt water paspalum in conjunction with Biosecurity group.
- Working with Matariki Forests Ltd to establish a buffer zone between logged areas and pasture/farm lands to decrease sediment and debris entering land after felling and during rain events.

5.3.1.3 Harbour fringe and Kapakapa Stream

Issues

- Blackberry, pampas, honey suckle issues in reserves and DoC parcel of land.
- Acmena smithii (Monkey Apple) growing in Opoutere settlement area, self sewn specimens growing along harbour fringe.
- Cattle access to harbour fringe and tributary causing pugging, damaging salt marsh habitat.
- Potential issue: If mangroves encroach on Kapakapa stream mouth and channel, this will cause flooding and poor channel performance during peak flow

Proposed actions

- Weed control on DoC parcel of land.
- Control of Acmena smithii.
- Fencing to stock class standard to remove cattle access to tributary and harbour/coastal marine area.
- Retire and plant harbour fringe.
- Monitor stream mouths for encroachment of mangroves into channel.

5.3.2 Tawatawa block

The Tawatawa block includes Liddell Road and the Paritu Stream. Four properties comprise the majority of this area (plus Matariki Forests Ltd).

The headwaters of the Tawatawa and the Paritu streams start in pasture lands at the end of McBeth Road then enter forestry (mainly production forest with some native) before returning to pasture. The lower Tawatawa stream and the harbour fringe have been protected under a historical Clean Streams plan. Additional planting would further enhance the site.

Issues

- Cattle access to riparian vegetation and stream bed on the upper to mid reach of the Paritu and Tawatawa causing stream bank erosion, degradation of the stream bed and impeded water quality.
- Degraded wetland area near school – over run with weeds (pampas, wilding grape vine, pussy willow).

Proposed actions

- Fencing off vegetation and riparian margins upstream (plan and funding has been approved for Bridson property in March 2008).
- Wetland restoration – good site for care group and school involvement.
- Encourage further planting on retired sites.

5.3.3 Wharekawa River

The Wharekawa River catchment is largely surrounded by pastoral lands. The head waters are in indigenous forest (administered by DoC) and flow downstream into production forest (Pinus radiata) before entering high producing grass lands. The main stem of the Wharekawa River is more than 22 kilometres in length.

Approximately 80% of the stream is fenced to stock class standard or is in the process of being fenced. This work prevents cattle accessing the stream bank and stream bed, significantly reducing erosion and run off. Once the area is planted or a grass buffer is established this will decrease nutrient run off and trap silt.

The mid reach of the Wharekawa has seen large willow (crack and fertile matsidana) block the flood plain and cause blockages in the stream channel, impacting on the carrying capacity of the stream during peak flow. A river management programme has been developed and is being implemented to alleviate some of these issues.

The lower reach is significantly influenced by tidal flow making it a prime restoration site for whitebait spawning habitat. Its proximity to the harbour makes it a popular recreational site for kayakers, who due to willow clearance can now go beyond the state highway bridge. Over the last few summers there has been an increase in the number of jet skiers using the channel and not abiding to the 5 knot within 200m of the shore rule. The wave action from the wake of the personal water craft is causing erosion and slumping of the stream bank as well as providing a possible navigational safety hazard to other channel users.

5.3.3.1 Lower reach

Area defined as from the state highway bridge down stream to the mouth of the Wharekawa River. The majority of the reach is in the process of being fenced or is already fenced to stock class standard. Proposed works generally relate to vegetation clearance.

Issues

- River bank erosion: particularly bad section directly below state highway bridge. Several hundred metres of stream bank erosion caused by cattle access further down stream on the true right.
- Stock access to stream banks; only a small section on the true left to be fenced, true right is almost completely unfenced.
- Invasive weeds in wetland area – two excellent wetland areas on the true left with some good native vegetation. Needs some weed management.
- Willow and poplar needed to be removed form river bank.
- Coastal wetland degraded (feeds back up into the Rangipo area).

Proposed actions

- Rock or concrete rip rap below bridge.
- Appropriate willow (sterile matsidana) and poplar pole planting for erosion control.
- Vegetation clearance on lower reach.
- Weed control in wetland area.
- Removal of obstructions and in stream blockages.
- Completion of riparian fencing mainly on true right bank.
- Where large areas of vegetation removed, replace with appropriate native. In particular just below bridge on true left.
- Coastal wetland enhancement – retirement and infill planting.

5.3.3.2 Upper reach

Area defined as up stream of the state highway bridge heading south west up to the headwaters. The riparian margins through the pastoral lands are generally well fenced with good vegetation cover.

Issues

- Invasive willow (grey willow).
- River bank erosion towards the top of the catchment. Badly eroded sections need repair (Schollum property).
- Crack willow (near Schollum's) needs removing though not urgent.
- Fences need upgrading in some minor areas above the bridge.
- Gravel and sand build up; islands forming in stream channel.
- Stock access to the stream margin causing slumping and bank erosion.
- Stock access damaging mature riparian native vegetation (left bank above bridge).

Proposed actions

- Vegetation management – removal of grey willow.
- Infill planting where vegetation is removed.
- Weed control (pampas, convolvulus) not a major problem. Needs to be managed before it becomes a problem.
- Gravel and sand extraction (van Leeuwen property) to centralise channel and improve channel capacity.
- Fencing to stock class standard (above bridge, true left bank).
- Willow planting for erosion control purposes.
- Willow layering on badly eroded sections and some rip rap work.

5.3.4 Rangipo

The Rangipo catchment was a significant coastal wetland up until the 1970s when it was drained under the then Catchment Board to be used as fertile farm land. Remnant rush species can be seen competing with grass species, particularly towards the harbour.

An ongoing drainage regime is carried out by the landowner with drain clearance occurring every 2-3 years.

The catchment is bounded by forestry to the east, west and top of the catchment, with the remainder in pasture (one dairy farm above the state highway, and beef conditioning blocks below).

Issues

- Stream margins unfenced above the state highway.
- Effluent disposal to land – historically there have been some concerns raised in regards to application rate and distance from stream edge.
- Weeds – pampas and woolly nightshade. Weeds are less of an issue downstream.
- Gaps in riparian fencing downstream.
- Very little, if any, vegetation on the stream banks to assist with stability and shading.

Proposed actions

- Riparian fencing (to stock class standard) and enhancing through appropriate planting.
- Weed control.
- Environment Waikato Resource Officer to look at effluent disposal and system.
- Encourage and support landowners to carry out and implement nutrient management plans.

5.3.5 Southern headland

Access could not be gained to the southern headland at the time of inspection. Approximately 80% of this area is in production forest, managed by Matariki Forests Ltd. The high producing grass land nearer the harbour entrance is owned by a company.

Several tributaries flow into the harbour from this land area, the only named stream is the Papahuahua stream.

Possible works for this area include:

- restoration and retirement of the harbour fringe and coastal marine area
- animal pest control
- plant pest control
- wetland restoration.

In order for works to be carried out an inspection with the landowner would be required and permission gained for works. Contact will continue to be sought with this landowner.

5.3.6 Harbour and estuary

Outlined below are the issues identified in the harbour. Some actions are proposed, but the majority of required works relate to land management practices and have been identified in previous sections.

The issues have been broken into four areas:

- Ecology
- Harbour Sedimentation
- Harbour vegetation
- Recreation.

5.3.6.1 Ecology

Issues

- Loss of coastal wetland from drainage and reclamation of the harbour edge
- Harvesting pressures on shellfish
- Lack of ecological corridors connecting the different ecosystems
- Decline in fish species numbers (including white bait)

Proposed actions

- Peninsula Project team to advocate retirement of riparian margins, forest fragments, wetlands and harbour fringes in a bid to link habitats by creating corridors
- Upgrade culverts to allow for fish passage
- Caregroups and landowners to seek funding for works from Environment Waikato by contact the Coromandel Land Management Officer
- Look at management options for shellfish; are there times where collection needs to be restricted? Does there need to be greater presence of fisheries staff?

5.3.6.2 Harbour sedimentation

The steep slopes of the landscape of the Coromandel Peninsula are vulnerable to erosion and therefore the estuaries of the Coromandel are prone to sedimentation. This sedimentation has very likely been accelerated by land use change. Initial catchment deforestation (shortly after European settlement) and subsequent pastoral farming likely initiated large scale erosion but land management practices have improved in recent years.

As part of forestry consents, Bioresearches have been carrying out a monitoring programme for Carter Holt Harvey (and now for Rayonier) in the harbour for about a decade. The monitoring programme shows a decline in invertebrate species sensitive to sedimentation. There are also signs that the harbour is infilling.

Results from studies have shown:

- Seabed level monitoring carried out over the last decade indicates present day sedimentation rates to be approximately 4.1 mm/year, which suggests that sedimentation has decreased slightly in recent years (when compared with rates of 5 to 8 mm/year for the period 1945 to 1995, calculated from sediment core studies). However, this measure of current sedimentation rates is still forty times that of pre-European sedimentation rates.

- The estimates for sediment yield (SedRate and Hicks and Shankar model – 60 and 96.9 tonnes/km^2/year, respectively) are much lower than sediment deposition measurements (sediment cores - 183 to 252 tonnes/km^2/year).

- Results from a sediment source study indicate that silt (flood material) contributed high proportions (29 to 95%) to the estuary sediments.

Issues

- Rate of infilling and amount of sediment entering the harbour - No one source of sediment (collective of land uses contribute to the results).

Proposed actions

Actions to address these issues are outlined in the land and stream assessment section above.

5.3.6.3 Harbour vegetation

The inter-tidal vegetated habitats makes up between 40-60% of the Wharekawa harbour. Of this more than 10% of the vegetation species are invasive exotic plants (i.e. Salt water Paspalum – *Paspalum vaginatum*). Sea grass and mangroves make up equal portions of the harbour (about 20%) with 41% of the channel being in inter-tidal flats and channels.

An ecologist was contacted to carry out a harbour vegetation survey in 2008, this allows for comparisons to be made between the current condition and a previous survey (Refer to figures 7 and 8). Changes in vegetation types and communities will be able to be examined, and management options recommended. It will also provide sound evidence as to how great the mangrove expansion has been in recent years. To date most of the information is anecdotal.

Rapid growth and spread of mangroves is a concern for the Wharekawa community. To the point where some unauthorised clearing occurred. This ended when the community began to look at a catchment management plan. The community wanted to look at the cause of the rapid mangrove growth as well as looking at management options. Records show mangrove cover was 20 hectare in1983 and by 1995 the area had increased to 49 hectare.

It is recommended that vegetation management options be looked at where mangroves are encroaching into sea grass habitat. Currently only threats to ecological values and flood mitigation can be considered by Environment Waikato in terms of mangrove management as these fit within the functions of the regional council.

An increasing issue within Coromandel harbours, including Wharekawa, is salt water paspalum. The reasons for this are that it:

- changes vegetation composition by out-competing and smothering other species. Infestations can form mats of 1m or more thick, and the below-ground component (roots) is just as extensive
- suppresses regeneration of other native plant species
- endangers populations of threatened plant species
- excludes burrowing fauna (eg: cockles) by way of the high density stem/root systems
- reduces access to feeding and roosting sites of estuarine birds
- alters fish spawning and feeding grounds
- modifies stream hydrology by trapping sediment.

Currently salt water paspalum is not a control species. However, it is proposed that steps be taken when the Regional Pest Management Strategy is reviewed to look at changing the status of this plant.

Issues

- Spread and growth of mangroves.
- Invasive exotic plants.
- Notable spread of salt water paspalum.
- Decline in endemic coastal species.

Proposed actions

- Community application for mangrove seedling removal consent, to hold the line pending further investigation.
- Seek resource consent to control salt water paspalum in the Waahi Tapu end of the harbour. Consent to be based on experiences at Matua in Tauranga and on NIWA research.
- Landowners and community interest groups to retire and restore coastal habitats around the harbours edge through removal of weed species, animal pest control, removal of stock access to saline areas.

5.3.6.4 Recreation

Issues

- Accidental spills of oil or contaminants in to harbour by harbour users. Threat to shellfish and wildlife breeding grounds.
- Ensuring good public access to the harbour and beaches is maintained for all to enjoy. Residents need to keep TCDC reserves manager and Environment Waikato Harbour Masters informed if an issue arises.
- Navigational Safety – appropriate signage and education of harbour users by the Harbour masters.
- Greater involvement needed by locals to monitor harbour activities.
- Decline in fish and shellfish numbers.

Proposed actions

- Establish honorary navigational safety wardens within the catchment to assist with educating the public on the rules and enforcing them when necessary.
- Maintain access ways and open water for activities.
- If accidental spill occurs contact Whangamata harbour master to seek advice and assistance.
- Identify opportunities to improve access, where appropriate, to and around the harbour and into the catchment.
- Shellfish gathering regulations continue to be enforced.

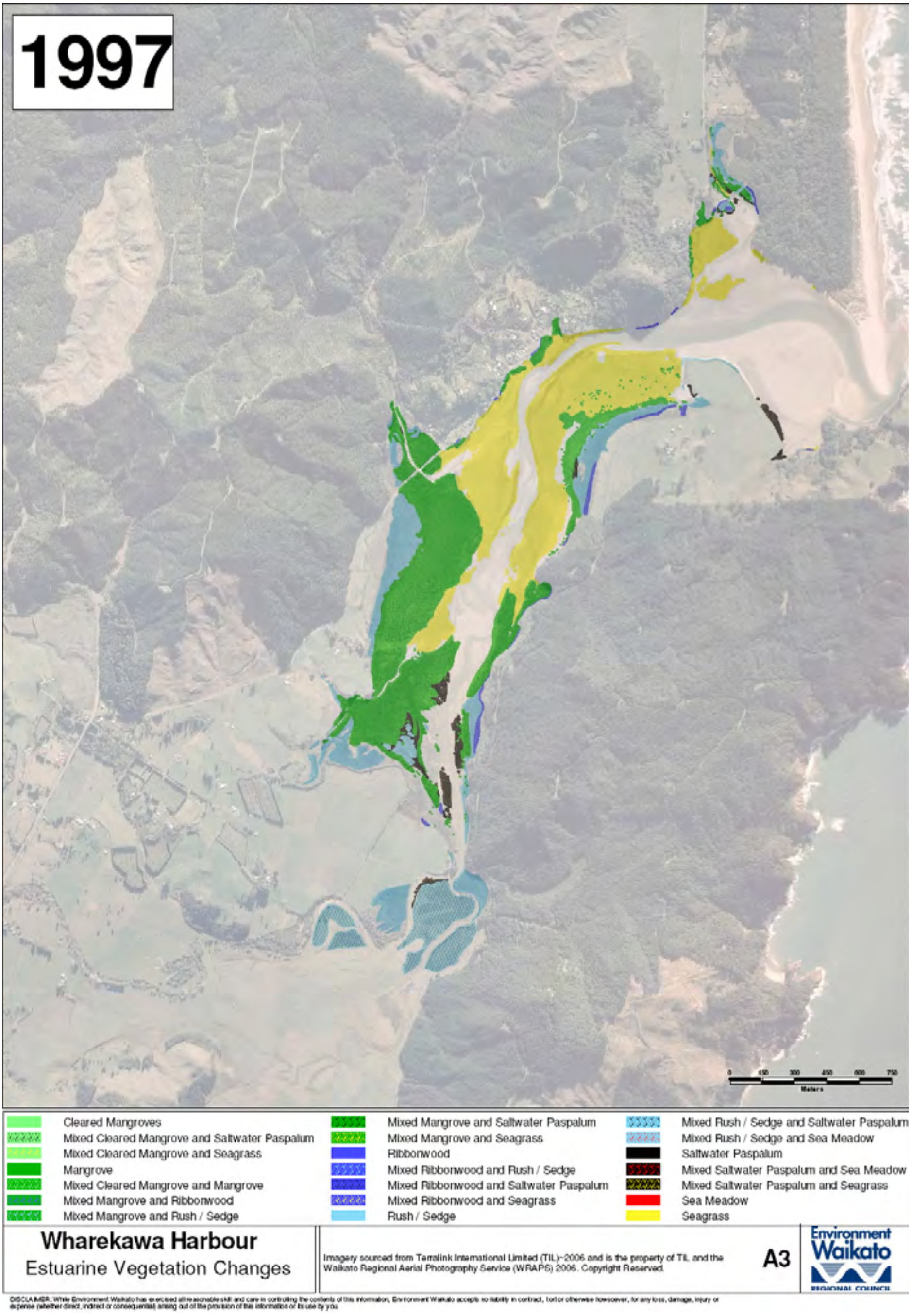

Figure 7:` Estuarine vegetation changes Wharekawa Harbour 1997

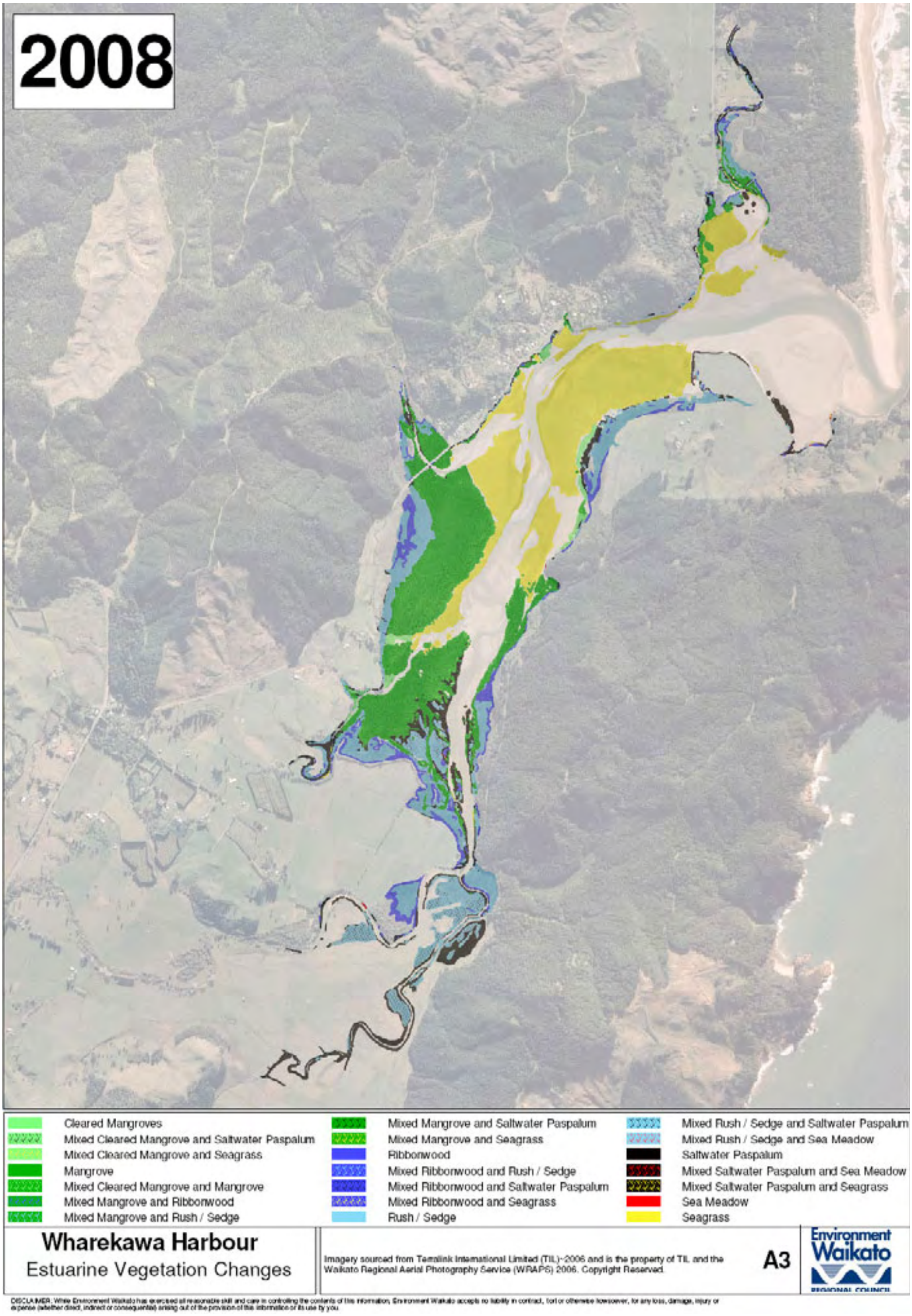

Figure 8: Estuarine vegetation changes Wharekawa Harbour 2008

6 Methods and outcomes

This section provides an overview of what would be involved in each component of work, the benefits and the expected outcomes.

6.1 Land management

Land management protection in this instance means enhancement work not associated with streams or wetlands. This work is essential in ensuring the big picture approach is taken and that the focus does not fall solely on stream works.

6.1.1 Methods

- Retire bush areas from stock access.
- Carry out pest control operations in pine and native bush on both public and private land.
- Encourage further forest fragment and riparian retirement.
- Rat control project around the harbour fringes and coastal wetlands.

6.1.2 Benefits

Land management protection works have the potential to have the greatest overall benefit to biodiversity by reducing animal pest numbers and allowing native species to successfully reproduce.

The focus on land cover and pest reduction would see improved forest structure with the ability to provide greater stability during rain events and consequently less erosion, downstream sedimentation and harbour infilling.

6.2 Land use practices

Relatively minor works can be carried out that will have a collective benefit to the harbour and water quality i.e. riparian fencing and planting. In order for there to be significant benefits, changes to land use practices need to be made.

Outlined below are some key areas of concern.

6.2.1 Nutrients and soils

Under the Waikato Regional Plan, where application of nitrogen exceeds 60kg per hectare per year, a Nutrient Management Plan is required. This is an opportunity to look at the amount of nutrients that are being applied (through effluent or fertiliser application) compared with what is being used, removed or lost from the system into ground and surface water. Applying more fertiliser does not necessarily mean more dry matter.

The benefits of a management plan are not only in terms of environmental benefits but also in terms of potential financial gains through reduced financial out lay.

It is a good opportunity to examine soil types, properties, limitations, soil structure and condition. Production gains can be significant by ensuring good biomass (i.e. worms) a good humus layer and organic matter content, examining porosity and looking at ways to remedy damage caused by pugging, cropping or cultivating.

6.2.2 Sediment sources

Tonnes of sediment and silt can enter waterways through poor management when carrying out earth works. Best practice guidelines (available from Environment Waikato) should be followed to ensure run off is contained.

Good practices include:

- buffer between works and waterways
- silt and sediment traps
- planning ahead – access ways and tracks that are given time to settle once constructed erode less. A benefit to the landowner in terms of repair and maintenance as well as reduced run off.

6.3 Riparian enhancement

For the purpose of this document riparian enhancement includes stream and wetland fencing, planting (both native and exotic species) and weed control.

6.3.1 Methods

- Native planting – planting of eco-sourced, site specific natives at 1.5 metre spacings (refer Appendix 2).
- Pole planting – poplar and matsudana willow pole planting used for their quick rowing dense root structure that binds soil. Species used do not form dense thickets and are a sterile variety.
- Fence out all waterways where stock have access, including tributaries and drains, to stock class standard.
- Wetland fencing to cattle class standard.
- Weed control – removal of weeds such as pampas and woolly nightshade either by chemical application or mechanical means.
- In areas where erosion is active, it is better to use willow stakes, or whole trees (layering). In such cases, there needs to be enough channel width to retain adequate flood capacity within the channel.

6.3.2 Benefits

- Decreased water temperature through shading.
- Creation of fish spawning habitat by retiring stream margins and planting.
- Decreased stream bank erosion by removing stock pressure and by planting appropriate plant species.
- Fencing:
  - increased water quality, by reducing the direct (cows defecating in the stream) and indirect (run off) inputs of faecal matter and nutrients
  - reduced stream bank erosion and surface erosion
  - stream bed health and stability improved – stock crossing/walking in the stream bed impacts on the structure within the channel and decreases aquatic invertebrate habitat
- Increased biodiversity by planting eco-sourced natives and creating new habitat.

6.3.3 Outcomes

- Improved water quality.
- Enhanced biodiversity.
- Stabilised stream banks.
- Reduced sedimentation.

6.4 River and flood management

6.4.1 Methods

- Removal of silt / mud that settles in the channel to maintain adequate channel capacity for each stream outlet on the harbour fringes. This will be done mainly by hydraulic excavator, and in some areas, the material will require complete removal from the Coastal Marine Area (CMA) where there is deemed a significant impact on the marine ecosystem.

- Repair eroding areas through site specific works and soil conservation planting and fencing.
- Removal or re-alignment of isolated whole trees, stumps or limbs that have fallen into the channel and which are likely to create an obstruction to flow or increase erosion.
- Removal of obstructive vegetation from the floodplain that may cause localised flooding. This includes species such as pampas, flaxes, willows and even mangroves.
- Undertaking simple erosion control work within channels.
- Spraying vegetation.

6.4.2 Benefits

- Increased channel capacity.
- Reduced risk of stream bank erosion.

6.4.3 Outcomes

- Adequate flow path in heavy rainfall events.
- Property and infrastructure protected.
- Improved water quality.

6.5 Animal pest control

Animal pests such as possums, goats and rats pose a threat to the forest canopy and structure. They reduce foliage cover and reduce the forests ability to slow down and trap water during peak rain fall events. Rats eat the seeds, stopping re-growth and an adequate under-story forming. Poor forest structure can lead to slipping, increased erosion and sedimentation of streams and harbours.

Animal pest control as part of a catchment management plan has multiple benefits. They include:

- increased bird and insect numbers through lack of predation and competition for food
- better foliage cover on vegetation
- increased vegetation cover and root structure leading to a decrease in run off and erosion
- decrease in faecal coli form levels in water ways leading to improved water quality
- opportunity for other species to establish (i.e. kiwi) or to be released in the area, increasing biodiversity and protection of natural heritage.

Base line surveys are needed, regardless of the treatment method, so that Residual Trap Catch (RTC) can be examined to define the scale of the problem. This information is used to determine the amount of resources required to get on top of the problem and also used to provide information for those tendering to carry out the works so that an accurate price can be determined.

Methods used are determined by:

- desired outcomes (i.e. biodiversity or foliar density)
- community wants and views
- landowner requirements (DoC have a policy of only using 1080, either in bait stations or applied aerially)
- accessibility of land
- cost/budget.

Once the operation is completed, post operation monitoring is carried out to ensure the targeted RTC is achieved. RTC targets vary depending on the goals and land use. For example RTC of 3% is desirable for biodiversity and forest health, where are production forest targets of around 18% sufficient to allow for growth of pine.

The Hikuai Wharekawa Community Possum Control Scheme have been active for a number of years and have recently carried out animal pest control works in the Paritu block. The efforts by this group would be rewarded by greater animal pest control works, particularly on crown managed lands.

6.5.1 Outcomes

Outcomes vary depending on the intensity of the operation, the objectives and the methods used. Key outcomes that can be expected as part of a comprehensive animal pest control programme include:

- improved forest health and forest structure
- increased biodiversity through decrease in predation and competition for food
- decreased erosion and slipping in upper catchment
- improved water quality.

7 Implementation

The following section looks at how the plan will be implemented and highlights the existing programmed and completed works for the catchment. It is proposed that the implementation of works be carried out within a short to medium time frame (10 years). Time frames will be dependant on the uptake of work from landowners. As there are already five landowners working on clean streams and soil conservation programmes it is hoped that river and enhancement works will be implemented in a shorter timeframe (5-6 years).

Recommended priorities for the 2008/2009 financial year have been made and are a guide only. A final programme will be confirmed through consultation with the community.

As previously stated, the plan is not statutory and the outcomes to gauge its success rely on the uptake of landowners and mangers in the catchment.

A detailed implementation strategy will be developed by the Harbour and Catchment Management Coordinator. This will provide a detail on the work that needs to be completed and assist in reporting outcomes and achievements back to the community and stakeholders.

7.1 Implementation strategy

A detailed implementation strategy will be developed by October 2009. This will be a stand alone document and will be inserted as an appendix to the harbour and catchment management plan.

The strategy will provide information on who is responsible for the various works, how and where actions will be implemented and in what time frame.

It will also aid in monitoring and reporting on the progress made and changes to the catchment over time.

7.2 Responsibilities

The scale and scope of the plan requires input from different groups within Environment Waikato as well as different organisations. Key responsibilities for the respective groups in terms of the Wharekawa catchment are outlined below.

River and Catchment Services

- Implementing the Wharekawa Catchment Management Plan.
- Overseeing and funding, soil conservation, stream management works.
- Ensuring target and outcomes set in plan are achieved.

Resource Use Group

- Monitoring permitted and consented actives within the catchment.
- Ensure that consent conditions are being met and best practice techniques are followed.
- Providing guidance on rules and guidelines.

Navigational Safety

- Support to community for honorary navigational safety warden.
- Ensure appropriate signage is in place.
- Take part in community events to educate harbour users on rules and safety.

Department of Conservation

- Provide support and advice on animal pest control.
- Support through land management responsibilities.
- Technical advice and support for endangered and threatened species recovery.

Thames Coromandel District Council

- Support to ensure works are in line with the community plan and the Blueprint project.
- Support from community board.
- Awareness raised at council level.
- Funding assistance where available i.e. rubbish disposal from clean up days.

7.3 Community process

Environment Waikato is fortunate to have had ongoing and continued support from the Wharekawa Catchment Care Group and is grateful for their patience throughout this process. It is envisaged that their networks and associations with other groups (i.e. Opoutere ratepayer association, Forest and Bird) will assist with the consultation process. The nature of the community, with its high number of non-resident ratepayers will require some thought into how to best capture their interest and input.

Steps have already been taken to gain the support of some landowners in the catchment by engaging them in riparian enhancement and river maintenance works.

Steps that will be taken to consult on the Wharekawa Catchment Management Plan will include:

- a targeted mailout to landowners greater than 5 hectares, to invite them to small group meetings
- meeting with iwi to hear their concerns about the catchment and how they feel the mauri of the catchment can be sustained and enhanced
- holding a community information day
- use of local media to keep the community up to date with progress
- newsletter to all landowners in the catchment on key information in the plan.

7.3.1 Community involvement

Wherever possible, opportunities will be created to ensure greater community involved. They will include, but not limited to:

- planting days
- weed busting
- a community nursery based at the school
- heritage mapping
- navigational safety promotion through local wardens

7.4 Works programme

Due to delay in the completion of the Wharekawa plan as a result of the shift in priority to Whangamata over the last year steps were taken to begin works within the catchment to demonstrate Environment Waikato's ongoing commitment to the project and to maintain community interest. They are as follows:

- **Land management:** Through Clean Streams and Peninsula Project Soil Conservation scheme a total works cost of $117,889 has been approved (and partly completed) in the catchment.
- **River management/maintenance:** Includes vegetation clearance, erosion control, removal of blockages and pole planting. To date $32,000 of works has been completed on the Wharekawa River channel.

These figures do not include staff time to plan, engage landowners and oversee works.

A detailed works programme will be developed annually for the catchment as part of annual planning for the Coromandel Zone.

Additional programmes will be developed for:

- plant pest control – with support from Biosecurity
- animal pest control – initially on private land where required, then a larger comprehensive plan developed as funding allows
- vegetation management in the harbour.

8 Costs

Environment Waikato funds river and catchment services on the Coromandel Peninsula under the Peninsula Project Funding Policy (Environment Waikato document number 924353). This policy provides for a Peninsula, Regional General Rate and land owner or community contribution to soil conservation, river management and flood protection works. At this stage, proposed works costs associated with the Draft Wharekawa Harbour and Catchment Management Plan total $628,000.00 as detailed below (this figure does not include ongoing annual maintenance costs, they do not reflect inflation, the rise in labour and materials costs or any requests for mangrove management). This is the total works cost including landowner contributions.

A detailed breakdown of expected cost is attached as Appendix 5 and 6. All recommended works costs are an estimate only, based on today's costs for materials

and works. Actual price will vary depending on uptake of work, land owner contribution, industry price increases and availability of materials.

Land Management Protection

Work/Materials	Cost/Item	Total Cost
Fencing - forest fragments gullies and erosion prone areas (8wire post and batten)	$18.00/metre	$12,000.00
Animal Pest Control -aerial	$26.00/ hectare	$156,000.00
Animal pest control – ground based		$162,000.00
Total Cost		**$330,000.00**

Riparian enhancement

Work/Materials	Cost/Item	Total Cost
Riparian fencing (3 wire electric)	$4.50/metre	$28,000.00
Native plants (including labour)	$5.50 per plant	$55,000.00
Weed control		$11,000.00
Pole Planting including labour		$5,000.00
Wetland restoration		$75,000.00
Total Cost		**$174,000.00**

River and flood management

Work/Materials	Cost/Item	Total Cost
Remove blockages		$45,000.00
Repair corners		$50,000.00
Willow removal		$29,000.00
Mangrove removal (to maintain channels)		$0.00 (as there is none required at this time)
Total Cost		**$124,000.00**

Vegetation/Mangroves

Work/Materials	Cost/Item	Total Cost
Investigation into mangrove issues		TBA
Seedling removal Consent		TBA
Salt water paspalum control		TBA
Total Cost		**TBA**

9 Funding

Environment Waikato funds river and catchment services on the Coromandel Peninsula under the Peninsula Project Funding Policy (Environment Waikato document number 924353). This policy provides for a Peninsula, Regional General Rate and land owner or community contribution to soil conservation, river management and flood protection works. At this stage, proposed costs for the catchment management programme total $628,000 (this figure does not include ongoing annual maintenance costs, labour cost or Coastal Vegetation/mangrove management).

The Peninsula Project Funding Policy also provides for targeted rates to be applied where there is significant local community benefit from works. This typically applies to flood protection programmes, but could equally apply to a harbour and catchment management programme where the community supported significant works being undertaken in a short-term time frame. The proportion of funds to be recovered from the particular community would be determined on a case by case basis.

The Peninsula Project is already significantly committed to existing projects in other communities and catchments. Under existing funding the implementation of the Wharekawa Catchment Management Plan would be carried out over the next 10 years or so. In order to reduce this time frame, targeted funding would be required.

Consultation with the community on funding, rating and costs of future works, services and activities related to carrying out the catchment plan's wider recommendations will also take place at each relevant stage as appropriate.

10 Monitoring and reporting

10.1 Monitoring

In 2005 the Peninsula Project initiated a monitoring programme on the Thames Coast, to monitor progress associated with animal pest control and flood management programmes running in that area. As part of the overall Peninsula Project it will be important to monitor and demonstrate change around the Peninsula. For that reason a monitoring programme was established for an east coast catchment.

The Wharekawa River Catchment is a priority for the Peninsula Project as it has been selected for the development of an integrated catchment management approach over the 2006/07 financial year. It is for this reason that this east coast catchment is selected as a monitored catchment.

River management and soil conservation initiatives are being implemented in the catchment. Catchment Environmental Monitoring (CEM) programmes support the use of soil conservation and river management works.

The aim of the monitoring is to demonstrate long term changes (and where possible quantitatively) in soil stability (stream bank and hill slope), sedimentation of surface water and aquatic habitat health for the Wharekawa River catchment where catchment management works are implemented.

10.1.1 Monitoring objectives

Where river and riparian management and soil conservation initiatives are implemented monitoring objectives are to:

1. Provide a representative (and where possible quantitative) indication of the long term changes to stream bank stability

2. Provide a representative (and where possible quantitative) indication of the long term changes in sedimentation of surface water
3. Provide a representative (and where possible quantitative) indication of the long term changes to stream bank character
4. Provide a representative (and where possible quantitative) indication of the long term changes to aquatic habitat condition.

10.1.2 Existing monitoring data

Monitoring in the catchment to date is minimal. The RERIMP (Regional Rivers Monitoring Programme) data is reported in EW technical report 2004/02 summarising information up to 2002. There is nothing noteworthy to report from this data other than total nitrogen has increased over the 11 year period the data was collected. A further three years of raw data since 2002 indicates that total nitrogen concentrations have levelled out. Despite the increase, total nitrogen concentrations still remain at low levels. It is important to note that the data since 2002 has not been flow adjusted, whereas the data reported in the technical report has been flow adjusted.

The annual stream ecological assessment as part of the REMS (Regional Ecological Monitoring) programme to date has some uncertainties over the consistency of the data collected. The inconsistencies have been identified and are now addressed with future monitoring. The Wharekawa River was dropped from the REMS monitoring programme but as the Wharekawa catchment has now been identified as a focus catchment for the Peninsula Project, it will be brought back into the REMS sampling programme. Due to the inconsistencies in the past over sampling locations and techniques, it is not recommended to put much weighting on the results collected to date.

10.1.3 Recommendations for monitoring

Monitoring methods consistent with those used for other catchments is recommended. However, monitoring will focus on the riparian areas in accordance with the priority work as determined by the Peninsula Project. The following methods are being proposed to provide a balanced assessment of long term riparian land and in-stream changes. Short term works monitoring will not be conducted as the environmental impacts of these works are likely to be far less than the long term environmental gains.

Monitoring will focus on assessing changes in the main Wharekawa River channel where the majority of the Peninsula Project work is scheduled. The following section of the report presents a summary of the scheduled monitoring, planned to commence in 2006/07.

Proposed monitoring methods for the Wharekawa catchment

Monitoring method	What is monitored and why	Frequency and term of change
1. Riparian characteristics	Change in fencing, vegetation and erosion - fencing decreases stock access, decreasing bank and streambed disturbance; planting increases bank stability	Repeated every 2 years Medium to long term changes (3-10+)
2. Photo points	Visual changes in riparian characteristics - quality of planting, aesthetics and bank stability are shown	Repeated every 2 years Medium to long term changes (3-10+)

3.	Suspended sediment site	Suspended sediment yields. Fencing decreases stock access, decreasing bank and streambed disturbance; planting increases bank stability. Collectively, soil conservation initiatives should reduce the land use contribution to sediment yield for the sub-catchments.	Event sampling Long term changes (10+)
4.	Stream temperature	Shading of surface water - shading increases as plantings grow, water temperature peaks during summer should decrease, providing good habitat for fish (~<20 C).	Annual Medium to long term changes (3-10+)
5.	Stream ecological health	Indicator of water quality – less sediment, nutrients and bugs in the water provides a good habitat for freshwater invertebrates	Annual Medium to long term changes (3-10+)

1. Riparian characteristics survey $8,000
   A riparian characteristics survey conducted in 2006/07. It is intended that the entire stream length from the forest edge to the estuarine margin will be assessed. The survey will collect baseline information about the amount of stream bank erosion relative to changes in riparian fencing and planting. It is expected that this method will show long term changes (>5 years) but some stream bank stability may be evident initially from exclusion of animals near the stream edge.

2. Photo points (cost included in riparian survey)
   A photo point assessment will be carried out. Photo reference points will be established and photos collected will be a valuable resource for showing early (<5 years) changes in riparian character.

3. Permanent suspended sediment site ($15,000 installation, $6,000 maintenance)
   A permanent sampling site will be re-established in 2009/10. This site will be used to collect suspended sediment samples during high flow events. The proposed location of the site is the same location used in the past, Adams farm bridge on the Wharekawa River.

4. Stream temperature ($2,500)
   Stream temperature monitoring sites will be installed annually (same 10 weeks over the summer months) at 3 locations along the river (initially it was thought 2 sites would be sufficient but through discussion 3 sites would capture a better picture:
   - SH25 bridge – lower end
   - Adams farm bridge – mid reach
   - Forest/farm boundary – upstream end.

   Temperature will be used to assess the effect of riparian soil conservation planting has through shading of the river. The initial data set will provide baseline data, which will be compared to subsequent annual data to indicate any change in stream temperature. Water temperature will be recorded for the warmer summer months as this is the time when high (>20° Celsius) water temperatures affect fish habitat.

5. Stream ecological health (no cost to the Wharekawa monitoring programme as it fits in to the REMS programme).
   A stream ecological health assessment will be conducted annually as part of the REMS monitoring programme at the Adams farm bridge. The MCI/QMCI will be calculated and used to indicate the stream aquatic habitat and biological condition. This will always be assessed in the gravely bottomed stream section to allow year to year consistency. At this stage this doesn't attract any extra costs for the Wharekawa catchment monitoring programme.

10.1.4 Monitoring schedule

The following schedule outlines the monitoring programme for the next five years (Table 2) with the estimated annual costs for the proposed programme.

2006/07	2007/08	2008/09	2009/10	2010/11
Riparian characteristics (including photo points)	Soil stability survey (2002 aerials)	Riparian characteristics (including photo points)	Install permanent sediment site	Riparian characteristics (including photo points)
Temperature	Temperature	Temperature	Temperature	Temperature
Stream ecology – REMS site	Stream ecology – REMS site	Stream ecology – REMS site	Stream ecology – REMS site	Stream ecology – REMS site
		Soil stability survey (2002 aerials)		Maintain permanent sediment site
$10,500	**$5,500**	**$15,000**	**$17,500**	**$16,500**

10.2 Reporting

The implementation of this plan will be overseen by the Harbour and Catchment Management Coordinator and progress will be reported to council via the Coromandel Liaison Subcommittee by the Coromandel Zone Manager.

Updates will be provided to the community of Wharekawa via existing community networks and local media.

Contact will be maintained with local iwi throughout this process.

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Appendix 1: Legislative and planning framework

Soil Conservation and Rivers Control Act (1941)

The Soil Conservation and Rivers Control (SCRC) Act (1941) has been replaced in part by the Resource Management Act (1991), but sections of the Act are still operative and are relevant to this management plan in respect of the responsibilities on regional councils (previously catchment authorities) in regard to flooding and soil erosion.

The objectives of the Act are:

(a) The promotion of soil conservation:
(b) The prevention and mitigation of soil erosion:
(c) The prevention of damage by floods:
(d) The utilisation of lands in such a manner as will tend towards the attainment of the objectives of the Act.

Resource Management Act (1991)

Part II of the Resource Management Act (RMA) 1991 outlines the purpose and principles of the Act as defined in sections 5, 6, 7, 8.

- Section 5 outlines the purpose of the Act to promote sustainable management of natural and physical resources.
- Section 6 deals with Matters of National Importance.
- Section 7 addresses Other Matters.
- Section 8 relates to the Principles of the Treaty of Waitangi.

Regional Policy Statement

The Waikato Regional Policy Statement (WRPS) provides a framework for resource use, which enables the regional community to achieve its social and economic aspirations, within the capacity of the environment. Where resource quality is high, it is the intention of objectives and policies to retain high resource quality. Where resource quality has been degraded through inappropriate use, the quality of such resources is intended to be improved over time.

Under the WRPS, Environment Waikato has a primary role for river and hazard risk management.

The key sections of the Regional Policy Statement that apply to this management plan relate to:

- land and soil
- water
- indigenous biodiversity
- natural hazards.

Waikato Regional Plan

The Waikato Regional Plan contains policy and methods to manage the natural and physical resources of the Waikato region. It implements the Regional Policy Statement.

The key sections of the Proposed Waikato Regional Plan that relate to this management plan include:

- matters of significance to Maori
- water quality
- wetlands

- biodiversity.

Regional Coastal Plan

Environment Waikato is responsible for managing the coastal marine area (CMA) that extends from mean high water springs to 12 nautical miles out to sea. District and city councils are responsible for managing land use in coastal areas above mean high water springs.

Whilst the Plan focuses on the management of the CMA, it also recognises that there are management issues which cross Mean High Water Springs. That is, because many activities occurring on the landward side of Mean High Water Springs affect the CMA. Integrated management is critical and consistency with other regional and district plans is necessary.

Management of the coastal environment is unique in that it is jointly managed by the Minister of Conservation, regional councils and territorial local authorities. Unlike other regional or district plans the final approval of the Regional Coastal Plan lies with the Minister of Conservation.

Department of Conservation

The Department of Conservation is the leading central government agency responsible for the conservation of New Zealand's natural and historic heritage. Its legislative mandate is the Conservation Act 1987 and other key statutes such as the National Parks Act 1980 and Reserves Act 1977.

Acts and Plans that impact on the Wharekawa Catchment are:

- Conservation Act
- Wild Animal Control Act
- Reserves Act
- The Conservation Management Strategy for Waikato
- Survey Report – Protected Natural Areas Programme (Coromandel ecological region).

Whaia to Mahere Taiao a Hauraki – Hauraki Iwi Environmental Plan

Section 3 (Te Whenua o Hauraki, he taonga) of the Hauraki Iwi Environmental Plan is of particular relevance. Environment Waikato recognises the role in which tangata whenua play as kaitiaki and aim to adopt this philosophy when working on environmental enhancement. The objectives set out in section 3 in relation to riparian zones, wetlands, forests, species, restoration and protection of ecosystems are of particular relevance and it is envisaged that the Wharekawa Harbour and Catchment Management Plan will compliment these.

Thames Coromandel District Council Community Plan - Whangamata

The Whangamata Community Plan was developed prior to the model that is now applied to TCDC community plans. As such, the surrounding communities (Opoutere / Wharekawa / Onemana / Otahu etc) were not included in the consultation and development of this plan.

However, TCDC apply The Whangamata Community plan over the wider area, including the Opoutere/Wharekawa area.

Visions and values in the plan of relevance to Wharekawa:

Visions

- The harbour will have a stable, natural backdrop including forests, bush walks, and appropriate land use.
- The harbour will be a clean, ecologically healthy, sandy playground in which human activity is in balance with nature.
- The beach will be clean and accessible, with naturally functioning dunes and bar.

Values

- Special interest groups are important because they have the commitment to ensure appropriate actions are taken.
- It is important to use the wealth of information held by the community.
- Diverse and varied knowledge in the community will lead to better decisions.
- Waahi tapu and other sites of historic value will be respected and protected.
- Community participation is essential.

Appendix 2: Soil classification and description

- **Recent soils -** Confined on the Coromandel to flood plains and streams.
  Mostly poorly drained in weakly developed horizons and of high nutrient status.

- **Yellow/brown earths**
  Derived from rhyolite, ignimbrite and siliceous sedimentary rocks = parent materials.
  Soil generally poorly supplied with plant nutrients.

- **Yellow/brown loams**
  Formed on late Pleistocene and Holocene volcanic ash beds and on alluvium containing a high proportion of volcanic ash. Very friable soils. Retention of phosphate in a form unavailable to plants. However good moisture retention, deep topsoils excellent for pastoral use.

- **Yellow/brown sands**
  Formed on fixed coastal sand dune, only on older dunes do soils have humus horizons. Rapid drainage, seasonal moisture deficits, low nutrient status are limitations to pastoral use.

- **Brown granular clay**
  Developed on weathered andesite and mixed andesite volcanic ash. Hydrous oxides of iron give rise to brown subsoil colours and to moderate to high phosphate retention.

- **Organic earth**
  Form where the water table is permanently high and vegetation accumulates as peat. Considerable amounts of minerals have been added by inwash or wind to Coromandel peat. These soils require high amounts of fertiliser. Need for careful controls of water levels and uneven subsidence are limitations of these soils to pasture use.

Appendix 3: Soils and agricultural properties

Source - Land Inventory Survey Coromandel Thames Counties 1975

- **Pinaki sand wet phase (Opoutere spit area)**
  Soil classification for Pinaki = yellow to brown sands
  Limitations of nutrients

  Location
  Easy rolling to rolling, fixed sand dunes. Parent material – wind blown beach sand.
  Soils of low to medium nutrient status; seasonally droughty.

- **Puketui hills soil**
  Soil classification = yellow to brown earth
  Limitations of erosion.

  Location
  Moderately steep and steep land; south from Whitianga mainly east of the divide.
  Parent material = weathered rhyolite. Similar to Puketui clay loam but soil is thinner. Also, inclusions of Whitianga silt loam and Whangamata sandy loam.
  Soils of low nutrient status, suitable for oversown pasture; sheet erosion.

- **Whangamata sand loam and gravelly sandy loam.**
  Soil classification = yellow to brown loams

  Location
  Easily rolling and rolling land; south from Whitianga Harbour.
  Parent material = Whangamata ash on Waihi ash very friable, poorly developed structure. Soils of medium to low nutrient status suitable for high producing pastures.

- **Tangatera stepland soils**
  Soil classification = yellow to brown earth
  Parent material = weathered and fresh rhyolite and ignimbrite.

  Location
  Steep and very steep land with many bluffs south of Kennedy Bay. Soils of low nutrients status liable to severe sheet and slip erosion.

- **Te Kie and Aroha stepland soils**
  Soil classification = brown granular clays

  Location.
  Steep to very steep land with many bluffs.
  Parent materials = weathered and fresh andesite weakly developed soil structure.
  Soils of medium to low nutrient status liable to erosion.

- **Ruakaka peaty loam and loamy peat**
  Soil classification= organic soils

  Location
  Found swamps, near river mouths and in depressions behind sand dunes.
  Parent materials= peat with some alluvium or wind blown sand.

  Limitations - problems with water table control and uneven shrinkage.

- **Ohinemuri loamy sand to clay loam.**
  Soil classification =recent soils

  Location
  Flood plains and low river terraces; widespread narrow strips.
  Parent materials = alluvium from weathered volcanic rocks, grey wacke and volcanic ash. Weakly developed soil structures. Soils of high nutrient status subject to flooding.

Appendix 4: Consented activities

Detailed below are a summary of the current consented activities within the catchment area as identified by Environment Waikato's Resource Use Group.

Type	Subtype	Finish	Purpose
Farm dairy effluent discharge to land	Farm dairy effluent discharge to land		
Farm dairy effluent discharge to land	Farm dairy effluent discharge to land		
Land use consent	Bed - disturbance	31/07/2029	Construct a culvert
Discharge permit	Discharge to water	1/06/2011	Discharge up to 34 l/s of stormwater from quarry site
Discharge permit	Discharge to water	1/06/2011	Discharge up to 66 l/s of stormwater from quarry site
Land use consent	Bed - disturbance	30/04/2031	Construct up to four stream crossings
Land use consent	Land - well	22/07/2034	Construct a well for water supply purposes
Land use consent	Land - well	6/10/2034	Construct a well for domestic supply purposes
Land use consent	Land - well	14/12/2034	Construct a well for domestic purposes
Land use consent	Bed - disturbance	1/08/2035	Install an erosion protection drop structure in the Wahitapu Stream
Discharge permit	Discharge to air	26/04/2011	Discharge odour to the air from effluent treatment & disposal facilities
Farm dairy effluent discharge to land	Farm dairy effluent discharge to land		
Land use consent	Land - disturbance	31/12/2023	Undertake harvesting of plantation forest which is within 5 metres of perennial water bodies within Tairua Forest
Discharge permit	Discharge to land	30/04/2015	Discharge up to 30 cubic metres of treated domestic effluent to the ground from a beach resort at Opoutere
Land use consent	Bed - disturbance	30/09/2041	Construct debris traps within the Kapakapa Stream and an unnamed tributary at Onemana
Land use consent	Land - well	31/03/2008	Construct a well for domestic water supply purposes

Appendix 5: Assessment of Wharekawa River October 2006

File No:	Z21 S780
Date:	19 October 2006
From:	Roger Spooner
Subject:	**Assessment of Wharekawa River – October 2006**

A ground inspection of the Wharekawa River was carried out on 18 October 2006 by Roger Spooner and Bob Muller. Results of that assessment [starting at the top end] is summarised as follows:

1. Individual Property Assessment

i) Foster (LB)

- Stream channel in relatively good condition.
- The entire reach is fenced with a single hotwire. Will need lifting as silt builds up from flooding.
- Good riparian zones with naturally regenerating natives. Some hybrid willows have been planted in the past to repair erosion.
- Couple of clumps of invasive willow present (grey?). Should be removed/sprayed. (Julian's side).
- More stakes required to stabilise erosion (minor).
- Couple of clumps of pampas needs to be sprayed to prevent further infestation.
- Leaning matsidana above bridge needs to be removed.

ii) Julian (RB)

- Inspection from Foster's side and didn't go above Foster's u/s boundary.
- Good riparian zones with mature natives.
- 30 metre length of erosion that needs heavy planting or layering.

iii) Schollum (LB)

- Excellent example of what a stream can look like.
- Well fenced and excellent riparian vegetation.
- Bad erosion on corner in the area retired by the SH. Needs layering (or riprap)
- priority.
- Some maintenance clearing of channel also required in this "reserve" area.
- Remove "crack" willow in reserve (not urgent). Good area to further enhance naturally regenerating natives.

iv) Adams (RB) (opposite main house, adjacent to SH)

- Fenced with good riparian vegetation.
- 20 metre length of erosion needs stake planting.

v) Brennan (RB)

- Two eroding areas need heavy planting in reserve area.

vi) van Leeuwen (both banks)

- Channel generally okay but needs some maintenance.
- Some crack willow needs removal (not high priority).
- Hybrid willows previously planted needs some maintenance.
- Two bad corners need attention (digger and planting).
- Fences generally OK. Needs attention in some isolated areas.
- Some good areas of native riparian vegetation. He is keen to enhance this.
- Two sites would benefit from gravel/sand extraction.
- One channel blockage needs removing (priority).
- Area immediately upstream of SH bridge (RB) ideal for planting with natives. Is visible from the road and he is keen to plant.

vii) Bridson (LB above State Highway)

- Not fenced or ineffective fencing. Stock grazing to rivers edge.
- Large area of natives slowing being destroyed by stock.
- Ideal area of forest fragment to retire.
- Crack willows in channel need removal.

viii) Crook (RB)

- Bad corner needs further planting.
- Further planting d/s would be an advantage.
- Rock or concrete riprap required to protect very large gum tree from undermining

ix) Bridson (LB d/s State Highway)

- Large area of willows and other trees have potential to be retired and eventually planted in natives. Will require substantial willow removal.

x) Palmer (LB)

- Channel is fenced virtually over its entire reach to the upper estuary area. One small bit to do at bottom end.
- Two excellent areas have naturally established as wetlands. These have been enhanced by the exclusion of stock. Removal of willows in the upper one would further enhance this.
- There is a forest fragment area which I presume is fenced.
- The common channel they share with Adams has significant crack willow infestation.
  - 900m is heavily infested
  - 700 m is moderately infested
  - 400 m is lightly infested
- 30 m length of erosion at d/s end.

xi) Adams (RB)

- Apart from a 500m reach near the middle, there is no fence.
- Where it is fenced, there are signs of native regeneration and would be a good place to enhance further.
- As with Palmer's, the common channel needs clearing of willows.
- Three corners of erosion. Significant stock damage evident at these sites.
- Two areas of marginal land would be ideal for wetland development if Adams was willing (each being around 1.5 ha).

2. Priority Works

At this stage I see the priorities being:

- Channel Management
  - Clear willows in channel below SH bridge (next 2 years).
  - Remove isolated blockages above SH bridge (next 2 years)
  - Repair erosion above bridge. Schollums corner is high priority and should be done this year. Others are less a priority and most can be done by providing willows for the landowners to plant.
  - Clear / maintain trees in rest of channel (years 3-5).

- -Riparian Enhancement
  - Retire the area of natives in Bridson's above the SH.
  - Fence the remainder of Adams once the clearing is done.
  - Natives in van Leeuwen's above SH.
  - Consider retiring Adams 2 areas into wetlands?
  - Further enhance ideas identified.

3. Funding

Current levels of funding for this river are	Maintenance	$10,000
	River Improvement	$10,000

4. Estimate of Costs for Channel Management Works only

Downstream of State Highway

(i) Clear Willows

(a)	900m of heavy willow		$	
	- clear and stack only 10 days @ $1600		16,000	
	- burn and regrass		8,000	
	- remove/reinstate fences		2,000	
	- spray		1,000	
	- follow up pole plant - poles 150 @ $10		1,500	
		- labour $5 ea	800	
				say 30,000
b)	700 m of moderate willow			
	- clear and stack only 6 days @ $1600		10,000	
	- burn and regrass		5,000	
	- remove/reinstate fences		2,000	
	- spray		1,000	
	- follow up pole plant - poles 100 @ $10		1,000	
		- labour $5 ea	500	
				say 20,000
c)	400 m of light willow			
	- clear and stack 2 days @ $1600		3,000	
	- burn and regrass		1,500	
	- fences		500	
	- spray		500	
	- f/up pole plant (Adams side only) -30 @ $10		300	
		- labour $5 ea	150	
				say 6,000

(ii) Repair Erosion Below Bridge
(fencing including in riparian works)
4 sites totalling 250 metres
planting should be successful if adequately fenced

200 heavy stakes @ $2.50	500	
Planting labour	500	
		1,000

Upstream of State Highway

(iii)	Remove willows and isolated blockages			
	Most works are in/adjacent o van Leeuwens			
	- clear and stack – 4 days $1,600		6,400	
	- burn		3,200	
	- spray		400	
	- fences		1000	
				11,000
(iv)	Repair erosion			
	a) van Leuweens 2 corners			
	- reshape and layer 3 days @ $1,600		4800	
	- plant/miscellaneous		200	
				5,000
	b) Vicinity of Brennans 2 corners			
	- heavy stakes 70 @ $3.00		200	
	- plant		300	
	- machine 1 day		1,000	
				1,500
	c) Schollums – Layer bad corner			
	- layer and clear down stream 2 days $1,600		3,200	
	- contingency		800	
				4,000
(v)	Maintenance Plant			
	Say 200 stakes @ $3		600	
	Say 100 poles @ $10		1,000	
	Labour to plant		1,000	
				2600
(vi)	Maintenance to channel/willows			
	Say 2 days @ $1600		3,200	
	Spray		1,800	
				4,000
	Total Works Cost			**85,000**
	Supervision			15,000
	Total Cost			**$100,000**

Note: Clearance under State Highway bridge would fall back on Transit if required.

5. Cost Sharing For Channel Management

Of the estimated costs scheduled in Item 4, those in red are works that can easily be carried out by the local landowners.

This amounts to $31,000 that they can do which represents;

- 36.5% of the cost of works ($85,000)
- 31% of the Total Estimated Cost ($100,000)

If we consider this as a total project with approximately half being river improvement and half being maintenance, the expected minimum contributions from landowners could be considered as follows.

		EW		**Landowner**	
Maintenance	$50000	50,000		?	
River Improvement	$50000	25,000		25,000	
	$100,000	**$75,000**	**max**	**$25,000**	**min**

On this basis, the community has the ability to be able to contribute some $6,000 more than the absolute minimum that would be expected for these works.

6. Recommendation

During the inspection, I spoke to all the major landowners. Adams, Palmer and van Leeuwen all indicated a willingness to contribute to any works. Schollum may be a challenge.

Taking into account the contributions from these landowners I recommend the following river works be undertaken this year:

- Clear channel through Adams / Palmer (approximately 30%).
- Remove bad blockages in van Leeuwens.
- Repair Schollums corner (winter job).
- Provide willows for landowners to plant under our direction.

Appendix 6: Stage two assessment of Catchment

File No: Z21 S780

Date: 9 April 2008

From: Emily O'Donnell

Subject: **Assessment of Land and Sub-Catchments Stage Two Wharekawa Catchment**

Assessment of Land and Sub-Catchments Stage Two

Inspections of the streams flowing into the Wharekawa Harbour and surrounding land were carried out in two stages.

Stage 1 Main Wharekawa Channel inspection was carried out by Roger Spooner and
Bob Muller on 18 October 2006. This is recorded in Doc # 1117990

Stage 2 Tributaries and lower Wharekawa was carried out by Emily O'Donnell, Suzanne Morgan and Roger Spooner on the 4th March 2008.

1 Waahitapu Stream

i) Upper Waahitapu Stream
- Pampas, broom and wattle has invaded the riparian margin of the stream
- Manuka cover good in places
- Both sides fenced in single hotwire
- Agri/forestry area – slumping of stream bank, unfenced large heavy stock impact on stream margin
- Weed control through agri/forestry area
- Wetland area out of forestry

ii) Camp Ground to Estuary
- Salt water paspalum intrusion
- Some good native stands, (coastal ribbon-wood, flax)
- Weeds – pampas, paspalum, wattle, wilding pine

Eastern side of sub-catchment - old wilding pine. Pine are holding sand bank together and land is a combination of DoC and private ownership.

Western side of sub-catchment – pine forest recently felled (last four years) has previously been issues in debris coming off forestry onto pasture land during rain events.

2 Harbour Fringe – from Opoutere Community toward Bridson's

- Some weed issues on reserve and harbour fringes (pampas, saltwater paspalum) generally reserve is just a mown strip
- DoC parcel of land next to Bridson's, cattle grazing area and access to harbour fringe and stream/tributary.

- Weeds – pampas, convolvulus, blackberry, honey suckle
- Channel of tributary under causeway, currently clear of mangroves will need to be managed to ensure it stays that way.
- Harbour is fenced with some planting through Bridson's

3 Tawatawa Stream

- Harbour up through Alan Bridson's, fenced and planted in some existing native
- Cattle access removed on true right as well
- Stream leaves Alan's and enters forestry for a short time before heading back into pasture lands (upstream)
- Upstream - good native riparian vegetation, currently cattle have limited access. Landowner (Murray Bridson) has since been engaged in fencing / stream and bush retirement works

4 Rangipo Channel

i) Above main highway
- Tributaries unfenced
- Travelling irrigator: follow up with RUG re effluent disposal and compliance
- Weeds – pampas, woolly nightshade

ii) Below main highway – Adams property
- Some fencing additional fencing required
- Historically, site was a coastal wetland, lower section attempting to revert, often wet in poor grazing
- Main Rangipo channel cleared by landowner every 2-3 years
- Very little weed problems

Overview of Works

1 Channel Management
- Maintain adequate channel capacity on harbour fringes for each stream outlet. Ensure vegetation does not encroach on channel
- Clear channels for obstruction or blockages
- Fence out main waterways where stock have access (includes tributaries and drains)
- Manage / remove unwanted vegetation in channel and floodway areas
- Repair eroding areas through specific site works and soil conservation planting and fencing

2 Riparian Enhancement
- Retire and plant in appropriate native species
- Carry out weed control and maintenance
- Restrict stock crossing points and install dry crossings where necessary

3 Upper Catchment Protection
- Retire bush areas from stock access and plant fringes to stop weed invasion
- Carry out animal pest control operations in pine and native bush
- Adequately manage forest operations
- Encourage future retirement
- Encourage change to appropriate land use in some of the steeper terrain

4 Harbour Management
- Review results of second vegetation survey
- Examine areas of concern / vegetation encroachment

- Look at appropriate management of vegetation in hot spots ie salt water paspalum
- Mangroves
  - Collate community's concerns on mangroves
  - Encourage community group to look at applying for seedling removal consent to hold the line

Proposed Works and Cost Estimates

1. Upper Waahitapu Stream

a) from forestry to campground

- weed spray and removal $6,000
- fencing tributaries (2 hectares) $3,000
- digger work – 3 days $3,000
- fencing main Waahitapu through $4,000
- agri / forestry area – 1.5 km
- self seeding pine removal $12,000
- riparian planting $dependant on L/O up to $50,000

b) camp ground to estuary

- Weed control $1,000
- riparian planting $15,000
- Saltwater paspalum control $?
- Digger time $1,000

2. Harbour Fringe – Opoutere Settlement to Bridson's)

- Weed control $2,000
- Fencing $2,500

3. Tawatawa Stream

- Weed control (minor) $1,000
- Infill planting $15,000
- Fencing (upstream) $?

(Identified in Clean Streams Application)

4. Rangipo Channel

a) Above main highway

- fencing $7,000
- weed control $1,000
- planting $?

b) Below main highway

- Fencing $3,500
- Wetland retirement $?

Riparian Enhancement

Planting @ 1.5m spacing except for sedges (@1m spacings)

- Cost of plants $3.50 each
- Labour to plant, site prep + 2
- Weed release $1.50 each

Wahitapu

- Plants (2500 x 3.5 $17,500
- Labour (5000 x 1.5) $7,500

Harbour Fringe

- Plants (2500 x 3.5) $8,750
- Labour (2500 x 1.5) $3,750

Tawatawa

- Plants (1000 x 3.5) $3,500
- Labour (1000 x 1.5) $1,500

Rangipo Channel
(in wetland channel)

- Plants (12000 x 3.5) $42,000
- Labour (12000 x 1.5) $18,000

Additional planting (wetland potential)
(ie Peter Dixon, below SH bridge))

- Plants (3000 @ $3.5) $10,500
- Labour $4500

Main Wharekawa Channel (as identified in separate report)

- Plant (2500 @ $3.50) $8,750
- Labour $3,750

Land Management & Protection

Fencing $40,000

Animal pest control

- allow to treat in aerial 1080 @ $26.00 per hectare – 6000 hectares $156,000
- bait stations @ $54.00 per hectare – 3000 hectares $162,000

Total $318,000

Weed Control **$40,000**

Total estimated Cost for Land Management Protection	$330,000.00
Total estimated cost for riparian Enhancement	$174,000.00
River and Flood Management	$139,000.00
Minor digger works (includes supervision by EW staff)	